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# ATTACHMENTS

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## **Development and Infrastructure Services Committee Meeting**

**10 February 2021**

6.00pm

City of Albany Council Chambers

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City of Albany  
Planning Scheme No. 1  
Scheme Amendment 35

September 2020

**PLANNING AND DEVELOPMENT ACT 2005**

**RESOLUTION TO ADOPT AMENDMENT TO LOCAL PLANNING SCHEME**

**CITY OF ALBANY**

**LOCAL PLANNING SCHEME NO. 1**

**AMENDMENT NO. 35**

Resolved that the local government pursuant to section 75 of the *Planning and Development Act 2005*, amend the above Local Planning Scheme by

- a) Rezoning Lot 5780 Down Road South, Drome, from 'Priority Agriculture' zone to 'Special Use – SU26' zone;
- b) Adding the following text to Schedule 4:

No.	Description of Land	Special Use	Conditions
SU26	Lot 5780 Down Road South, Drome	Motorsport based recreation and incidental uses	<ol style="list-style-type: none"> <li>1. All development requires the development approval of the local government.</li> <li>2. Applications for development approval shall be advertised in accordance with clause 64 of the deemed provisions.</li> <li>3. All use and development is to be in accordance with the Regional Motorsports Park Precinct Plan and approved management plans.</li> <li>4. Any application for development approval for the site shall be accompanied by an Environmental Management Plan for the site that addresses:                             <ul style="list-style-type: none"> <li>(a) Noise Management Plan for construction and operation of the site, and which includes but is not limited to:                                     <ul style="list-style-type: none"> <li>(i) Limitations on hours of operation as follows:   <ul style="list-style-type: none"> <li>• Sundays: 9 am – 6 pm;</li> <li>• Monday – Saturday: 8 am – 6 pm.</li> </ul> </li> <li>(ii) Events not occurring on both the multi-use track and the motocross track at the same time;</li> <li>(iii) Frequent/ongoing monitoring and reporting on noise emissions; and</li> </ul> </li> </ul> </li> </ol>

## REPORT ITEM DIS245 REFERS

			<p>(iv) Provide notification of events to stakeholders / landholders.</p> <p>(b) Water Management Plan for construction and operation of the site.</p> <p>(c) Hydrocarbon Management Plan for operation of the site.</p> <p>(d) Waste Management Plan for construction and operation of the site.</p> <p>(e) Dust Management Plan for construction and operation of the site.</p> <p>(f) Acid Sulfate Soils (ASS) risk.</p> <p>(g) Protected Exclusion Zone Management Plan addressing management responsibilities, revegetation, and vegetation condition and wetland water quality monitoring.</p> <p>(h) Decommissioning Plan.</p> <p>(i) Construction Management Plan.</p> <p>5. Any application for development approval for the site shall be accompanied by a visual impact assessment to determine the appropriate physical treatments to mitigate visual impact to Lot 5781 Down Road South, Drome.</p> <p>6. Development shall be in accordance with an approved Bushfire Management Plan that has been implemented to the satisfaction of the Local Government, Department of Planning, Lands and Heritage, and the Department of Fire and Emergency Services.</p> <p>7. Any application for development approval for the site shall be accompanied by a Traffic and Parking Management Plan for construction and operation of the site, including consideration of peak parking and traffic management during larger and special events (i.e. events attracting greater than 500 attendees).</p>
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c) Adding the following precinct plan to Schedule 4:

Down Rd



**Legend**

**Precinct Areas**

- 4WD & ATV Training Area
- Development Exclusion Buffer (50m) (Low fuel)
- Emergency Muster Area
- Motorcross Track Area
- Multi-use Track
- Protected Exclusion Zone
- Albany Motorsports Precinct
- Lot 5780 Down Road South
- Physical treatment required to mitigate visual impact
- Area subleased by Plantation Energy Australia
- Marbellup Flats - CCW
- Cadastre

<p>Paper Size ISO A4</p> <p>0 50 100 150 200</p> <p>Meters</p> <p>Map Projection: Transverse Mercator Horizontal Datum: GDA 1994 Grid: GDA 1994 MGA Zone 50</p>	<p><b>City of Albany</b> <b>Regional Motorsports Facility</b> <b>Lot 5780 Down Road South, Drome</b></p> <p><b>PRECINCT PLAN</b></p>	<p>Project No. 61-37331 Revision No. <b>3</b> Date <b>22/09/2020</b></p>
<p><small>Data source: GHD: Lot 5780 Down Road South, Albany Motorsports Precinct 20190503, Precinct Areas 20190412, Area subleased by Plantation Energy 20190503, Physical treatments 20190412; Landgate: Aerial - WAnow, Cadastre 20180709; DBCA: South Coast Significant Wetlands. Created by: v.davies</small></p>		



## REPORT ITEM DIS245 REFERS

- d) Amending the Scheme Map accordingly.
  
- e) The amendment is considered to be a complex amendment for the following reasons:
  - (i) it is not consistent with the endorsed local planning strategy for the scheme;
  - (ii) it is of a scale and nature that may have an impact on the amenity of the locality and environs; and
  - (iii) it may result in some environmental or social impacts on land within the Scheme area,

Dated this 28<sup>th</sup> day of JULY 2020

CHIEF EXECUTIVE OFFICER

## Proposal to Amend a Town Planning Scheme

- |                                   |  |
|-----------------------------------|--|
| <b>1. Local Authority:</b>        | City of Albany   |
| <b>2. Description of Scheme:</b>  | Local Planning Scheme No. 1  |
| <b>3. Type of Scheme</b>          | District Zoning Scheme   |
| <b>4. Serial No. of Amendment</b> | 35   |
| <b>5. Amendment Type</b>          | Complex  |
| <b>6. Proposal</b>                | Rezone Lot 5780 Down Road South, Drome from 'Priority Agriculture' zone to 'Special Use – SU26' zone and add text and a precinct plan to Schedule 4. |





City of Albany  
Local Planning Scheme No. 1  
Scheme Amendment 35  
Scheme Amendment Report

September 2020

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# Appendices

Appendix A – References

Appendix B – Precinct Plan and Concept Plan (August 2020)

Appendix C – Proposed amendment to City of Albany Local Planning Scheme No. 1

Appendix D – Certificate of Title

Appendix E – Albany Motorsport Park – Site Feasibility Study (Oct. 2018)

Appendix F – Flora and Fauna Survey (Feb. 2019)

Appendix G – Bushfire Management Plan (May 2019)

Appendix H – Noise Assessment Report (September 2020)

Appendix I – Agricultural Land Capability Assessment (Mar. 2019)

Appendix J – Local Water Management Strategy (Jan. 2020)

# 1. Executive summary

Participation in motorsports is a popular recreational activity for many Australians. In Albany and the surrounding areas, motorsport is already known to be popular, with several well organised clubs, a national-level venue for speedway, a state-level venue for go-karts and widely recognised events such as the Albany Classic, Show 'n Shine and Race Wars. However, some motorsport disciplines, particularly motocross, lack suitable facilities in the region.

In 2016, the City of Albany undertook a demand study into the need for a multi-use motorsports facility that demonstrated a strong need and desire for such a facility in the region. The draft *WA Motorsport Strategy (WAMS)* (DLGSCI, 2018) identified the proposed site as a regional level facility also serving local need. The strategy further recommended detailed planning and feasibility of developing the motorsports facility be undertaken.

Recognising the interest in motorsports in the Great Southern, the Western Australian Government has committed \$250,000 to undertake preliminary planning for a regional motorsports facility (Watson, 2018) and a further commitment of \$5.75 million in the 2020/21 forward estimates (GoWA, 2018) for its development.

A technical site feasibility study (GHD, 2018) was recently prepared for the City of Albany, in collaboration with the Department of Local Government, Sport and Cultural Industries (DLGSCI), to facilitate development of a multi-use regional motorsports facility. A scheme amendment is proposed now for Lot 5780 Down Road South, Drome (the site) to provide the necessary land use planning framework to enable development of a suitable regional motorsports facility to meet regional and local demand and fulfil State Government commitments in the short to medium term.

In preparing the scheme amendment, GHD has engaged closely with relevant agencies on behalf of the City to discuss the merit of the proposal and requirements for lodgement of the scheme amendment.

The purpose of this report is to discuss the scheme amendment and key considerations for the site and its proposed role within the Albany area and broader Great Southern Region within a planning context.

## 1.1 Proposal

This amendment proposes to rezone Lot 5780 Down Road South, Drome from *Priority Agriculture* to *Special Use – SU26* with appropriate land use and development provisions proposed to be included in Schedule 4 of the LPS1 to guide future development.

## 1.2 Planning merit

The State Government through dedicated funding and in State strategic documents, including the WAMS, has recognised the need for a regional motorsports facility in the Great Southern region and specifically at Down Road. This amendment is proposed to facilitate a land-use planning pathway for the development of Lot 5780 Down Road South, Drome as a regional motorsports facility.

The proposed amendment has planning merit for the following reasons:

- The proposal will achieve key objectives of the local planning strategy related to tourism and community infrastructure. Specifically, enabling diversification of the City's competitive advantages in tourism by providing a regional scale motorsports facility. The development has the potential to not only provide a formalised space for existing

## REPORT ITEM DIS245 REFERS

motorsport participants, but also to tap into latent demand and enable alternative businesses to establish on site to support the economic growth of Albany and the region.

- The proposal will meet currently unmet demand for motorsports facilities and support State Government strategic recommendations for establishment of a facility in the Great Southern region.
- The proposal is located to align with broader strategic intent of the City to protect urban and infill areas from inappropriate land uses and reduce land use conflict by siting the proposed activity in close proximity to an industrial area within an existing noise buffer.
- The proposal will facilitate productive use of the land for economic purposes. The land is currently zoned for agricultural priority activities however, findings of a site-specific land capability evaluation concluded that the removal of the *Priority Agriculture* zoning from the land is considered to have no significant effect on agricultural land protection objectives under the State and local planning framework. This presents an opportunity to develop the land for a use with higher economic value that brings benefit to the City, local communities and the broader region.

## 2. Introduction

### 2.1 Site details

The land subject to this amendment comprises Lot 5780 Down Road South (the site) in the locality of Drome, 20 kilometres north of the Albany town centre. The site is bounded by Down Road West to the north, Down Road South to the east, Lot 5781 Down Road South to the south (privately owned) and a local road reserve and the Avon-Albany rail reserve to the west. The site is located adjacent to the Mirambeena Timber Processing Precinct and sits within the industrial buffer area.

The regional context of the site and its location is shown in Figure 1.

A pending Mining Tenement held by Australia Silica Quartz Pty Ltd falls over a large portion of the site. The Mining Tenement status is classified as 'unsurveyed'. The site is 192.34 ha in area, approximately 52 ha of which is covered in well-established vegetation, which is proposed to be retained.

### 2.2 Existing land use

The site is currently being used for livestock grazing, sand extraction, wood chip storage and a drainage basin associated with the nearby operations of Plantation Energy Australia Pty Ltd.

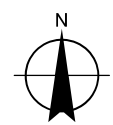
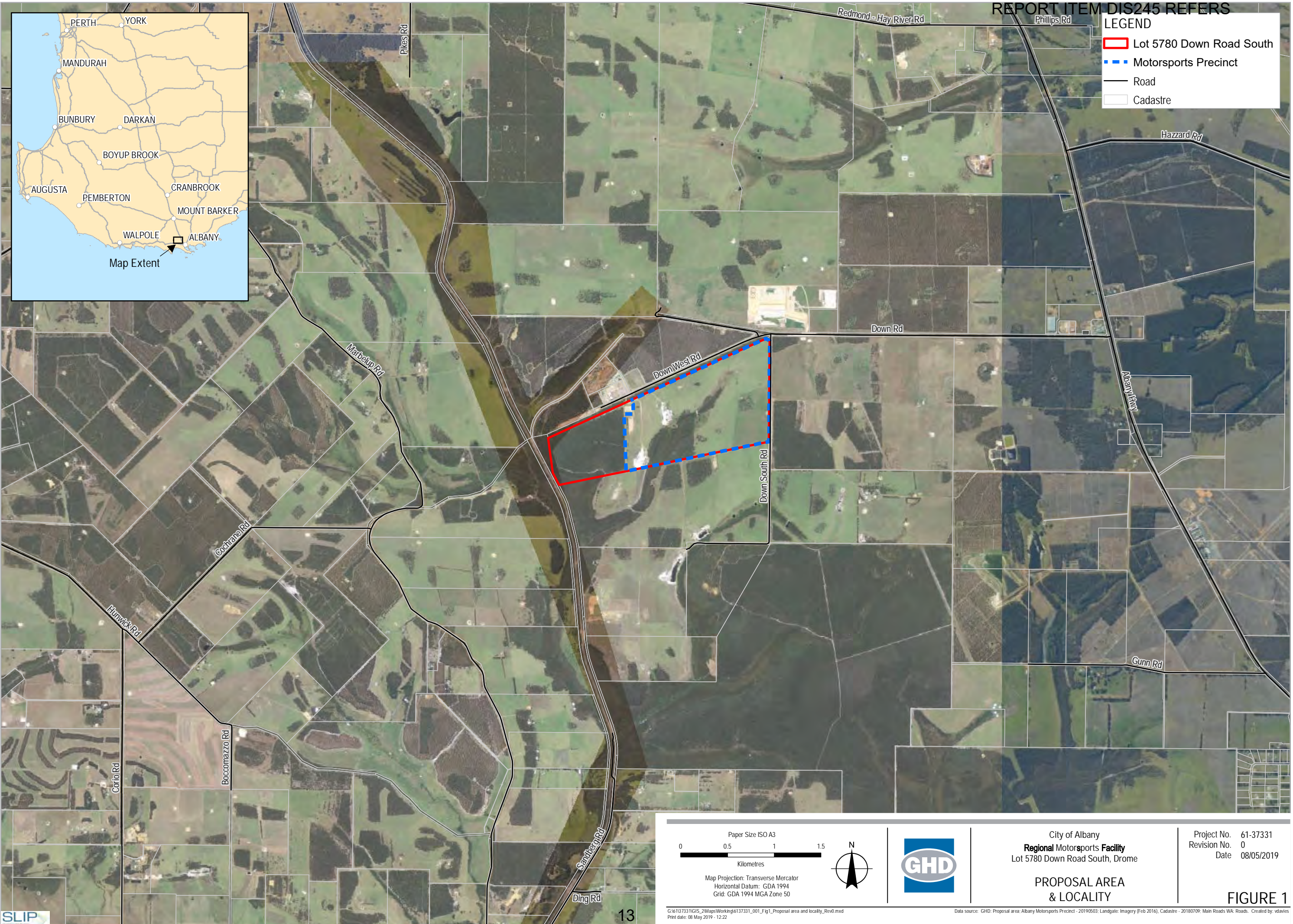
### 2.3 Proponent and land ownership

The Great Southern Motorplex Group Inc. (GSMG), in partnership with the City of Albany, intends to develop the site as a regional motorsports facility. In October 2018, the City of Albany Council resolved to purchase the site. Settlement of the land purchase was concluded in 2019.

A copy of the Certificate of Title is provided in Appendix D.

**LEGEND**

- Lot 5780 Down Road South
- Motorsports Precinct
- Road
- Cadastre



City of Albany  
**Regional Motorsports Facility**  
 Lot 5780 Down Road South, Drome

Project No. 61-37331  
 Revision No. 0  
 Date 08/05/2019

**PROPOSAL AREA  
 & LOCALITY**

**FIGURE 1**

## 2.4 Amendment rationale

### **The proposal will meet currently unmet demand for motorsports facilities in the Great Southern Region**

The State Government through dedicated funding and in State strategic documents, including the WAMS, has recognised the need for a motorsports facility in the Great Southern region and specifically at Down Road. This amendment is proposed to facilitate a land-use planning pathway for the development of Lot 5780 Down Road South, Drome as a regional motorsports facility.

The motorsports facility is identified in the WAMS as a regional level site and will facilitate tourism and broader participation in motorsports in the region. The City of Albany has identified tourism as a key competitive advantage for the City. The closure of the Albany Motorcycle Club's facilities at Roberts Road in 2011 has meant that motocross and enduro motorcycle riders currently lack a permanent formalised facility to pursue their sport in the lower Great Southern region. The project has the potential to not only provide a formalised space for existing motorsport participants, but also to tap into latent demand and enable alternative businesses to establish on site, such as commercial driver training and component testing. Findings of the *Motor Sport in the Lower Great Southern – Feasibility Study* (2016), prepared by GHD for the City of Albany in collaboration with the Department of Local Government, Sport and Cultural Industries, reinforced the potential of the motorsports facility to directly support the City in achieving its objective of diversification through tourism:

- Direct value added (DVA) of motorsports in the region could grow from \$3.3 million currently to \$3.7 million over 10 years. This is a small percentage (<1%) of Gross Regional Product and total household expenditure on “recreation and culture”.
- Total expenditure by local motorsport participants could be expected to grow through increased participation rates and increased rates of expenditure. This could grow from an estimated \$5.6 – \$8.8 million currently, to \$12.0 – \$15.0 million in 10 years. Motorsport participants in the Lower Great Southern study area spend \$7,000 – \$11,000 per year on their sport (compared to a national average of \$12,000 - \$15,000 per year).
- There is presently insufficient information to estimate the potential boost caused by a motorsports facility to the Study Area's \$90 million tourism industry. However, data suggests that sports-related tourists spend up to 30 percent more than typical 'holiday' tourists.

### **The proposal is located to mitigate land use conflict and encroachment of incompatible uses**

The preliminary studies undertaken as part of the land-use planning for a motorsports facility included a regional and site-specific feasibility study to determine a suitable location for the project. The feasibility studies took a holistic approach, considering environmental, planning, social, economic and strategic factors to assess the potential location for the motorsports facility. The current proposed location aligns with broader strategic intent of the City to support consolidation of serviced urban and infill areas from inappropriate land uses and reduce development conflicts by siting the proposed activity in close proximity to an existing industrial area within existing noise buffer contours. This scheme amendment application will assist in the development of a regional motorsports facility in an appropriate location that minimises land use conflict and encroachment of incompatible land uses on urban areas.



### **The proposal will facilitate productive use of the land for economic purposes**

While the site is currently zoned *Priority Agriculture*, and recognising the need to protect suitable land for agricultural activities, the land capability assessment undertaken as part of the preliminary planning for the site found the land is not unique in terms of the nature of its soils and landforms. The assessment concluded that the removal of the *Priority Agriculture* zoning from the land is considered to have no significant effect on agricultural land protection objectives under SPP 2.5 and LPS1.

The imperative for the land to remain zoned *Priority Agriculture* is therefore removed, representing an opportunity to develop the land for a use with higher economic value that brings benefit to the City, local communities and the broader region.

### 3. Strategic and statutory framework

#### 3.1 State planning context

##### 3.1.1 State Planning Policies

A summary of the proposed amendment against State Government strategic policy is provided in the table below.

Table 1: Relevant State strategic policy documents

Document	Summary	Assessment
SPP 2.0 Environment and natural resources policy	Overarching policy ensuring integration with environment and natural resource management with broader land use planning and decision-making. The policy sets out general measures for protection of the natural environment, supplemented by detailed policies for specific natural resource matters.	<p>The site accommodates a significant portion of remnant vegetation. In addition, environmentally sensitive areas, conservation significant flora and fauna and water resources have been identified within and surrounding the site.</p> <p>The proposal will be referred to the EPA under Sections 48A and 38 of the EP Act to ensure appropriate environmental conditions are identified for the protection of environmental assets on site.</p> <p>A flora and fauna survey was undertaken for the site. The survey did not identify any unacceptable impacts based on the proposed concept for the site. Findings of the survey, as well as recommendations, are discussed in section 6.2.4.</p>
SPP 2.5 Rural Planning	<p>Protects and preserves rural land assets, including land zoned for agricultural purposes, as well as ensuring broad compatibility between land uses. The policy applies where an amendment to a local planning scheme is proposed.</p> <p>The policy notes regional facilities including sporting venues should not be visually dominant and should be visually compatible with surrounding land uses.</p>	<p>The site is currently zoned <i>Priority Agriculture</i>.</p> <p>The site is adjacent to the Mirambeena Strategic Industrial Area with no sensitive land uses in close proximity. It is therefore not expected that the use of the site for motorsports will have a significant visual impact. Nevertheless, the proposed amendment includes provisions for development on the site to address any potential visual impact concerns once the final layout of the site is confirmed.</p> <p>The City of Albany commissioned a land capability assessment (Appendix I) to evaluate the site-specific capability of Lot 5780 for agricultural uses and to determine the uniqueness or otherwise of the site. The assessment concluded that the site is not unique in terms of the nature of its soils and landforms and the removal of the <i>Priority Agriculture</i> zoning</p>

## REPORT ITEM DIS245 REFERS

Document	Summary	Assessment
		<p>from the land is considered to have no significant effect on agricultural land protection objectives under SPP 2.5. See section 6.2.3 for further information.</p>
<p>SPP 2.7 Public drinking water source</p>	<p>Ensures land use and development within identified public drinking water source areas (PDWSA) is compatible with the protection and long-term management of water resources for public water supply.</p>	<p>The site is located within a Priority 2 (P2) PDWSA within the Marbelup Brook Catchment Area. P2 areas are delineated to ensure no increased risk of pollution to the water source.</p> <p>The PDWSA is gazetted under the <i>Country Areas Water Supply Act 1947</i>. While not currently in use, the PDWSA is identified as a potential future water source option in the <i>Great Southern Regional Water Supply Strategy 2014</i>.</p> <p>The PDWSA is reflected in LPS1 as a PDWSA Special Control Area.</p> <p>Section 6.2.7 summarises the findings of the preliminary water management strategy. The strategy demonstrates that there are acceptable solutions for management of stormwater and wastewater to manage any adverse impacts on the PDWSA that would make development incompatible with the policy objective.</p>
<p>SPP 2.9 Water resources</p>	<p>Identifies measures to protect and manage water resources.</p>	<p>The site encompasses several water resources including proclaimed groundwater areas and a Conservation class wetland (Marbelup Flats).</p> <p>Section 6.2.5 summarises the findings of the preliminary water management strategy prepared as part of this amendment. The strategy demonstrates that there are acceptable solutions for management of water quality and quantity to meet the objectives of SPP 2.7.</p> <p>Further investigation and detailed design will be required at development stage, likely through a site-specific water management strategy (including targeted engineering controls).</p>

## REPORT ITEM DIS245 REFERS

Document	Summary	Assessment
SPP 3.7 Planning in bushfire prone areas	Directs how land use should address bushfire risk management through implementation of risk-based land use planning.	<p>The site is within a designated bushfire prone area. As a regional attraction, the site is both a 'vulnerable' and 'high-risk' land use as well as a potential place of refuge in fire emergencies.</p> <p>A Bushfire Management Plan (BMP) including emergency evacuation plan has been prepared for the site and is discussed further in section 6.2.2.</p> <p>The BMP provides sufficient evidence that the rezoning proposal has, or can be made to have, a low to moderate bushfire hazard. The BMP further includes a Bushfire Emergency Evacuation Plan and identifies a preferred Emergency Access Way.</p>
SPP 4.1 State industrial interface	<p>Establishes a consistent approach to the securing of buffer areas to protect the certain uses from encroachment of incompatible land uses and provide safety and amenity of surrounding land uses.</p> <p>Draft SPP 4.1 Industrial Interface was released in November 2017 to update policy measures and provide greater clarity on implementation.</p>	<p>A noise assessment including draft noise management plan has been prepared to support the scheme amendment. Outcomes of the assessment are discussed in section 6.2.4.</p> <p>The noise assessment report concluded that for construction works, if carried out according to relevant Australian standards will have minimal impact, and vibrations are unlikely to be an issue.</p> <p>The report further identified the need for a noise management plan during operation of the site as a regional motorsports facility to manage noise where it exceeds the assigned levels.</p>
Draft government sewerage policy	Requires provision of reticulated sewerage to all new subdivision and development unless exempt under the policy and provides guidance where reticulated sewerage cannot be achieved.	<p>Wastewater management will require on-site solutions due to lack of existing or potential connections to the Albany sewerage scheme. The site is defined under the draft policy as a sewage sensitive area, with the majority of the site being within 1 km of a significant wetland (Marbelup Flats).</p> <p>The preliminary water management strategy has identified a potential wastewater management strategy that meets the requirements of the draft policy, as discussed in section 6.2.7.</p>

3.1.2 State Planning Strategies

**Lower Great Southern Strategy 2016**

Released in 2016, the Lower Great Southern Strategy will guide land use planning for the region over the next twenty years. The proposed scheme amendment has considered and responded to relevant actions identified in the strategy, as identified below. Primarily, and in accordance with a key action for the City of Albany recognised in the strategy, the amendment will facilitate the development of a site for future regional private recreational facilities (e.g. motorsports).

Table 2: Responses to Lower Great Southern Strategy 2016

Objective/Action	Response
<p><b>Priority agriculture</b></p> <ul style="list-style-type: none"> <li>- When preparing local planning schemes or amendments, local government to have regard to the extent of saline land when determining the best use of the land</li> </ul>	<p>The City of Albany commissioned a land capability assessment (Appendix I) to evaluate the site-specific capability of Lot 5780 for agricultural uses and to determine the uniqueness or otherwise of the site. The assessment concluded that removal of the <i>Priority Agriculture</i> zoning from the land is considered to have no significant effect on agricultural land protection objectives.</p> <p>One finding based on a 2018 report prepared by GHD noted that groundwater salinity in the local area is in the range of 500 – 1000 mg/L which is considered to be marginal for productive uses. See section 6.2.3 for further discussion of the site’s agricultural capability.</p>
<p><b>Bushfire management</b></p> <ul style="list-style-type: none"> <li>- Planning proposals including rezoning, structure planning, subdivision and development to incorporate bushfire assessment and management measures as required by WAPC’s policy framework</li> </ul>	<p>A BMP was prepared to support the proposed rezoning of Lot 5780 Down Road, Drome in accordance with SPP 3.7, the Guidelines for Planning in Bushfire Prone Areas as well as relevant Australian Standards to ensure relevant bushfire hazards were considered and can be managed.</p>

**Western Australian Motorsport Strategy**

The Western Australian Motorsport Strategy (WAMS) was released in August 2019 and identifies infrastructure needs of road/track based motorsport activities throughout the state. The proposed Down Road site is identified in the WAMS as a proposed regional level facility. The WAMS recommends the development of a land-use policy framework to support the development of motorsport within WA, including exploration of the development of a regional motorsports facility at Down Road, Albany noting the potential issues relating to the PDWSA and existing environmental assets. This amendment will facilitate the development of the site as a regional motorsports facility through application of relevant land use planning tools.

The WAMS further recommends water monitoring and development of an environmental management plan to ensure long-term management, protection and enhancement of the natural environment within the site. The proposed amendment sets out provisions under the *Special Use* zone requiring development of an environmental management plan and local water management strategy.

### 3.2 Local planning context

#### City of Albany Local Planning Scheme No. 1

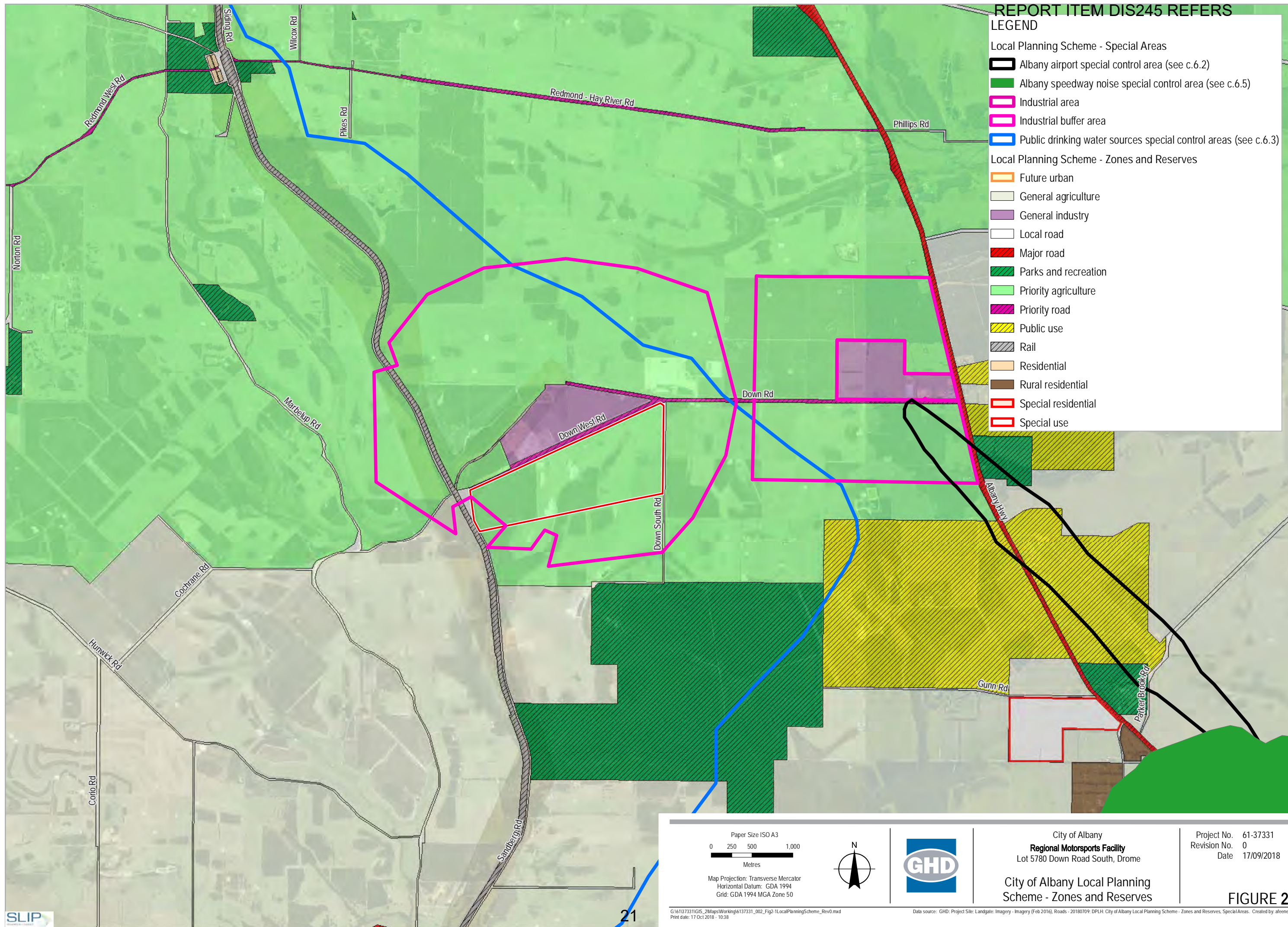
The site is zoned *Priority Agriculture* under LPS1. A motorsports facility is a use not listed in the LPS1 Zoning Table (Table 1). Under the existing *Priority Agriculture* zone, a motorsports facility would not be considered consistent with the objectives of the zone. On this basis, it is proposed to rezone the site to a *Special Use* zone, recognising that there is no zone within LPS1 that would adequately facilitate the development of the site for use as a regional motorsports facility.

With the exception of a small portion of land to the south-west, the site is located within an Industrial Buffer Area (IA4BA) surrounding the Mirambeena Timber Processing Precinct (TPP – i.e. Albany Plantation Export Company (APEC) and Plantation Energy) to the north of Down Road West.

Development within the buffer is controlled by additional provisions set out in Schedule 11 of LPS, including:

- All development to be generally in accordance with the Development Guide Plan as endorsed by the CEO subject to minor variations which may be approved by the Local Government.
- No dwellings or other habitable structures shall be permitted within the Industry Buffer Area designated on the Scheme Map.

The concept plan for future development of the regional motorsports facility includes club rooms and other structures that are incidental to motorsports activities. Whilst these structures would be defined as habitable structures, they are not considered incompatible with the Industrial Buffer Area as they are not for residential or accommodation uses. The structures will be used in conjunction with a noise generating activity; therefore are not noise sensitive.



**REPORT ITEM DIS245 REFERS LEGEND**

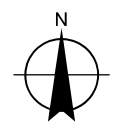
**Local Planning Scheme - Special Areas**

- Albany airport special control area (see c.6.2)
- Albany speedway noise special control area (see c.6.5)
- Industrial area
- Industrial buffer area
- Public drinking water sources special control areas (see c.6.3)

**Local Planning Scheme - Zones and Reserves**

- Future urban
- General agriculture
- General industry
- Local road
- Major road
- Parks and recreation
- Priority agriculture
- Priority road
- Public use
- Rail
- Residential
- Rural residential
- Special residential
- Special use

Paper Size ISO A3  
 0 250 500 1,000  
 Metres



City of Albany  
**Regional Motorsports Facility**  
 Lot 5780 Down Road South, Drome

Project No. 61-37331  
 Revision No. 0  
 Date 17/09/2018

Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 50

City of Albany Local Planning Scheme - Zones and Reserves

**FIGURE 2**

### 3.3 Local planning policies

#### Down Road Timber Processing Precinct

The Down Road Timber Processing Precinct seeks to protect operations and opportunities for industrial uses in the area through identification of buffer areas precluding certain development types. The policy identifies a Special Use Area 17 – Inner Area, Special Use Area 17 – Outer Area and a Down Road Timber Processing Precinct Hazard Area. Commencing on January 1, 2009 no dwelling house, permanent dwelling unit or habitable structure shall be constructed within that area of a lot identified within Special Use Zone 17 – Inner Area or the Down Road Timber Processing Precinct Hazard Risk Area. The majority of the site is located within the buffer areas.

The concept plan for future development of the regional motorsports facility includes club rooms and other structures that are incidental to motorsports activities. Whilst these structures would be defined as habitable structures, they are not considered incompatible with the Industrial Buffer Area as they are not for residential or accommodation uses. The structures will be used in conjunction with a noise generating activity; therefore are not noise sensitive.

### 3.4 City of Albany Local Planning Strategy (2019)

The City of Albany Local Planning Strategy (2019) provides the strategic justification for the proposed scheme amendment. The site is within an area identified in the Strategy as 'Investigation Area 4 – Mirambeena Strategic Industrial Expansion Area'. The purpose of the investigation area is to identify land around Mirambeena Strategic Industrial Area for industrial expansion and identifies the need to prepare a structure plan to address various matters, including the extent of the expansion area. Development of a regional motorsports facility within proximity of a strategic industrial area will not prejudice the use of surrounding land for industrial purposes.

The Local Planning Strategy also specifically identifies support for an "Albany Motorsports Park", through the provision of planning advice, land acquisition and fund sourcing, as a strategic direction under "Community Services and Facilities".

The motorsports facility is identified in the WAMS as a regional level site and will facilitate tourism and broader participation in motor sports in the region. The City of Albany has identified tourism as a key competitive advantage for the City, with an objective of the Strategy to:

- Facilitate the diversification of the City's competitive advantages in agriculture and tourism.

The regional motorsports facility will contribute to the City's unique tourism market by providing a location for regional, national and international motorsport competitions and events providing broader economic benefit to the community and Great Southern region. The proposed amendment and subsequent development of a motorsports facility will provide economic benefit through sports-related tourism, directly contributing to the City's strategic objective of diversification through tourism.



## 4. Site analysis

### 4.1 Topography, land form and soil

The surface elevation of the site ranges from approximately 41 m AHD to 73 m AHD. The lowest elevation is on the southern boundary and extends through the centre of the site within a gully (a tributary to Marbelup Brook) that lies in a north-easterly direction. The highest elevation occurs on the eastern boundary of the site.

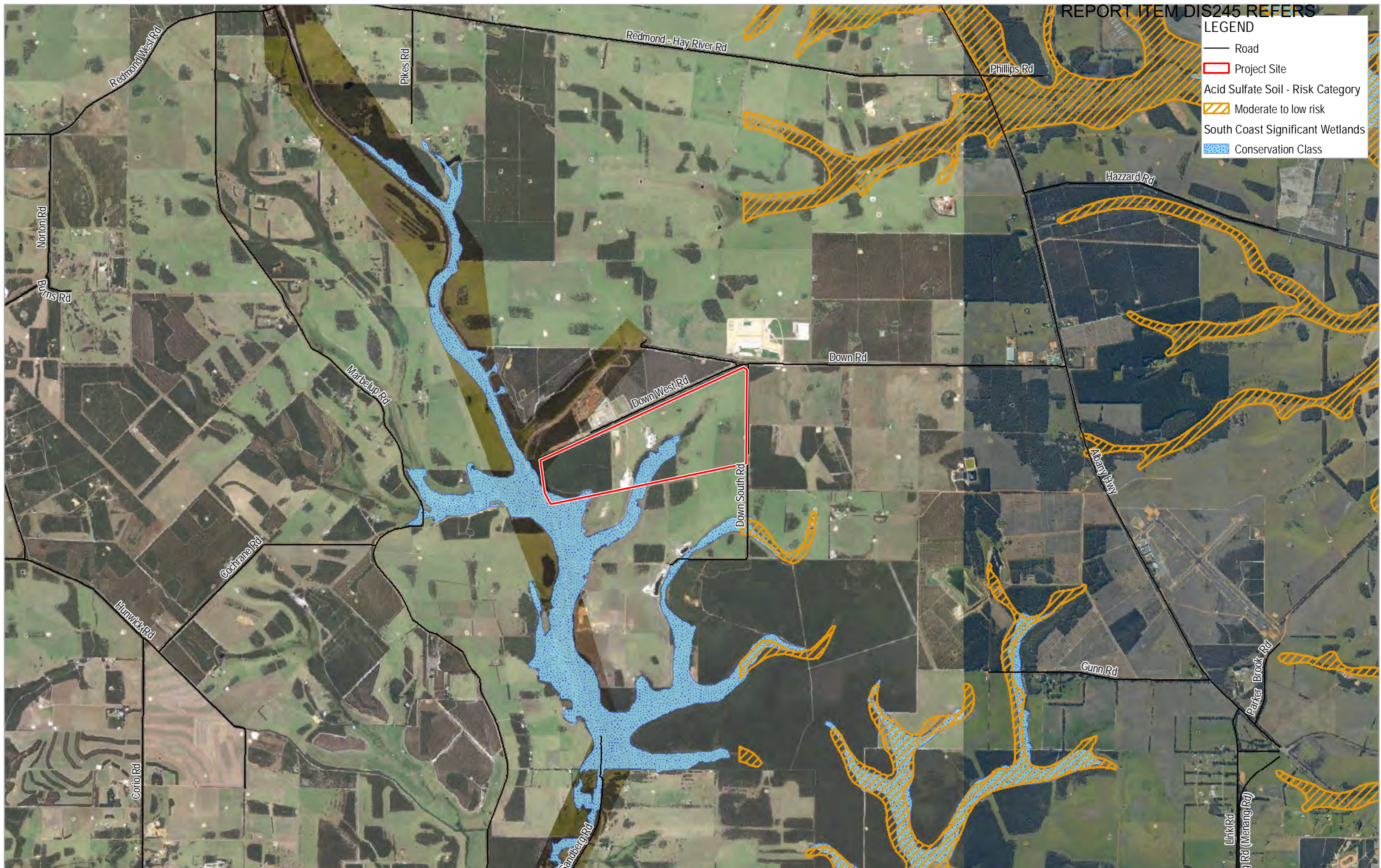
Reference to the 1:50,000 Environmental Geology series map (Albany sheet) and the 1:250,000 Geological Series map (Mt Barker – Albany sheet) indicates the Project Site is underlain by Cainozoic sand of colluvial origin – “Qc: Colluvium – Sand, silt and clay” on the slopes and within the low lying areas of the Marbelup Brook “QA – Clay, silt, sand and gravel in watercourses” (Allen & Sofoulis, 1984).

A review of the DWER Acid Sulfate Soils (ASS) risk mapping for Albany-Torbay indicates the site is located directly adjacent to the boundary of this dataset. Tributaries of Marbelup Brook located approximately 750 m to the south of the site are mapped within areas of “Moderate to Low Risk” of ASS occurring within 3 m of the natural soil surface (Figure 3).

The tributaries of Marbelup Brook within the site may also have a “Moderate to Low Risk” of ASS occurring within 3 m of the natural soil surface.

LEGEND

- Road
- ▭ Project Site
- Acid Sulfate Soil - Risk Category
- ▨ Moderate to low risk
- South Coast Significant Wetlands
- ▨ Conservation Class



<p>Paper Size ISO A3</p> <p>Kilometres</p> <p>Map Projection: Transverse Mercator Horizontal Datum: GDA 1994 Grid: GDA 1994 MGA Zone 50</p>			<p>City of Albany <b>Regional Motorsports Facility</b> Lot 5780 Down Road South, Drome</p> <p>Acid sulfate soil risk map and South Coast significant wetlands</p>	<p>Project No. 61-37331 Revision No. 0 Date 17/09/2018</p>
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FIGURE 3

## 4.2 Vegetation

### Regional biography

The site is located in the South West Botanical Province of Western Australia (Beard, 1990). The Southern Jarrah Forest IBRA subregion is characterised by “Jarrah-Marri forest on laterite gravels and, in the eastern part, by Wandoo - Marri woodlands on clayey soils. Eluvial and alluvial deposits support Agonis shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands” (Hearn, Williams, Comer, & Beecham, 2002, p. 382).

A Level 1 Flora Survey was undertaken between 31 October 2018 and 1 November 2018 by Bio Diverse Solutions using the *EPA Guidance Statement 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2016). The full Flora and Fauna Survey Report can be found in Appendix F.

### Pre-European vegetation

Broad scale pre-European vegetation mapping of the Southern Jarrah Forest IBRA Region was completed by Beard (1979) at an association level. The mapping indicates that two vegetation associations are present within the site and lie within the Albany System Association (Table 3).

Table 3: Vegetation associations within the site

Vegetation association	Vegetation description	Structure description
51	Cyperaceae, Restionaceae, Juncaceae (mainly in the South-West)	Sedgeland
978	Jarrah, banksia or casuarina Eucalyptus marginata, Banksia spp., Allocasuarina spp.	Low forest, woodland or low woodland with scattered trees

### Albany Regional Vegetation Survey

The mapping undertaken by Bio Diverse Solutions identified six vegetation type, five of which aligned with vegetation units described in the Albany Regional Vegetation Survey (ARVS) report by Sandiford and Barret (2010), as described in the table below. The ARVS provides a local and regional overview of the native vegetation within the area east, west and north of Albany. The sixth vegetation type included open paddock / agricultural land, including bare and sand extraction areas (see Figure 4).

Table 4: ARVS vegetation units within the site

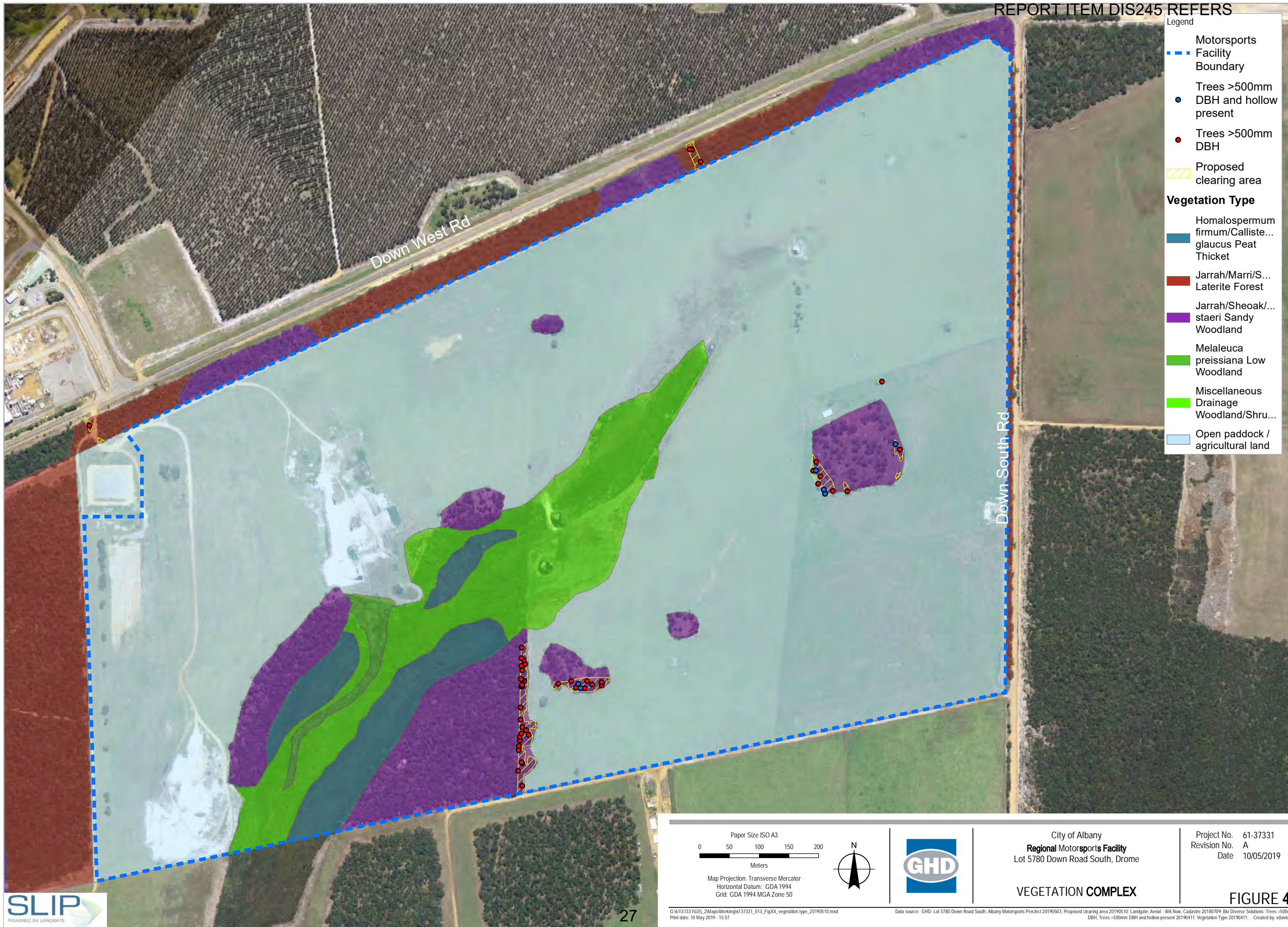
Map code	Vegetation unit	Soil type description
12	Jarrah/ Marri/ Sheoak Laterite Forest	Well drained shallow loamy/sandy soil with outcropping laterite, usually occurring on the crests and middle slopes of low relief hills and plateaus with occasional occurrences on lower slopes
13	Jarrah/ Sheoak/ <i>E. staeri</i> Sandy Woodland	Usually found on gentle middle to lower slopes on sandy soil overlying laterite
47	Homalospermum firmum/ <i>Callistemon glaucus</i> Peat Thicket	Occurs in drainage depressions below the seepage zone on dark brown peat or sandy peat that is waterlogged in winter and moist in summer

## REPORT ITEM DIS245 REFERS

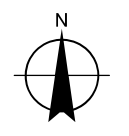
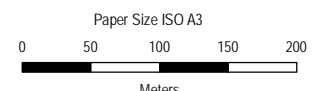
Map code	Vegetation unit	Soil type description
49	<i>Melaleuca preissiana</i> Low Woodland	Found throughout the survey area along drainage lines on dark grey sandy loam and occasionally on sandy peat soil
50	Miscellaneous Drainage Woodland/Shrubland	N/A

A search of relevant databases identified 17 Declared Rare Fauna (DRF), 41 Priority and one Presumed Extinct species as potentially being present within the site, as well as two Threatened Ecological Communities (TECs). Of the DRF and priority species potentially occurring in the area, none were found present. Based on the existing concept design (see Appendix B) the remnant vegetation areas will not be underdoing any development. The vegetation complexes identified within the survey area do not meet the key diagnostic features of the two TECs potentially occurring in the area. As there were no threatened flora of TECs identified within the survey area, there are no constraints to threatened species subject to the *Wildlife Conservation Act 1950*.

The vegetation in the creek/drainage area of the site is predominantly in Pristine and Very Good condition, based on the Keighery condition rating scale (Keighery 1994, Figure 5). To maintain the health of the creek, the survey recommends the protection of fringing vegetation. Fencing of the creek/drainage line to exclude access will enable maintenance of current vegetation conditions. The survey further concludes that adequate protection of flora can be achieved once the site is developed through the concept plan's proposed 50 m development exclusion buffer area. The survey notes that some restoration or management may be necessary to ensure weed species do not continue to encroach on the creek system and that the buffer should be extended to include the south eastern corner of the Jarrah/Marri Forest.



- Legend**
- Motorsports Facility Boundary
  - Trees >500mm DBH and hollow present
  - Trees >500mm DBH
  - Proposed clearing area
- Vegetation Type**
- Homalospermum firmum/Callisteglossum Peat Thicket
  - Jarrah/Marri/S... Laterite Forest
  - Jarrah/Sheoak/... staeri Sandy Woodland
  - Melaleuca preissiana Low Woodland
  - Miscellaneous Drainage Woodland/Shru...
  - Open paddock / agricultural land

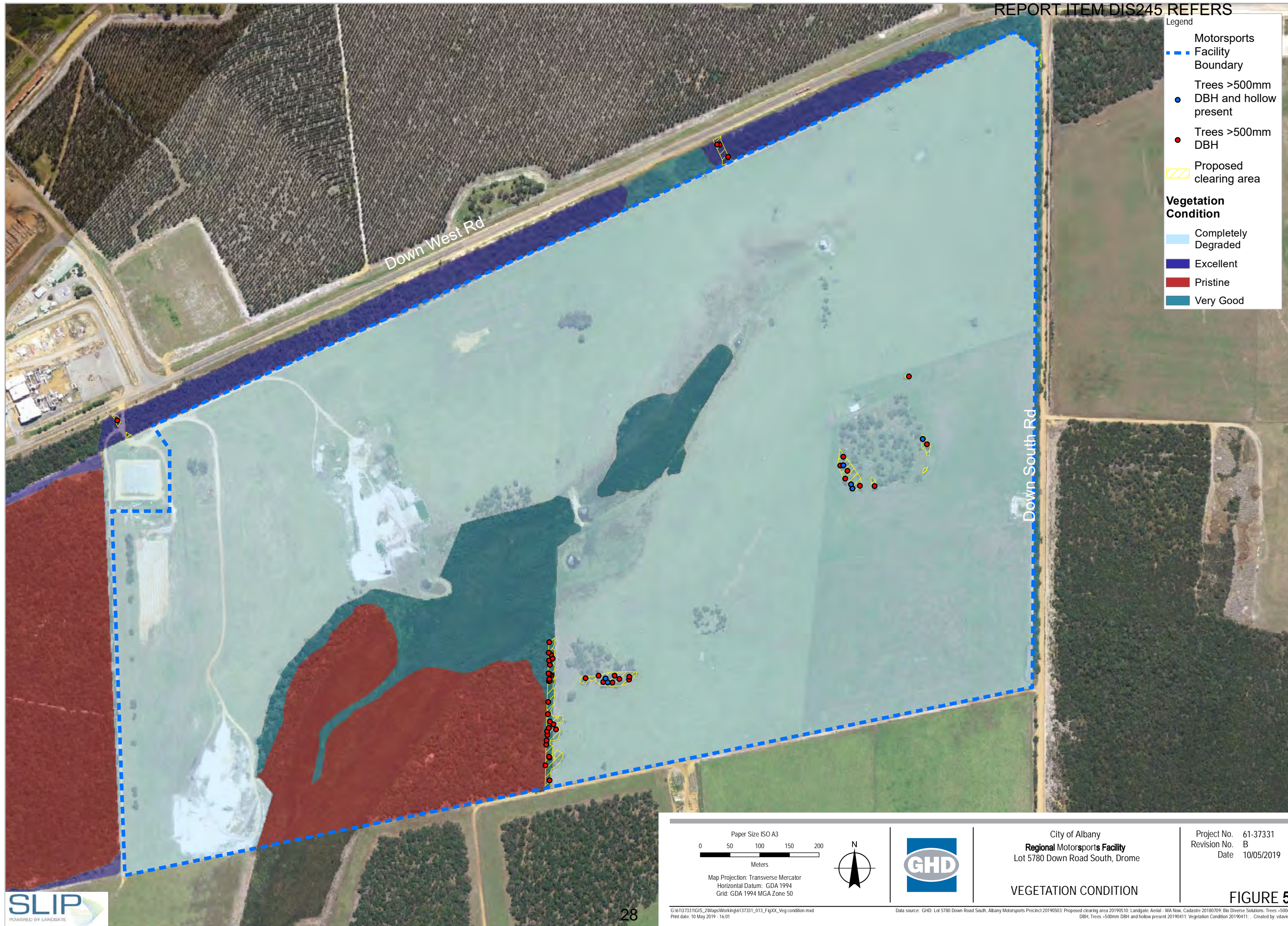


City of Albany  
**Regional Motorsports Facility**  
 Lot 5780 Down Road South, Drome

Project No. 61-37331  
 Revision No. A  
 Date 10/05/2019

**VEGETATION COMPLEX**

**FIGURE 4**

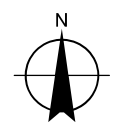
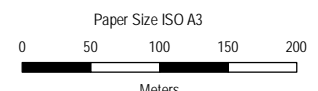


**Legend**

- Motorsports Facility Boundary
- Trees >500mm DBH and hollow present
- Trees >500mm DBH
- ▨ Proposed clearing area

**Vegetation Condition**

- Completely Degraded
- Excellent
- Pristine
- Very Good



City of Albany  
**Regional Motorsports Facility**  
 Lot 5780 Down Road South, Drome

Project No. 61-37331  
 Revision No. B  
 Date 10/05/2019

**VEGETATION CONDITION**

**FIGURE 5**

### 4.3 Fauna

A Level 1 Fauna Survey was undertaken between 29 October 2018 and 2 November 2018 by Bio Diverse Solutions using the *EPA Guidance Statement 56: Terrestrial Fauna and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2010). The full Level 1 Flora and Fauna Survey Report can be found in Appendix F. As the western remnant vegetation area is not proposed for development, significant trees within the area were not measured and mapped.

Targeted assessment was carried out for *Calyptorhynchus baudinii* (Baudin's Cockatoo), *Calyptorhynchus banksii naso* (Forest Red-tailed Black-Cockatoo), *Calyptorhynchus latirostris* (Carnaby's Cockatoo), *Dasyurus geoffreyi* (Chuditch), *Hydromys chrysogaster* (Water Rat), *Falsistrellus mackenziei* (Western False Pipistrelle), *Isoodon obesulus fusciventer* (Quenda), *Notamacropus irma* (Western Brush Wallaby), *Phascogale tapoatafa wambenger* (Brush-tailed Phascogale), *Pseudocheirus occidentalis* (Western Ringtail Possum), *Setonix brachyurus* (Quokka) and *Zephyrarchaea mainae* (Western Arachnid Spider).

Of the 40 species detected during the survey, three were introduced species: *Felis catus* (Cat), *Vulpes Vulpes* (Red Fox) and *Oryctolagus cuniculus* (Rabbit). Four of the detected species were threatened (Forest Red-tailed Black-Cockatoo, Baudin's Cockatoo, Quenda, Western Brush Wallaby). The most important habitat for these species are the creek line vegetation, surrounding remnant vegetation and the roadside vegetation along the northern site boundary. The survey notes that this provides further evidence for the need to maintain a 50 m development exclusion buffer.

Potential habitat was found for Carnaby's Black-Cockatoo, Chuditch, Water Rat, Western False Pipistrelle, Brush-tailed Phascogale, Western Ringtail Possum, Quokka, *Apus pacificus* (Fork-tailed Swift), *Falco peregrinus* (Peregrine Falcon), *Falco peregrinus subsp. macropus* (Australian Peregrine Falcon), *Tringa nebularia* (Common greenshank), *Tyto novaehollandiae subsp. novae-hollandiae* (Masked Owl (southern subsp.)), *Galaxiella munda* (Western Mud Minnow), *Galaxiella nigrostriata* (Black-stripe Minnow) and *Lepidogalaxias salamandroides* (Salamanderfish). The potential habitat areas include all remnant vegetation within the site, the creek system and the larger stands of paddock trees.

There is a high level of fauna activity within the vegetation surrounding the creek line from both threatened and non-threatened fauna species as well as the highest occurrence of significant trees containing hollows. However, as no vegetation clearing is proposed in this area, the survey concludes that the development is thought to have minimal impact.

The southern pocket of Jarrah/Marri remnant vegetation had the highest occurrences of Baudin's Cockatoo and Forest Red-tailed Black-Cockatoo feeding signs. The majority of feeding evidence consisted of *Corymbia calophylla* nuts. As the number of significant Black Cockatoo feeding sites across the survey area was relatively low this indicates that although the site contains potential foraging habitat for the three species it is marginal and not a favoured feeding area. The presence of significant feeding signs in the remnant vegetation in the south appears to indicate this area is anecdotally more attractive for food than the other vegetated areas. The survey concludes that this further strengthens the need for the proposed development exclusion buffer to be expanded to the south east to include all of the remnant vegetation surrounding the creek line.

There are several active hollows within the stand of paddock trees (located in the eastern area adjacent to the existing shed) that is currently proposed in the concept plan to be a spectator area and situated between the multi-use track and public parking. This area had a high level of bird activity, with multiple nests and hollows observed. The survey notes that clearing of trees is

not recommended and significant trees that contain active hollows or future Black Cockatoo hollows should be retained.

Under the definitions defined in the Black Cockatoo Referral Guidelines (DSEWPaC, 2012) individual trees of *Eucalyptus marginata*, *Corymbia calophylla*, *Eucalyptus staeri* and *Allocasuarina fraseriana* could be considered potential breeding, roosting and foraging trees. These guidelines also state that clearing of more than 1 ha of quality foraging habitat and clearing of a known night roost site or any clearing which may impact foraging or roosting habitat has a high likelihood of resulting in significant impacts. In such instances referral under the EPBC Act is recommended.

Overall, the remnant vegetation areas of the survey area provide high quality habitat for a range of threatened and non-threatened species. The survey recommends that areas of remnant vegetation should be retained and appropriately protected based on the high-quality habitat value they provide. Where the western area of remnant vegetation is subject to development such as passive recreational activities, targeted surveys should be undertaken of proposed alignments to guide the development of the area.

#### 4.4 Conservation areas

##### Conservation reserves

There are no DBCA Legislated Lands and Waters intercepted by the site. However, there are two sites within 5 km of the site including (DBCA 2007):

- Down Road Nature Reserve located approximately 900 m to the south, and
- Phillips Brook Nature Reserve located approximately 4.4 km to the north east.

##### Environmentally Sensitive Areas

The unnamed watercourse located within the site is a tributary of Marbelup Brook and is a Conservation Class wetland (GoWA 2018, see Figure 3). As per DWER guidance (DER 2014), a conservation category wetland is “a defined wetland and the area within 50 m of the wetland” and is declared to be an Environmentally Sensitive Area (ESA) under the *Environmental Protection Act 1986*.

There is an additional ESA located approximately 4.7 km to the north-east of the site.





Figure 6: Fauna habitat values

REPORT ITEM DIS245 REFERS



29 Hercules Crescent  
Albany, WA 6330  
Australia  
Tel: 08 9842 1575  
Fax: 08 9842 1575



Overview Map Scale 1:100,000

- Legend**
- ▭ Subject Site
  - Cadastre
  - Camera

- Fauna Indicators**
- ▲ Active Den
  - ▲ Active Fox Den
  - Baudins Cockatoo
  - ✦ Brush Wallaby
  - ▲ Brushtail Possum Scat
  - ▲ Brushtail Possum Scratchings
  - ▲ Cockatoo Hollow
  - Forest Red-Tailed BC
  - ▲ Fox Den
  - ▲ Fox Scat
  - ▲ Galah Hollow
  - ▲ Hollow
  - ▲ Possum Hollow
  - ▲ Potential Den
  - ▲ Potential den log
  - ★ Quenda
  - ▲ Rabbit
  - ▲ Unoccupied Hollow

Scale  
1:8,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
City of Albany  
PO Box 484  
Albany, WA 6331

**Fauna Habitat Values**

Assessor <b>KB &amp; BT</b>	QA Check <b>KK</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>MSC0137-002</b>	DATE <b>30/01/2019</b>

## 4.5 Hydrology and hydrogeology

### Groundwater

On a regional scale, the 250K Map Series – Hydrogeology identifies a “sedimentary aquifer within intergranular porosity – extensive aquifers, major groundwater resources” underlying the site (DoW, 2002). Groundwater salinity in the local area is in the range of 500 – 1,000 mg/L, which is considered to be marginal for productive uses (GoWA 2018).

GHD prepared a conceptual hydrogeological model to understand surface and groundwater water flows and potential linkages. The model was prepared to support the preliminary water management plan as part of the site feasibility study (GHD 2018). The outcomes of the model (see Appendix E and Appendix J) noted:

- The groundwater levels observed in the shallow bores indicate that groundwater is present in the lower lying areas nearer the creek and will be most likely be supplying the creek with groundwater inflow.
- The groundwater levels and gradient, inferred from topography, supports that groundwater discharges into the creek.
- Shallow/perched groundwater may discharge and resurface via sandier layers that sit on top of more impermeable lateritic, coffee rock or clay layers; especially when there is significant slope.
- The discharging groundwater either expresses as surface water, or migrates within the deeper more permeable deposits.

### Surface water

The site lies in the Marbelup Brook sub-catchment, which forms part of the wider Torbay Inlet Catchment in the Denmark Coast Basin within the South West Division (GoWA 2018).

The entire site and surrounds are located within the Marbelup Brook Surface Water Allocation Sub Area, which is a sub area of the Albany Coast Surface Water Allocation Area (GoWA 2018).

There is a significant upstream catchment within Lot 5780, of approximately 132 hectares, to the north and east. It is believed that these areas drain into the site via culverts along Down Road and Down Road West, particularly in larger storm events. Upstream land uses include agriculture and industrial sites with both woodlots and developed hardstand. Within the external upstream catchments is the CBH Mirambeena grain storage facility, which may have a potential impact. Within the site’s development area, the topography ranges from a maximum of 73 m AHD on the eastern boundary to a minimum of 41 m AHD in the creek line that bisects the southern boundary.

An unnamed watercourse is present within the site draining from the north-east and centre of the site to the south across the southern boundary to the Marbelup Brook which ultimately drains to Lake Powell. However, the natural drainage of the lower part of Marbelup Brook catchment has been modified which diverts the lower part of Marbelup Brook away from Lake Powell to the Torbay Inlet (DoW 2007).

During a site visit (3 July 2018) the watercourse was observed to be in a modified state, with cattle currently having access to the watercourse. Erosion was evident, particularly in the eastern extent of the watercourse. This area was also mostly devoid of native vegetation, with the exception of some sedges (*Juncus spp*). The western section of the watercourse contains native shrubs/ sedges and had a defined bed/ banks.

## 4.6 Heritage

### 4.6.1 Aboriginal heritage

A search of the Aboriginal Heritage Inquiry System found that there are no Registered Sites of Aboriginal heritage significance within the site or within a 5 km buffer of the site. There are also no sites lodged as 'Other Heritage Places' intersecting the site, however three 'Other Heritage Places' are located within 5 km of the site:

- King River (ID 4630),
- Down Road, Albany (ID 4632),
- Marbelup Brook (ID 29673).

The search of the Aboriginal Heritage Inquiry System provided the following information regarding Indigenous Land Use Agreements in the South West:

*"On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).*

*The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site" (DPLH, 2018)*

Section 5 of this report summarises consultation with DPLH regarding the ILUA and Aboriginal heritage.

### 4.6.2 Heritage (non-indigenous)

A search of the EPBC Protected Matters Search Tool did not identify any Commonwealth listed heritage sites in or within a 5 km buffer of the site.

A search of the Western Australian State Heritage Office Inherit database did not identify any State Registered Places within the site (DPLH 2018). The closest known site of heritage significance (Albany Airfield and 'Sigint' Radar System Place No 15574) was identified approximately 4.5 km from the site.

## 4.7 Infrastructure

### 4.7.1 Power

A 22 kV, three-phase overhead power line site within the property boundary, which includes an underslung overhead earth wire. This power line is part of the ALB 518.0 Mt Barker line and emanates from Albany Zone substation, located 10 km from the site. A 200 kVA pole top transformer is located on Down Road West and services the property to the north of the road. Preliminary investigation suggests the 200 kVA transformer is located too far from the proposed motorsports facility to be of use.

### 4.7.2 Communications

Telstra communication cables exist along Down Road West within P6 and P8 pits. The site is reasonably well serviced by 3G and 4G mobile phone coverage, with some loss of coverage likely to occur in the valleys of the site.

### 4.7.3 Potable water

The Water Corporation's Lower Great Southern Towns Water Supply Scheme (LGSTWSS) runs along Albany Highway, with the nearest connection point approximately 4 km to the east at 66 Down Road (fertiliser distribution warehouse) (Water Corporation 2018).

It is noted that in the initial stages of development, it would be cost prohibitive to connect to the LGSTWSS. The concept therefore proposes to service drinking water needs on the site through a combination of collected rainwater and water carts (see section 6.2.7).

### 4.7.4 Wastewater






The Water Corporation's Albany sewerage scheme is not in close proximity to the site, with the nearest connection point being at Lancaster Road, McKail (being some 10 km distant). Wastewater management will require on-site solutions and is discussed further in section 6.2.7.

## 4.8 Surrounding land uses



The immediately surrounding land uses include a railway to the west, the wood chip processing facility on the north side of Down Road and land used for agricultural purposes (stock grazing) to the south and east. The Down Road Nature Reserve is located approximately 900 metres to the south. There is a tree plantation 2,500 metres to the east and the Mirambeena Strategic Industrial area is located approximately 2,000 metres to the east on Albany Highway.

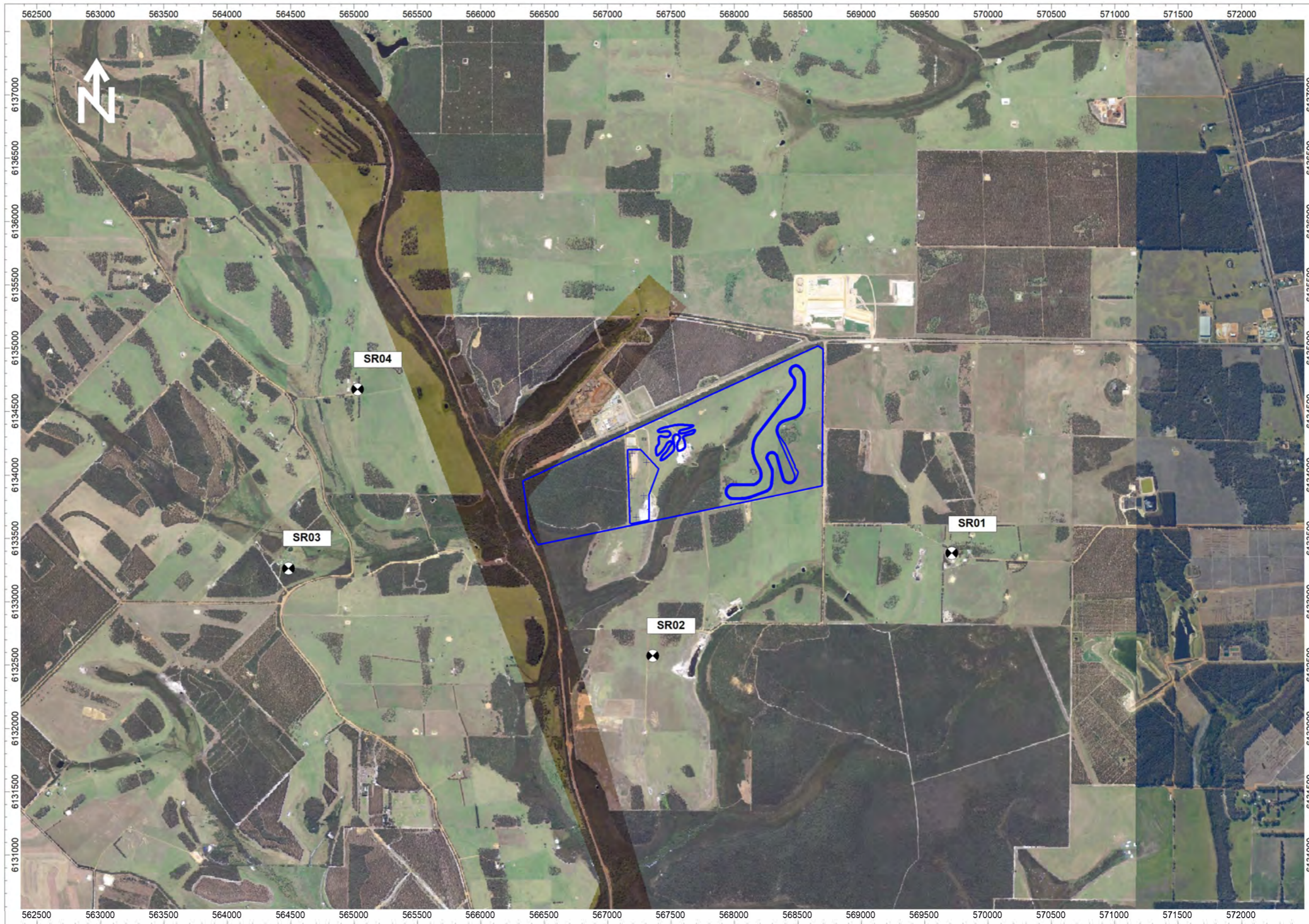
There are four residential receptors within proximity of the site (SR01, SR02, SR03 and SR04) within 2 km of the site (see Figure 7).

**PREDICTED NOISE LEVELS**

-  35 dBA
-  40 dBA
-  45 dBA
-  50 dBA
-  55 dBA
-  60 dBA
-  65 dBA
-  70 dBA
-  75 dBA
-  80 dBA
-  85 dBA
-  90 dBA

**LEGEND**

-  Noise sensitive receptor
-  Development area boundary



**SCALE**



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CREATED JF	CHECKED JF	APPROVED JF
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MAP PROJECTION: Universal Transverse Mercator  
 HORIZONTAL DATUM: Geocentric Datum of Australia (GDA)  
 GRID: Map Grid of Australia 1994, Zone 50

DATE 10.08.2020	FILE LOCATION N:\A\U\Albany WA\Projects\61137331\Technical\Noise
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REVISION 2	DRAWING NO.
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**REGIONAL MOTORSPORTS FACILITY**

**NOISE SENSITIVE RECEPTOR LOCATIONS**

**FIGURE 7**

**Noise Assessment**



CLIENTS | PEOPLE | PERFORMANCE

4.10 Traffic and access

Down Road West to the north and Down Road South to the east currently provide access to the site. Down Road is a single carriageway road that connects with Albany Highway approximately 4 km to the east. Albany Highway is a Primary Distributor Road with a speed limit of 110 km/h and can accommodate heavy vehicle traffic. Current traffic volumes for Down Road and Albany Highway are shown in the table below. A review of Main Roads WA crash analysis reporting system indicates one reported crash in 2013 at the Albany Highway/ Down Road intersection, which has since been upgraded and no crashes along Down Road in the last five-year period.

Down Road forms part of the Restricted Access Vehicle (RAV) network 7 and accommodates multi combination vehicles up to 36.5 m in length. Down Road accommodates RAVs serving the CBH grain storage facility, Plantation Energy and the APEC wood chipping facility.

Albany Highway also forms part of the RAV network 7 and accommodates multi combination vehicles up to 36.5 m in length.

Table 5: Average weekday and weekend traffic volumes (2017) - existing vehicles per day(vpd) (MRWA Traffic Map 2018)

Location	Average weekday (vpd)	Trucks	Average weekend (vpd)	Trucks
Down Road	844	34%	419	40%
Albany Highway	4,950	20%	3,520	16%

## 5. Consultation

Significant pre-lodgement consultation has been undertaken regarding this regional motorsports facility proposal, and the specific site which is the subject of this Scheme Amendment. This consultation has been led by the City of Albany, with support from GSMG and associated consultants. The record of consultation since July 2018 is shown below.

Table 6: Record of consultation

Date	Attendees	Discussion
20 July 2018	City of Albany Great Southern Motorplex Group (GSMG) Inc. Department of Local Government, Sport and Cultural Industries (DLGSCI)	<ul style="list-style-type: none"> <li>Project initiation meeting for site feasibility study</li> </ul>
17 August 2018	City of Albany GSMG Inc. DLGSCI Department of Planning, Lands and Heritage (DPLH) Department of Water and Environmental Regulation (DWER) Great Southern Development Commission (GSDC) Office of Peter Watson, MLA	<ul style="list-style-type: none"> <li>Progress update on site feasibility study</li> </ul>
20 September 2018	City of Albany Wagyl Kaip and Southern Noongar Working Party	<ul style="list-style-type: none"> <li>Briefing and presentation of proposed regional motorsports facility</li> </ul>
27 September 2018	City of Albany Councillors	<ul style="list-style-type: none"> <li>Briefing and presentation of draft <i>Site Technical Feasibility Study</i></li> </ul>
19 October 2018	City of Albany GSMG Inc. DLGSCI DPLH DWER GSDC Office of Peter Watson, MLA Water Corporation	<ul style="list-style-type: none"> <li>Presentation of final <i>Site Technical Feasibility Study</i></li> </ul>

## REPORT ITEM DIS245 REFERS

Date	Attendees	Discussion
28 November 2018	City of Albany GSMG Inc. DPLH	<ul style="list-style-type: none"> <li>Pre-lodgement consultation meeting for Scheme Amendment with DPLH (Great Southern)</li> </ul>
7 January 2019	Environmental Protection Authority (EPA)	<ul style="list-style-type: none"> <li>Pre-lodgement consultation for Scheme Amendment referral with EPA.</li> </ul>
15 February 2019	City of Albany DWER	<ul style="list-style-type: none"> <li>Feedback on preliminary site water management plan and noise modelling</li> </ul>
28 February 2019	City of Albany GSMG Inc. DLGSCI DPLH DWER GSDC Office of Peter Watson, MLA Main Roads WA Department of Biodiversity, Conservation and Attractions (DBCA) Department of Health (DoH)	<ul style="list-style-type: none"> <li>Progress update on site technical studies (specifically, bushfire management, water quality monitoring, flora &amp; fauna) and Scheme Amendment.</li> </ul>
11 April 2019	City of Albany GSMG Inc. EPA DWER DPLH	<ul style="list-style-type: none"> <li>Site visit specifically with EPA and DWER officers to discuss key environmental constraints and proposed management approaches.</li> </ul>

In addition, the City of Albany provided several Ministerial briefing notes/letters regarding the project, namely:

- Briefing note for the Hon. Dave Kelly – Minister for Water, 19 December 2017
- Briefing note for the Hon. Mick Murray – Minister for Seniors and Ageing; Volunteering; Sport and Recreation, 27 February 2018
- Letter to the Hon. Mick Murray – Minister for Seniors and Ageing; Volunteering; Sport and Recreation, 23 March 2018

In reply, the City of Albany received the following responses:

- Letter from the Hon. Peter Water MLA – Member for Albany, 17 January 2018
- Letter from the Hon. Dave Kelly – Minister for Water; Fisheries; Innovation and ICT; Science, 9 February 2018



## 6. Details of proposal

### 6.1 Proposed amendment

The proposed scheme amendment will facilitate the development of the site for a multi-use regional motorsports facility to cater for the growing needs of the Albany and Great Southern region. The approach taken to achieve this is to rezone Lot 5780 Down Road South, Drome from *Priority Agriculture* to *Special Use – SU26* under LPS1.

This amendment proposes to rezone the entire site to a *Special Use* zone under LPS1. A *Special Use* zone has been identified as the most appropriate planning mechanism for the site, as use of the site for motorsports is not a defined use and not consistent with the objectives of any other zone within LPS1. Rezoning of the site to *Special Use – SU26* will allow greater control of the development of the site to ensure appropriate consideration of environmental, interface and management issues.

Conditions for inclusion in Schedule 4 of the scheme provide a statutory framework to facilitate a management approach to use and development by prescribing the nature of management plans required, rather than specifying specific management approaches. This enables ongoing review and revision of management plans as required to incorporate contemporary benchmarks and technologies into managing environmental and amenity risks associated with the use and development of the land for a regional motorsports facility.

A Precinct Plan has been prepared to provide a spatial framework for future land use and development. This provides for the spatial implementation of key assumptions that underpin the environmental studies and management plans prepared to support the scheme amendment.

### 6.2 Future development proposal

A preliminary concept plan has been prepared to demonstrate the future development of the site for use as a regional motorsports facility, see Appendix B. The details associated with this plan are to be finalised as part of a future development application, however the plan broadly incorporates the following key elements:

1. Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with CAMS' Track Operator's Safety Guide (CAMS 2012) and Motorcycling Australia (MA) Track Guidelines (MA 2011)
  - To be licensed by CAMS for Fédération Internationalé de l'Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing)
2. A motocross circuit:
  - Designed and constructed in association with MA guidelines
3. An off-road four wheel drive (4WD) and all-terrain vehicle (ATV) training area.

#### 6.2.1 Traffic and access

A traffic investigation was undertaken as part of the site technical feasibility study, and can be viewed in section 10 of the report in Appendix E. This section summarises the traffic and access impacts of the proposed development. Table 7 below outlines the expected usage of the facility at full build out. For the purposes of sizing facilities and servicing infrastructure, a typical/frequent site attendance of 500 persons has been assumed (i.e. competitors, officials

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and spectators). For special events that anticipate a greater number of site attendees, additional management measures will need to be implemented.

The regional motorsports facility is proposed to operate within the following hours:

- Typical operation (Monday – Saturday) 8:00 am – 6:00 pm
- Typical Sunday and Public Holiday operation 9:00 am – 6:00 pm

Table 7: Indicative event profile

Use	Level	Frequency	Duration	Entrants	Spectators
Driver training, schools, manufacturer testing		Week days	Day	50	0
Car test & tune day	Club	4 week days / month	Day	30	30
Car speed events	Club	1 weekend / month	Day	100	200 – 500
Car speed events	State	1 weekend / month	Day	100 – 200	200 – 1,000
Car speed events	National	1 weekend / year	Day	200 – 300	2,000 – 5,000
Super cars events	National	1 × 3 day weekend / year	Day	200 – 300	10,000 – 20,000
Bike test and tune day	Club	4 week days / month	Day	50	50
Bike speed events	Club	1 weekend / month	Day	100	200 – 500
Bike speed events – Champions Ride Day	State	1 weekend / month	Day	100	200 – 1,000
Bike speed events	National	1 weekend / year	Day	200	1,000 – 5,000
Motocross events	Club	3 days / week training 4 single days / month	Day	100 – 200	200 – 400
Motocross events	State	1 weekend / month	Day	200 – 300	500 – 1,000
Drifting day	Club	2 days / month	Day and evening	30	30
Drifting day	State	1 weekend / month	Day and evening	50	200 – 500
Motorkhana	Club	1 day / month	Day	50	200

**Traffic**

Assuming two people per vehicle, an overall attendance of 500 people would represent 250 vehicles in and 250 vehicles per hour (vph) out of which, five percent (13) are heavy vehicles transporting competition vehicles.

Table 8: Site generated traffic (typical)

Vehicle type	In (vph)	Out (vph)
Light vehicle	237	237
Heavy vehicle	13	13
Total	250	250

A capacity assessment of Down Road using Highway Capacity software (HCS7) indicates a level of service B, assuming event and peak hour traffic movement occur at the same time.

The intersection of Albany Highway/Down Road has recently been upgraded to accommodate CBH traffic (for grain haulage) and no further upgrade is anticipated to be required for general use of the site as a regional motorsports facility. Analysis has been undertaken assuming the event exit traffic occurs at the same time as the pm peak hour of the intersection and confirms no forecast delay or congestion.

Further analysis has been undertaken assuming a one percent growth rate on Albany Highway for ten years and the results indicate all levels of service remain the same for both the am and pm peak period.

Traffic management for larger events will require careful planning and consultation with relevant stakeholders and neighbouring businesses, as well as preparation of a detailed traffic management plan.

**Access**

Two access points are proposed to serve the site from Down Road West (see Appendix B). Entry to the site would be via the eastern entry point only. The western entry point is for separate controlled access to the small dam in the north-west corner of the site.

Traffic volumes on Down Road are approximately 840 vpd, of which, approximately 34 percent are trucks (large multi combination vehicles). A left turn lane in Down Road West is recommended at the access location to minimise the impacts on large trucks using Down Road during weekday use. Austroads Guide to Road Design indicates the length of the turn lane should be 180 m at 110 km/h or 120 m if a posted speed of 80 km/h is adopted.

The current speed limit on Down Road is 110 km/h. This is considered too high in view of the likely activity associated with the proposed motorsports facility and should be reduced to a maximum of 80 km/h. Main Roads WA will need to be consulted regarding this matter. If a speed limit of 110 km/h is maintained, a review of aerial photography would indicate a suitable location for the eastern access is approximately 240 m west of Down Road North, or 150-200 m if the speed limit is reduced to 80 km/h.

**Parking**

Two car parking areas are proposed to accommodate general event demand. Based on 500 spectators/competitors, an overall provision of 250-300 bays is forecast to be required. For larger events, overspill parking areas are provided which will be controlled and managed by event staff. All parking demand is proposed to be contained on site.

### 6.2.2 Bushfire risk

The site is located in a Bushfire Prone Area (DFES 2018), and requires compliance with State Planning Policy 3.7 (SPP 3.7). The proposed scheme amendment is considered a 'Strategic Planning Proposal' under SPP 3.7 and must be accompanied by a Bushfire Hazard Level (BHL) assessment and demonstrate compliance with bushfire protection criteria in the form of a BMP. The BMP was prepared in accordance with SPP 3.7, *Guidelines for Planning in Bushfire Prone Areas* and AS 3959-2009. The BMP provides sufficient evidence that the rezoning proposal has, or can be made to have, a low to moderate bushfire hazard. The BMP provides a detailed assessment of the proposal against the WAPC *Guidelines for Planning in Bushfire Prone Areas* protection criteria.

Consultation with the DPLH and DFES confirmed that use of the site as a regional motorsports facility is deemed a 'high risk' land use, defined as land uses that may potentially ignite a bushfire, prolong its duration or increase its intensity, due to:

- Motorsport activities giving rise to risk of ignition and bushfire.
- Exposure of the community, fire fighters and environment to dangerous substances from vehicles igniting.

It is noted that although designated high risk, the controls and management procedures implemented through the BMP will reduce the risks of the facility and its status should be refined in future stages of the development approval process.

The proposed use is further defined as a 'vulnerable' land use due to:

- Large numbers of people attending the motorsports events (400-500 people club events, 10,000 people state events).
- Elderly demographic, children and mobility impaired people attending the events.
- Presence of a function centre and clubrooms.
- Site evacuation challenges associated with visitors and spectators on site.

Additional access has been identified and a Bushfire Emergency Evacuation Plan (BEEP) prepared to respond to the proposal's designation as a vulnerable use and in accordance with the *Draft Position Statement: Tourism land uses within bushfire prone areas* (WAPC 2018). The BEEP will form part of the Emergency Management Plan, to be developed by the proponents of the site prior to operations.

Four access options were investigated for secondary access/egress in a bushfire event, with the favoured option for an Emergency Access Way being a link from Down Road South to Albany Highway. Verbal in-principle agreement for the link has been sought between the landowners and Main Roads WA to enable gazettal of an easement in gross to allow for emergency access/egress in a bushfire event.

Alternative access options for the entire Mirambeena precinct will be required to be investigated as part of a broader structure planning exercise.

### 6.2.3 Agricultural land capability

Land capability is a term used to express the ability of land to support a proposed use with minimal risk of degradation to its soil and water resources. The site is zoned *Priority Agriculture* under LPS1, designating the area as land considered to be of State, regional or local significance for food production purposes. This designation is based on the site's comparative advantage in terms of soils, climate, water and access to services. The City of Albany commissioned a land capability assessment (see Appendix I) to evaluate the site-specific capability of Lot 5780 for agricultural uses and to determine the uniqueness or otherwise of the

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site. The assessment concluded that the site is not unique in terms of the nature of its soils and landforms and the removal of the Priority Agriculture zoning from the land is considered to have no significant effect on agricultural land protection objectives under SPP 2.5 and LPS1. This conclusion is based on the following findings:

- The soil and landform conditions within Lot 5780 are generally consistent with the range and variations described by the earlier, broad-scale CSIRO mapping, apart from a greater proportion of pale sands on the valley sideslopes.
- Within the existing cleared portions of the property the capability of the land to support grazing is predominantly 'fair' and consistent with the earlier assessment by DPIRD based on its broad-scale soil-landscape mapping.
- Within the existing cleared portions of the property the capability of the land to support perennial horticulture (including viticulture) is a mix of 'fair', 'fair - high' and some 'low' capability land. Whilst generally consistent with the earlier assessment by DPIRD there is a greater percentage of low capability due to the poor ability of pale sands within lower parts of the landscape to retain nutrients against losses to drainage.
- The extent of remnant vegetation (approximately 38 percent of Lot 5780) is a significant constraint to the agricultural capability of the total property.
- As shown in Figure 2, Lot 5780 occurs near the southern edge of the most extensive portion of *Priority Agriculture* zoned land, and is within an industrial buffer zone. It is also within the Marbelup Catchment PDWSA where there are land use restrictions on horticultural activity.
- The City's Local Planning Strategy (CoA 2019) indicates the intent for *Priority Agriculture* land is to protect better quality rural land for potential agricultural diversification, particularly for intensive agriculture where a suitable supply of water is available. GHD (2018) report however that groundwater salinity in the local area is in the range of 500 – 1,000 mg/L, which is considered to be marginal for productive uses.
- Lot 5780 is 192.4 ha in area and this represents just 0.23 percent of the total *Priority Agriculture* zoned land within the City of Albany.
- The lateritic uplands and minor valley sideslopes (DMc and S7h broad-scale map units) encompassed within Lot 5780 occur widely throughout the rural areas of the City of Albany and together cover 28,229 ha (or 33.7 percent) of its *Priority Agriculture* zone.

### 6.2.4 Noise

A Noise Assessment Report was prepared to support the scheme amendment and investigate noise implications for construction and use of the site as a regional motorsports facility. The report (see Appendix H) encompasses identification of sensitive receptors, desktop assessment of construction noise and noise modelling to assess predicted noise impacts during operation of the site. The report recommends noise mitigation measures for construction and operational noise sources based on the current concept plan.

Noise monitoring was used to measure existing noise levels at the site and experienced by sensitive receptors (residential dwellings) within proximity of the proposed motorsports facility. The noise monitoring indicates that there are no existing sources considered 'significantly contributing' and the noise impacts from the facility were therefore assessed in isolation.

## Construction noise modelling

Construction noise impacts were assessed based on a number of factors, including:

- The intensity and location of construction activities,
- The type of equipment used,
- Existing local noise sources,
- Intervening terrain, and
- The prevailing weather conditions.

Based on predicted plant activity noise levels, noise levels exceeding the day  $L_{A10}$  assigned level of 45 dBA are not expected to impact on the closest noise sensitive receptors, with the exception of noisy equipment with a sound power level (SPL) higher than 115 dBA (i.e. concrete saw, jack hammers, dump trucks etc.)

In line with the *Environmental Protection (Noise) Regulations 1997*, construction will be carried out in accordance with control of environmental noise practices set out in Section 6 of *Australian Standard (AS) 2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites* and equipment used will be the quietest reasonably available.

Construction activity may result in varying degrees of ground vibration depending on the equipment used and methods employed. The noise assessment report concluded that, given the distances involved between site works and the nearest receptors, vibrations affecting human comfort and building integrity are not expected to be an issue.

## Operation noise modelling

Noise modelling was undertaken using Computer Aided Noise Abatement (CadnaA) to predict the effects of noise generated by motorsport events at the site with the aim of determining the noise impact at the nearest noise sensitive receptors. The noise model was based on the concept plan for the facility as shown in Appendix B.

Results for both neutral and worst case meteorological conditions demonstrate that for some events (multi-use track and motocross), predicted noise levels for the regional motorsports facility may exceed the assigned noise levels at the nearest sensitive receptors.

Where noise levels for the facility cannot practicably comply with the assigned noise levels, Division 3 of the *Environmental Protection (Noise) Regulations 1997* allows the venue occupier to apply for a special approval to exceed assigned levels in accordance with an approved Noise Management Plan (NMP). An example NMP has been prepared as part of the noise assessment report based on the concept plan and aligning with the *Guide to Management of Noise from Motor Sport Venues* (see Appendix H). The aim of requiring the facility to operate in accordance with an NMP is to provide a mechanism to prevent further increase of events without consulting residents, and may not reduce noise levels from proposed operations.

Mitigation measures to reduce noise levels at the facility are limited, however further detailed design will consider the viability of constructing a barrier adjacent to the venue to reduce noise levels at sensitive receptors. Mitigation measures for any future residential development should align with SPP 5.4, including:

- Reducing outdoor levels by implementing 'quiet house' design measures relating to screening of outdoor areas with the residence itself (building orientation considerations) or screen walls.
- Reducing internal noise levels by implementing 'deemed to comply packages' relating to improving noise insulation of residences.

- Providing information to new residents within the development of the potential noise impacts from motorsport events (notifications on titles).

### 6.2.5 Air quality

It is anticipated that all roads and tracks proposed within the development with the exception of the motocross track will be sealed. It is therefore unlikely that the development will present any significant air quality issues relating to dust. Nevertheless, the proposed scheme amendment provides for a dust management plan prior to works, once the final layout for the regional motorsports facility has been determined and as required by the local government in consultation with DWER.

Emissions from vehicles would be quickly dispersed and not pose an issue. Any vehicle emitting excessive smoke or other emissions would be removed from competition until rectified.

### 6.2.6 Flora and fauna impacts

A Flora and Fauna Survey was undertaken in October/November 2018 to gain an understanding of the flora and fauna present on site, their significance and the potential impact of the proposed development. Findings of the flora and fauna survey note that as the wetland and surrounding vegetation are to be protected through a 50 m development exclusion buffer and the majority of remnant vegetation will be retained, the development will not have an unacceptable impact on flora and fauna within the site. The survey recommends the following:

#### Flora

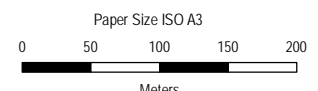
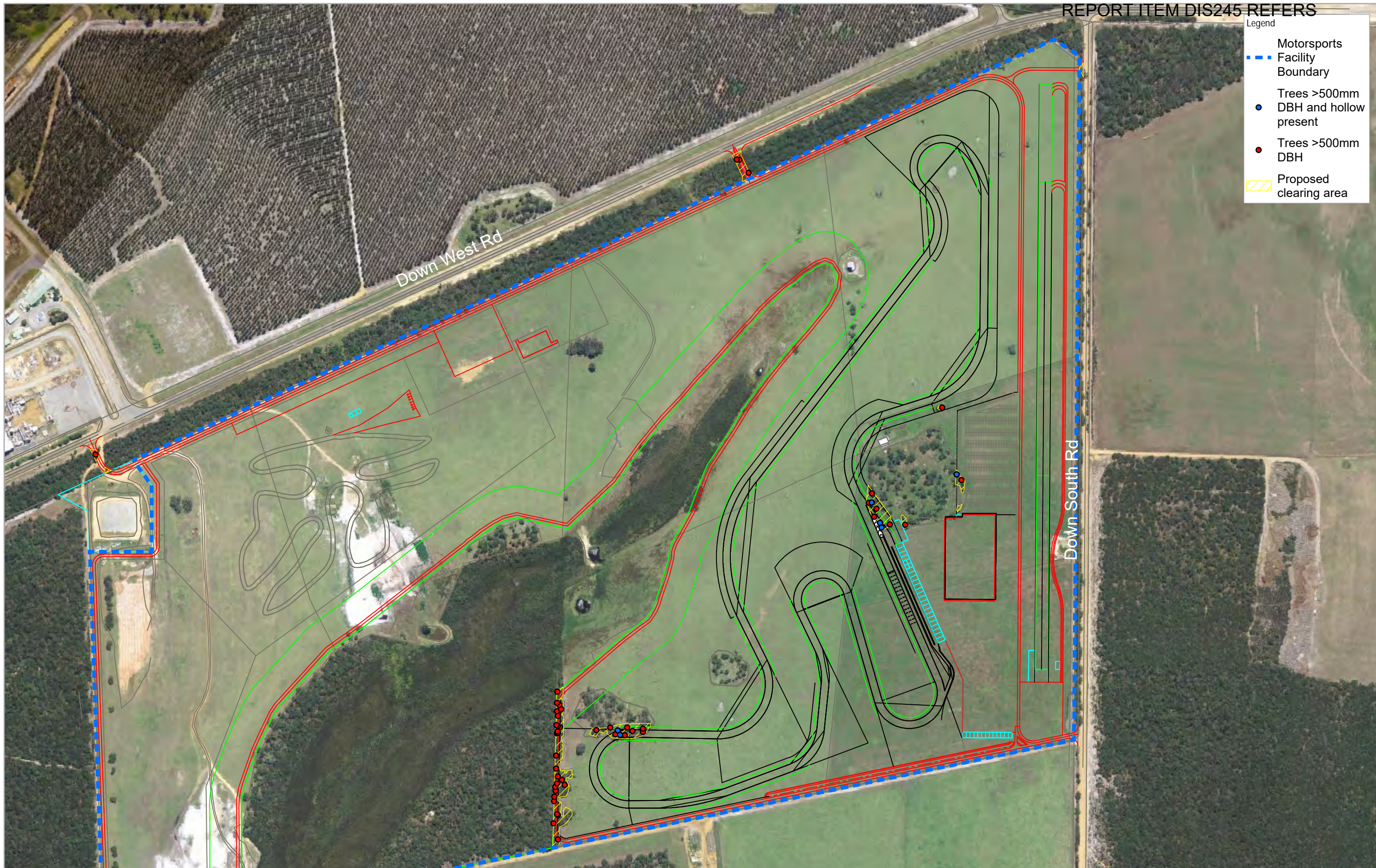
- Undertake restoration/ revegetation inside the proposed 50 m development exclusion buffer where applicable.
- Install fencing to exclude stock/ public access where fencing does not exist.
- Buffer extended to the south east to include all of the southern portion of Jarrah/ Marri remnant vegetation.
- Weed, dust, erosion and hygiene management plans developed and implemented.

#### Fauna

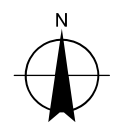
- Fox and cat control.
- Buffer extended to the south east to include all of the southern portion of Jarrah/ Marri remnant vegetation.
- Where clearing in road reserves is proposed for public access, significant trees are to be retained where possible. Significant paddock trees should also be retained where possible.
- The creek system contains high value habitat and high fauna activity. The area is not proposed to be developed/ disturbed and should continue to be protected.
- If any development/ modification occurs within the creek area a targeted survey to identify the presence/ absence of *Galaxiella munda* (Western Mud Minnow), *Galaxiella nigrostriata* (Black-stripe Minnow) and *Lepidogalaxias salamandroides* (Salamanderfish) is required.
- Targeted fauna assessment for any proposed works in the remnant vegetation to the west.

The following section discusses management of the conservation category wetland and water systems on site.

- Legend
- Motorsports Facility Boundary
  - Trees >500mm DBH and hollow present
  - Trees >500mm DBH
  - Proposed clearing area



Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 50



City of Albany  
**Regional Motorsports Facility**  
Lot 5780 Down Road South, Drome  
**CLEARING IMPACT AREA**

Project No. 61-37331  
Revision No. A  
Date 10/05/2019

**FIGURE 8**

G:\6137331\GIS\_2\Maps\Working\6137331\_013\_FigXX\_Clearing area.mxd  
Print date: 10 May 2019 - 15:52  
Data source: GHD: Lot 5780 Down Road South, Motorsports Precinct Boundary 20190503; Proposed clearing area 20190510; Landgate: Aerial - WA Now; Cadastre 20180709; Bio Diverse Solutions: Trees >500m DBH, Trees >500mm DBH and hollow present. Created by: v.davies



## 6.2.7 Water management

The site is within a Priority 2 area of the Marbelup Brook public drinking water source area. A risk assessment for the proposed development was undertaken in accordance with the Australian Drinking Water Guidelines (ADWG) (NHMRC, NRMCC 2011) and *Water Quality Protection Note 77: Risk Assessment of Public Drinking Water Source Areas* (DoE, 2005). A local water management strategy was prepared (GHD 2020, see Appendix J) and provides management strategies to mitigate potential risks to storm water and groundwater quality and quantity.

The following section summarises the management strategies and controls proposed to prevent the use of the site as a regional motorsports facility compromising water quality and quantity and to ensure the objectives of SPP 2.3 are met. A detailed local water management strategy for the site is recommended to be submitted as part of the development application.

Consultation with the Department of Water and Environment Regulation as well as Department of Health was undertaken as part of the pre-lodgement engagement for the proposed scheme amendment. Refer to section 5.

### Drinking water supply

Connection to the existing LGSTWSS will be cost prohibitive in the initial stages of the project. It is therefore proposed to service drinking water needs on the site through a combination of collected rainwater and water carts.

Uncontaminated rainwater from the site buildings will be collected in standard 110,000 litre rainwater tanks. At source treatment by household-scale filtration and ultraviolet disinfection will be undertaken. This will allow a safe drinking water supply to the site facilities (i.e. clubrooms, canteen, etc.) and ablutions.

A preliminary water balance for the site suggests that rainfall alone will be insufficient to meet expected demand for regular attendance of 500 people. Where there is a shortfall, the facility operators will need to purchase and cart water to the site. Water demands for other external uses (i.e. irrigation, dust suppression, etc.) will be met from site dams and groundwater bores.

### Stormwater management

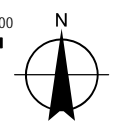
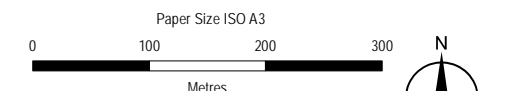
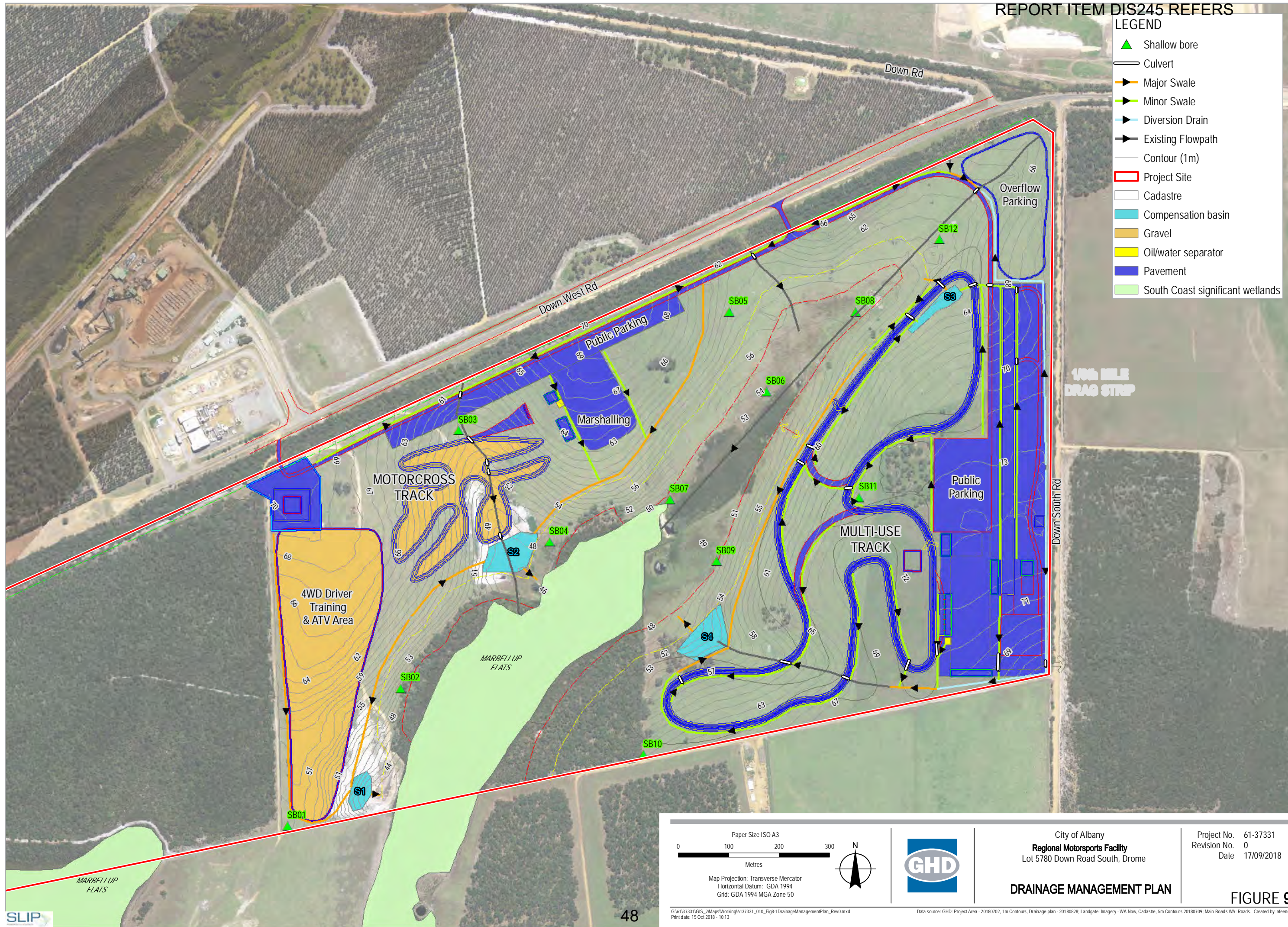
#### Stormwater quantity

The proposed stormwater management plan for the site is depicted in Figure 9 and consists of the following principles and elements:

- Where possible, uncontaminated runoff from impervious areas will be collected for drinking water, or targeted for infiltration near to the source.
- The release of (potentially) hydrocarbon impacted stormwater from high risk areas (e.g. maintenance areas, pits, etc.) is prevented by suitable engineering controls.
- Drainage swales to divert the (upstream) eastern boundary catchment around the multi-use track, to minimise the potential for this water to impact on the site infrastructure.
- Suitable compensating (detention) basins to limit post-development peak discharge rates to pre-development rates from areas subject to development.
- Suitable swales, culverts and pipework to convey the runoff generated from the site to engineered locations for treatment / compensation before discharge to the waterway.
- Suitable buffer separations to the wetland/creek to minimise the potential for impacts of site-generated water impacting on the wetland.

LEGEND

- ▲ Shallow bore
- Culvert
- Major Swale
- Minor Swale
- Diversion Drain
- Existing Flowpath
- Contour (1m)
- Project Site
- Cadastrate
- Compensation basin
- Gravel
- Oil/water separator
- Pavement
- South Coast significant wetlands



City of Albany  
**Regional Motorsports Facility**  
 Lot 5780 Down Road South, Drome

Project No. 61-37331  
 Revision No. 0  
 Date 17/09/2018

**DRAINAGE MANAGEMENT PLAN**

**FIGURE 9**

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 Print date: 15 Oct 2018 - 10:13

Data source: GHD; Project Area - 20180702, 1m Contours, Drainage plan - 20180828; Landgate; Imagery - WA Now; Cadastrate, 5m Contours 20180709; Main Roads WA; Roads. Created by: allecey

## Stormwater quality

Stormwater quality issues requiring management within the site include:

- Sediment load: Erosion caused by high flow velocity can result in a loss of soil, damage to drainage swales, and increased sediment load to the receiving water body.
- Nutrient load: Increased nutrient loading to the receiving water body may result from over-application of fertilisers to landscaped areas.
- Gross: Suspended and dissolved pollutants: Including rubbish, hydrocarbons, dissolved metals, and pesticides.

Best Management Practices (BMPs) are design strategies targeted to manage total suspended solids, gross pollutants, total phosphorous (TP) and total nitrogen (TN) within stormwater discharged from urban catchments (DoW, 2007). Frequently occurring rainfall events are targeted, using source, in-transit and end-of-pipe controls to improve water quality. BMPs considered appropriate for the site development include:

- Construction of drainage swales and dry/ephemeral detention basins using weirs and low flow drain system, to reduce flow velocity, thus reducing erosion and sediment mobilisation, allowing sedimentation, reduce total flow discharged from each site, and allowing infiltration to groundwater.
- Construction of suitable bio-retention areas to allow for suitable water quality treatment.
- Planting and regeneration of low-lying native vegetation in swale drains for filtering of particulates and uptake of dissolved nutrients.
- Use of suitable soils within bio-retention areas that target the uptake of nutrients.
- Maximising infiltration by adopting a stormwater retention system to contain, and as a minimum, treat the first 15 mm of rainfall on site.
- Construction of compensating basins/storages to reduce peak flow rates and encourage infiltration.
- Minimising discharge rates, allowing the compensating basin to act as a sediment trap, to capture suspended solids and bound pollutants prior to discharge.

## Spill control and pollution management

The preliminary water management strategy defines practices to be implemented to achieve spill control and pollution management in high risk areas of the site based on *WQPN 52: Stormwater management at industrial sites* (DoW, 2006) and *WQPN 100: Motor sport facilities near sensitive waters* (DoW, 2007). Control practices include operational measures such as separating uncontaminated stormwater from potentially contaminated stormwater, design measures including provision of buffers as well as practices specific to construction and maintenance on site.

An erosion and sediment control plan is recommended within the Construction Environmental Management Plan (CEMP) prior to commencement of works on site.

## Wastewater management

Given the significant distance of the site from the nearest connection point of Water Corporation's Albany sewerage scheme, on-site management of wastewater will be required. On-site wastewater management will need to cater for human sewage as well as wastewater from vehicular activities.

The preliminary water management strategy reviewed potential wastewater management strategies and identified one potential solution that would enable the use of the site as a motorsports facility while meeting the requirements of the draft government sewerage policy. Further detailed investigations will be required into the most appropriate disposal system for the site, including a better understanding of the geotechnical conditions of the area. This should be undertaken prior to development on site.

The proposed use of the motorsports facility will be mostly periodic (i.e. events based) with several different groups using the site. On-site wastewater treatment systems will typically consist of both a treatment system and a disposal system. These were preliminarily sized using the Department of Health's (DoH) Onsite wastewater system assessment tool for estimation purposes.

The calculator tool produced a required demand (hydraulic loading) of 17,500 L/day and aided in the sizing of the treatment and disposal systems. To determine the feasibility of on-site wastewater management, a sub-surface drip irrigation system was chosen as the most suitable option. This system will require a disposal/irrigation area of approx. 5000 m<sup>2</sup>, which could be readily accommodated within the track design and facilities area.

The most suitable arrangement will be to have two wastewater treatment systems, one serving the motocross facilities, the other serving the multi-use track. Numbers in excess of system capacity (potentially up to 20,000 for national race events) would need to be catered for with portable facilities.

A minimum clearance of two metres between the maximum groundwater level and the discharge point of the disposal system will also be required. Therefore, wastewater facilities should be located at high ground on the site, where a greater clearance to groundwater is to be expected.

### **Water quality monitoring**

The Preliminary Water Management Strategy proposes ongoing groundwater and surface water monitoring and includes a summary of proposed monitoring programs. The plan recommends preparation of an annual water quality report in accordance with ANZECC Guidelines (2000) and DWER quality assurance/control systems to be presented to the City and DWER.

### **Groundwater monitoring**

Initial groundwater and water quality sampling was undertaken by Bio Diverse Solutions in February, May and September 2018. DWER has been consulted during the development of this monitoring plan. Further to this, GHD recommends the following;

- There is limited existing site-specific groundwater data, and pre-development data are limited. If the development proposal seeks approval to install a production bore for abstraction of groundwater as a water supply source for the development, then six-monthly groundwater monitoring for water levels and salinity will be a required.
- Groundwater monitoring should be conducted for three years following practical completion, to allow any groundwater level or quality changes as a result of development to be identified, and action taken if necessary.

### **Surface water monitoring**

Continued surface water sampling is recommended to be undertaken prior to the construction of the regional motorsports facility to develop a baseline for ongoing assessment. This monitoring should continue during construction and then following construction to assess the impact of the development on runoff water quality.

## Operational controls

On site operational controls shall include but not limited to the following:

- Vehicle maintenance and refuelling to only be undertaken in the designated pit area where hydrocarbon interception/spill controls are implemented.
- Vehicle wash down to be undertaken on a bunded, impervious pad and runoff directed into a detention area containing a sediment trap and oil separator.
- Clean-up kits to be kept at strategic locations across the site in order to provide an immediate response to fuel, oil or chemical spills.
- On-site wastewater treatment (secondary standard) and disposal from toilets, washrooms and kitchens to be in accordance with the *Draft Government Sewerage Policy* and as noted in section 8.4 of the Preliminary Water Management Strategy.
- An adequate number of rubbish and recycling bins to be provided across the site and regularly maintained.
- Any landscaping on the site to be designed to minimise water, fertiliser and pesticide use.
- An emergency response plan to be prepared for situations that could place local water resources at risk.

## 7. Conclusion

The proposed rezoning of the site from *Priority Agricultural* to *Special Use – SU26* is justified in the context of the current local planning framework, overarching LPS1 objectives and local context.

## Appendices

## Appendix A – References

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## Appendix B – Precinct Plan and Concept Plan (August 2020)

Down Rd



**Legend**

**Precinct Areas**

- 4WD & ATV Training Area
- Development Exclusion Buffer (50m) (Low fuel)
- Emergency Muster Area
- Motorcross Track Area
- Multi-use Track
- Protected Exclusion Zone
- Albany Motorsports Precinct
- Lot 5780 Down Road South
- Physical treatment required to mitigate visual impact
- Area subleased by Plantation Energy Australia
- Marbellup Flats - CCW
- Cadastre

Paper Size ISO A4

0 50 100 150 200

Meters

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 50

City of Albany  
Regional Motorsports Facility  
Lot 5780 Down Road South, Drome

**PRECINCT PLAN**

Project No. 61-37331  
Revision No. 3  
Date 22/09/2020





# Appendix C – Proposed amendment to City of Albany Local Planning Scheme No. 1

**PLANNING AND DEVELOPMENT ACT 2005**

**RESOLUTION TO ADOPT AMENDMENT TO LOCAL PLANNING SCHEME**

**CITY OF ALBANY**

**LOCAL PLANNING SCHEME NO. 1**

**AMENDMENT NO. 35**

Resolved that the local government pursuant to section 72 of the *Planning and Development Act 2005*, amend the above Local Planning Scheme by

- a) Rezoning Lot 5780 Down Road South, Drome, from 'Priority Agriculture' zone to 'Special Use – SU26' zone;
- b) Adding the following text to Schedule 4:

No.	Description of Land	Special Use	Conditions
SU26	Lot 5780 Down Road South, Drome	Motorsport based recreation and incidental uses	<ol style="list-style-type: none"> <li>1. All development requires the development approval of the local government.</li> <li>2. Applications for development approval shall be advertised in accordance with clause 64 of the deemed provisions.</li> <li>3. All use and development is to be in accordance with the Regional Motorsports Facility Precinct Plan and approved management plans.</li> <li>4. Any application for development approval for the site shall be accompanied by an Environmental Management Plan for the site that addresses:                             <ul style="list-style-type: none"> <li>(a) Noise Management Plan for construction and operation of the site, and which includes but is not limited to:                                     <ul style="list-style-type: none"> <li>(i) Limitations on hours of operation as follows:   <ul style="list-style-type: none"> <li>• Sundays: 9 am – 6 pm;</li> <li>• Monday – Saturday: 8 am – 6 pm.</li> </ul> </li> <li>(ii) Events not occurring on both the multi-use track and the motocross track at the same time;</li> <li>(iii) Frequent/ongoing monitoring and reporting on noise emissions; and</li> </ul> </li> </ul> </li> </ol>

## REPORT ITEM DIS245 REFERS

			<p style="text-align: center;">(iv) Provide notification of events to stakeholders / landholders.</p> <p>(b) Water Management Plan for construction and operation of the site.</p> <p>(c) Hydrocarbon Management Plan for operation of the site.</p> <p>(d) Waste Management Plan for construction and operation of the site.</p> <p>(e) Dust Management Plan for construction and operation of the site.</p> <p>(f) Acid Sulfate Soils (ASS) risk.</p> <p>(g) Protected Exclusion Zone Management Plan addressing management responsibilities, revegetation, and vegetation condition and wetland water quality monitoring.</p> <p>(h) Decommissioning Plan.</p> <p>(i) Construction Management Plan.</p> <p>5. Any application for development approval for the site shall be accompanied by a visual impact assessment to determine the appropriate physical treatments to mitigate visual impact to Lot 5781 Down Road South, Drome.</p> <p>6. Development shall be in accordance with an approved Bushfire Management Plan that has been implemented to the satisfaction of the Local Government, Department of Planning, Lands and Heritage, and the Department of Fire and Emergency Services.</p> <p>7. Any application for development approval for the site shall be accompanied by a Traffic and Parking Management Plan for construction and operation of the site, including consideration of peak parking and traffic management during larger and special events (i.e. events attracting greater than 500 attendees).</p>
--	--	--	--

c) Adding the following precinct plan to Schedule 4:

Down Rd



**Legend**

**Precinct Areas**

- 4WD & ATV Training Area
- Development Exclusion Buffer (50m) (Low fuel)
- Emergency Muster Area
- Motorcross Track Area
- Multi-use Track
- Protected Exclusion Zone
- Albany Motorsports Precinct
- Lot 5780 Down Road South
- Physical treatment required to mitigate visual impact
- Area subleased by Plantation Energy Australia
- Marbellup Flats - CCW
- Cadastre

<p>Paper Size ISO A4</p> <p>0 50 100 150 200</p> <p>Meters</p> <p>Map Projection: Transverse Mercator Horizontal Datum: GDA 1994 Grid: GDA 1994 MGA Zone 50</p>		<p><b>City of Albany</b> <b>Regional Motorsports Facility</b> <b>Lot 5780 Down Road South, Drome</b></p> <p><b>PRECINCT PLAN</b></p>	<p>Project No. 61-37331 Revision No. <b>3</b> Date <b>22/09/2020</b></p>
<p>G:\6137331\GIS_2\Maps\Working\6137331_011_Fig4_Precinct Plan_A4_1.mxd Print date: 27 Jul 2020 - 14:31</p>		<p>Data source: GHD: Lot 5780 Down Road South, Albany Motorsports Precinct 20190503, Precinct Areas 20190412, Area subleased by Plantation Energy 20190503, Physical treatments 20190412; Landgate: Aerial - WANow, Cadastre 20180709; DBCA: South Coast Significant Wetlands. Created by: vdavies</p>	



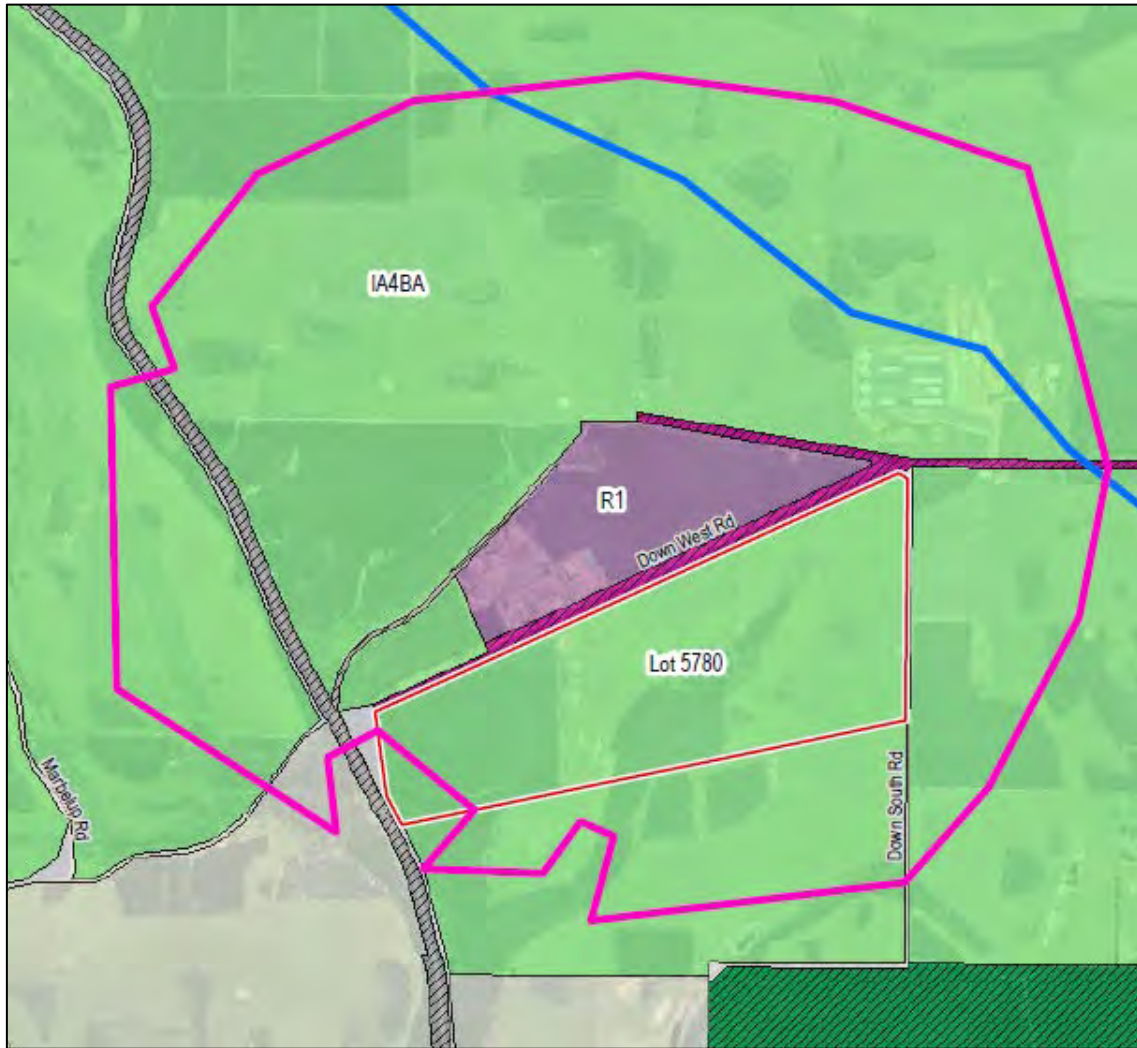


- d) Amending the Scheme Map accordingly.
  
- e) The amendment is considered to be a complex amendment for the following reasons:
  - a. it is not consistent with the endorsed local planning strategy for the scheme;
  - b. it is of a scale and nature that may have an impact on the amenity of the locality and environs; and
  - c. it may result in some environmental or social impacts on land within the Scheme area,

Dated this 28<sup>th</sup> day of JULY 2020






CHIEF EXECUTIVE OFFICER

**Existing Zoning**







**LEGEND**

**Local Planning Scheme - Special Areas**

-  Albany airport special control area
-  Albany speedway noise special control area
-  Industrial area (IA4)
-  Industrial buffer area (IA4BA)
-  Public drinking water sources special control areas

**Local Planning Scheme - Zones and Reserves**






-  General agriculture
-  General industry
-  Local road
-  Major road
-  Parks and recreation
-  Priority agriculture
-  Priority road
-  Public use
-  Rail
-  Rural residential
-  Special use

**Scheme Amendment Map**



**LEGEND**

**Local Planning Scheme - Special Areas**

-  Albany airport special control area
-  Albany speedway noise special control area
-  Industrial area (IA4)
-  Industrial buffer area (IA4BA)
-  Public drinking water sources special control areas

**Local Planning Scheme - Zones and Reserves**

-  General agriculture
-  General industry
-  Local road
-  Major road
-  Parks and recreation
-  Priority agriculture
-  Priority road
-  Public use
-  Rail
-  Rural residential
-  Special use

**COUNCIL PREPARATION AND ADVERTISEMENT**

The Council of the City of Albany resolved to prepare and advertise this Complex Amendment at the Ordinary Council Meeting held on the 28<sup>th</sup> day of July, 2020.

.....  
**MAYOR**

.....  
**CHIEF EXECUTIVE OFFICER**

**COUNCIL RECOMMENDATION**

This Amendment is recommended for support by resolution of the City of Albany at the Ordinary Council Meeting held on the 28<sup>th</sup> day of July, 2020 and the Common Seal of the City of Albany was hereunto affixed by the authority of a resolution of the Council in the presence of:

.....  
**MAYOR**

.....  
**CHIEF EXECUTIVE OFFICER**

**WAPC ENDORSEMENT (r.63)**

.....  
**DELEGATED UNDER S.16 OF  
THE P&D ACT 2005**

**DATE.....**

**APPROVAL GRANTED**

.....  
**MINISTER FOR PLANNING**

**DATE.....**

## Appendix D – Certificate of Title

REPORT ITEM DIS245 REFERS

WESTERN



AUSTRALIA

REGISTER NUMBER <b>5780/DP206199</b>	
DUPLICATE EDITION <b>5</b>	DATE DUPLICATE ISSUED <b>11/6/2019</b>

**RECORD OF CERTIFICATE OF TITLE**  
UNDER THE TRANSFER OF LAND ACT 1893

VOLUME 1352 FOLIO 224

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.



REGISTRAR OF TITLES

**LAND DESCRIPTION:**

LOT 5780 ON DEPOSITED PLAN 206199

**REGISTERED PROPRIETOR:**  
(FIRST SCHEDULE)

CITY OF ALBANY OF 102 NORTH ROAD ALBANY WA 6330

(T O164019 ) REGISTERED 31/5/2019

**LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:**  
(SECOND SCHEDULE)

- 1. \*J875978 NOTIFICATION CONTAINS FACTORS AFFECTING THE WITHIN LAND. LODGED 16/8/2006.
  - 2. K809392 LEASE TO PLANTATION ENERGY AUSTRALIA PTY LTD OF LEVEL 2, 45 STIRLING HIGHWAY, NEDLANDS AS TO PORTION ONLY. EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 22/12/2008.
- N538854 MORTGAGE OF LEASE K809392 TO GDF INTERNATIONAL SAS REGISTERED 24/1/2017.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.  
\* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.  
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF TITLE-----

**STATEMENTS:**

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: 1352-224 (5780/DP206199)  
PREVIOUS TITLE: 1352-224  
PROPERTY STREET ADDRESS: 54 DOWN RD SOUTH, DROME.  
LOCAL GOVERNMENT AUTHORITY: CITY OF ALBANY

Appendix E – Albany Motorsport Park – Site  
Feasibility Study (Oct. 2018)

## Appendix F – Flora and Fauna Survey (Feb. 2019)



## Appendix G – Bushfire Management Plan (May 2019)

## Appendix H – Noise Assessment Report (September 2020)

Appendix I – Agricultural Land Capability  
Assessment (Mar. 2019)

Appendix J – Local Water Management Strategy  
(Jan. 2020)

## REPORT ITEM DIS245 REFERS

This report: has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and the City of Albany as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD

GHD, 999 Hay Street, Perth, WA 6000

P.O. Box 3106, Perth WA 6832

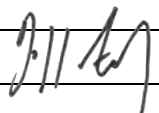
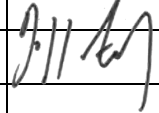
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6136995-3429

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	B Benjamin	C Thompson	On file	J Foley	On file	10/05/2019
1	B Benjamin	J Foley		J Foley		25.09.20

Appendix E – Albany Motorsport Park – Site  
Feasibility Study (Oct. 2018)



City of Albany  
Albany Motorsport Park  
Site Feasibility Study –  
Lot 5780 Down Road South, Drome

October 2018

# Executive summary

## Background

Participation in motorsports is a popular recreational activity for many Australians. In Albany and the surrounding areas, motorsport is already known to be popular, with several well organised clubs, a national-level venue for speedway, a state-level venue for go-karts and widely recognised events such as the Albany Classic, Show 'n Shine and Race Wars. However, some motorsport disciplines, particularly motocross, lack suitable facilities in the region.

Recently, an independent proposal has been advanced by the Great Southern Motorplex Group Inc. (GSMG) to develop a multi-use Albany Motorsport Park (AMP) near the Mirambeena timber processing precinct on Down Road. The Western Australian Government has committed \$250,000 to undertake preliminary planning for the proposal (Watson, 2018) and a further commitment of \$5.75 million in 2020/21 (GoWA, 2017) for its development.

In cooperation with the Department of Local Government, Sport and Cultural Industries (DLGSCI), the City of Albany has commissioned GHD to undertake this technical site feasibility assessment as part of the preliminary planning for the proposed AMP at Lot 5780, Down Road South, Drome (the 'Project Site'). The scope of works for the project included three main elements:

### 1. Site concept development

- The AMP concept design has been developed by the GSMG (including Roberts Gardiner Architects) and City of Albany. GHD has assisted with the concept design development.
- GHD has prepared a preliminary capital budget estimate, based on the GSMG concept design and these technical feasibility investigations.

### 2. Site technical feasibility investigations

GHD has undertaken the following technical investigations:

- Collation of background information, existing and surrounding land uses, planning restrictions (including bushfire planning provisions), approvals and buffer requirements,
- Traffic investigation for Down Road and the intersection with Albany Highway,
- Desktop geotechnical investigation of anticipated ground and groundwater conditions,
- Desktop investigation into anticipated power demands and servicing requirements,
- Desktop hydro(geo)logy investigation,
- Preliminary Water Management Plan for the site, particularly addressing the requirements of *Water Quality Protection Note (WQPN) 100: Motor sport facilities near sensitive waters*,
- Preliminary desktop Environmental Impact Assessment (EIA) and site walkover, and
- Preliminary desktop noise investigation and management plan.

### 3. Stakeholder consultation

Regular consultation with a small working group has occurred throughout the study period. A broader consultation workshop was also held on 17 August with representatives from City of Albany, DLGSCI, GSMG, Department of Planning, Lands and Heritage (DPLH), Department of Water and Environmental Regulation (DWER), Great Southern Development Commission (GSDC), and the office of Peter Watson MLA.



## Site description

The Project Site is located approximately 20 km to the north of the Albany CBD and is 192.34 ha in size, of which approximately 52 ha at the western end is covered with well-established vegetation and not considered available for development.

The freehold owner of the property is Susan Elizabeth Page, as executor of the Will of Audrey Helen Old who died on 20 June 2015. The property is presently leased to Lindsay and Joy Black for grazing and sand quarrying purposes. A small portion in the north-west corner of the property (1.3655 ha) is also leased to Plantation Energy Australia Pty Ltd for the purpose of maintaining a detention basin for their site drainage.

### Redacted text

Under the City of Albany Local Planning Scheme No. 1 the Project Site is zoned as '*Priority Agriculture*' and is located within an Industrial Buffer Area surrounding the Mirambeena timber processing facilities. The Project Site is also located within a Priority 2 (P2) public drinking water sources area (PDWSA) within the Marbelup Brook Catchment Area (DoP, 2014). In February 2018, the Minister for Water formally provided advice to the City of Albany that while a motorsport facility is incompatible with a P2 PDWSA, "there are measures that can be put in place to protect water quality should the City proceed to approve the development".

The Project Site is currently unserviced, with no connections to scheme water, sewerage, power or wired telecommunications.

## Albany Motorsport Park concept design

At full development, the proposed AMP will consist of:

1. Sealed, configurable multi-use track (3.2 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with CAMS' *Track Operator's Safety Guide* (CAMS, 2012) and Motorcycling Australia (MA) *Track Guidelines* (MA, 2011), and
  - To be licensed by Confederation of Australian Motor Sport (CAMS) for FIA Grade 2 and FIM Grade B (i.e. up to second-tier international motor racing).
2. A motocross circuit:
  - Designed and constructed in association with MA guidelines.
3. A 1/8<sup>th</sup> mile drag racing strip:
  - Designed and constructed in accordance with FIA specifications for drag strips and in association with Australian National Drag Racing Association (ANDRA).
4. A 1,300 m<sup>2</sup> burnout area,
5. An off-road four wheel drive (4WD) and all-terrain vehicle (ATV) training area,
6. Allowance for future speedway,
7. Allowance for future go-karts.



Figure ES-1: AMP concept site layout

For the purposes of sizing facilities and servicing infrastructure, a typical / frequent site attendance of 500 persons has been assumed (i.e. competitors + officials + spectators). For special events that anticipate a greater number of site attendees, additional management measures will need to be implemented.

Governance and ownership arrangements for the AMP are still subject to further investigation, but for the purposes of this study it is assumed that the property, tracks and facilities will be owned by the City of Albany. The AMP will be leased to an operator-manager, for all operational and maintenance activities. The operator-manager will be a “not-for-profit” company consisting of a Board of Management and no other shareholders.

## Preliminary capital cost estimate

Outlined in Table ES-1 is a summary of the capital cost estimate for the AMP concept design, including the likely staging of development. The preliminary cost estimate has been prepared for the purpose of budget setting and must not be used for any other purpose.

Table ES-1: Preliminary capital cost estimate

Area	TOTAL (\$)	In-kind contribution	Stage 1	Stage 2	Stage 3
Motocross	2,973,000	382,000	437,000	1,673,000	449,000
Multi-use track	11,426,000	151,000	7,379,500	2,772,500	1,111,000
Drag strip	3,726,000	0	0	2,968,000	513,000
4WD / ATV area	444,000	133,000	0	300,000	0
Common / general items	5,261,000	270,000	3,016,000	1,189,200	436,800
<b>TOTAL</b>	<b>23,830,000</b>	<b>936,000</b>	<b>10,832,500</b>	<b>8,902,700</b>	<b>2,509,800</b>

## Priorities and staging plan

The priority facilities in Stage 1 are:

1. The motocross track – to resolve the lack of safe, permanent, easily accessible facilities for the Albany Motorcycle Club and enable rider training, Club and State level competitions to be held on a track that is to be accredited and licenced by Motorcycling Australia (MA),
2. The multi-use track – to allow the operator-manager to generate revenue through driver training and track rental activities, provide a safe and scrutinised venue to local enthusiasts and provide a high level venue for State motor car, motorcycle and cycling events on a track to be approved and licenced by CAMS, and,
3. Enabling works, such as feasibility / planning / design works, and access roads.

Stages 2 and 3 contemplate the further development of the AMP site as patronage increases and the range of uses is broadened (for example, to include lighted evening events) and is dependent on further funding from various sources becoming available.

## Summary of site feasibility assessment

To summarise, assess and prioritise the site feasibility issues investigated in this study, GHD has undertaken a preliminary risk assessment, using the City of Albany's *Risk & Opportunity Management Framework* (2018). This preliminary risk assessment captured 20 material risk issues, based on the feasibility investigations. Each risk has then been addressed by recommended remedial actions, controls and responsibility, with attention paid to the preferred hierarchy of controls. The residual risk level for each issue is targeted to be 'Low / acceptable', or 'Medium / monitor'. In the latter case, the proposed remedial actions will require on-going monitoring to assure their effectiveness.

A summary of the risk issues and initial and residual risk ratings is shown in Table ES-2.

Table ES-2: Summary of risk assessment

Risk issue	Initial risk rating	Residual risk rating
Zoning of Project Site	High	Low
Bushfire Prone Area	High	Medium
Security of Project Site	High	Medium
Visual amenity impacts	High	Low
Loss of fauna habitat (Black Cockatoos)	High	Medium
Heritage impacts	Medium	Medium
Adverse geotechnical conditions	High	Medium
Waste materials dumped on site	Medium	Low
General construction phase impacts	Medium	Low
Erosion and sediment pollution to Wetland (construction and operation phases)	Extreme	Medium
Hydrocarbon / chemical pollution to Wetland	Extreme	Medium
Drinking water availability	High	Medium
On-site wastewater management	High	Low
Noise impacts	High	Medium
Traffic impacts from special events	High	Medium
Crash risk with heavy vehicles on Down Rd	High	Medium
Power availability	High	Low
Telecommunications availability	Medium	Low

**Based on this assessment, it can be concluded that the Albany Motorsport Park proposal at Lot 5780, Down Road South does not have any technical obstructions to its feasibility, pending regulatory approvals and implementation of the recommended remedial and control actions.**

## Recommended remedial and control actions

The recommended remedial and control actions for the AMP proposal are outlined below according to the phase of development – i.e. planning, design development, construction and operation.

### Planning phase (2018 to 2020)

The following planning phase actions are recommended:

1. City of Albany to include reference to the AMP in the *Albany Local Planning Strategy*.
2. City of Albany and GSMG to continue the baseline water quality monitoring program.

3. GSMG and City of Albany to conduct a baseline flora and fauna survey and undertake environmental offset calculations.
4. City of Albany to seek comment from Wagyl Kaip on the AMP proposal.
5. GSMG to arrange for all waste materials on site to be sampled and removed by sub-Lessees, and site 'made good'.
6. GSMG and City of Albany to prepare a Bushfire Management Plan for the Project Site, including secondary road access from Down Road, north to Redmond-Hay River Road.
7. GSMG and City of Albany to seek MRWA approval for reduction of speed limit on Down Road to 80 km/h, west of CBH site. Also, install a westbound left turn lane on Down Road.
8. City of Albany to prepare a Scheme Amendment to change zoning to 'Special Use'.

### **Design development phase (2019 to 2021)**

The following design development actions are recommended:

9. GSMG and City of Albany to undertake further geotechnical and ASS investigations on site.
10. Designer to incorporate all design elements of the Water Management Plan (refer section 8).
11. GSMG and Designer to liaise with Western Power and Telstra / NBN Co. for power and communications servicing to the Project Site.
12. GSMG and Designer to undertake detailed noise modelling.
13. Designer and GSMG to incorporate security fencing and gates around each separate area.

### **Construction phase (summer / autumn 2021)**

The following construction actions are recommended:

14. GSMG and Constructor to prepare a Construction Environmental Management Plan (CEMP) to mitigate construction phase impacts.
15. GSMG and Constructor to undertake site re-vegetation and beautification.

### **Operational phase (post 2021)**

The following operational actions are recommended:

16. GSMG to prepare an operational phase Environmental Management Plan (EMP).
17. GSMG to implement a Noise Management Plan (NMP).
18. For special events (i.e. >> 500 people), GSMG to undertake community advertising and liaison, additional traffic management controls, and hire additional portable generator(s), portaloos, water carts etc. to meet demand.

*This report is subject to, and must be read in conjunction with, the limitations set out in section 1.2 and the assumptions and qualifications contained throughout the Report.*

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- Appendix H – DBYD search results
- Appendix I – Site photos

# Glossary

ADWG	Australian Drinking Water Guidelines
AEP	Annual exceedance probability
AHD	Australian height datum
ALARP	As low as reasonably practicable
AMP	Albany Motorsport Park
ANDRA	Australian National Drag Racing Association
ANZECC	Australian and New Zealand Environment and Conservation Council
APEC	Albany Plantation Export Company
ARI	Average recurrence interval
ARR	Australian Rainfall and Runoff
ARVS	Albany Regional Vegetation Survey
ASS	Acid sulfate soils
ATV	All-terrain vehicle
BAL	Bushfire attack level
BHL	Bushfire hazard level
BMP	Bushfire Management Plan
BOD	Biochemical oxygen demand
BoM	Bureau of Meteorology
CAMS	Confederation of Australian Motor Sport
CARS	Crash analysis reporting system
CBD	Central business district
CBR	California bearing ratio
(C)EMP	(Construction) environmental management plan
cfu	Colony forming units
CoA	City of Albany
DAA	Department of Aboriginal Affairs
DBCA	Department of Biodiversity, Conservation and Attractions
DBYD	Dial before you dig
DEE	Department of the Environment and Energy
DFES	Department of Fire and Emergency Services
DLGSCI	Department of Local Government, Sport and Cultural Industries
DoH	Department of Health
DoW	Department of Water
DPIRD	Department of Primary Industries and Regional Development

## REPORT ITEM DIS245 REFERS

DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
DBYD	Dial before you dig
DCP	Dynamic cone penetrometer
DLVCHS	Distribution Low Voltage Contribution Headworks Scheme
DVA	Direct value added
EIA	Environmental impact assessment
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESA	Environmentally sensitive area
EY	Exceedance year
FIA	Federation Internationale de l'Automobile
FIM	Federation Internationale Motocyclisme
FTTP	Fibre to the premise
GoWA	Government of Western Australia
GSDC	Great Southern Development Commission
GSMG	Great Southern Motorsports Group
HV	High voltage
IBRA	Interim Biogeographic Regionalisation for Australia
IECA	International Erosion Control Association
ILUA	Indigenous Land Use Agreement
JDAP	Joint Development Assessment Panel
LGA	Local government area
LGS	Lower Great Southern (i.e. Albany, Denmark, Plantagenet)
LGSTWSS	Lower Great Southern Towns Water Supply Scheme
MA	Motorcycling Australia
MNES	Matters of National Environmental Significance
MRWA	Main Roads Western Australia
NHSA	Noongar Standard Heritage Agreement
NMP	Noise management plan
PDWSA	Public drinking water source area
PEC	Priority ecological communities
PMST	Protected Matters Search Tool
PTTx	Pole top transformer
RAV	Restricted access vehicle
RIWI Act	<i>Rights in Water and Irrigation Act 1914</i>

## REPORT ITEM DIS245 REFERS

SIA	Strategic industrial area
SLK	Straight line kilometre
SMSB	Site main switchboard
SPP	State Planning Policy
SWAA	Surface Water Allocation Area
SWALSC	South West Aboriginal Land and Sea Council
SWASA	Surface Water Allocation Sub Area
TEC	Threatened ecological communities
TN	Total nitrogen
TP	Total phosphorus
TPP	Timber processing precinct (Mirambeena)
TSS	Total suspended solids
VMS	Variable message signs
WAER	Western Australian electrical requirements
WIN	Water Information Network/Reporting
WoNS	Weeds of National Significance
WQPN	Water quality protection note
WSUD	Water sensitive urban design
1LOP	1 <sup>st</sup> level of protection ( <i>Track Operator's Safety Guide</i> (CAMS, 2012))
2LOP	2 <sup>nd</sup> level of protection ( <i>Track Operator's Safety Guide</i> (CAMS, 2012))
3LOP	3 <sup>rd</sup> level of protection ( <i>Track Operator's Safety Guide</i> (CAMS, 2012))
4WD	Four wheel drive

# 1. Introduction

## 1.1 Background

Participation in motorsports is a popular recreational activity for many Australians, including residents in Albany and the Great Southern region. By one estimate, motorsport is the fourth most watched sport in Australia, with over 150,000 participants across the country (CAMS, 2014). Anecdotally, motorsport in Albany and the surrounding areas is already known to be popular, with several well organised clubs, a national-level venue for speedway, a state-level venue for go-karts and widely recognised events such as the Albany Classic, Show 'n Shine and Race Wars at Albany Airport. However, some motorsport disciplines lack suitable facilities in the region. In particular, the closure of Albany Motorcycle Club's facility at Roberts Road in 2011 has meant that motocross and enduro motorcycle riders currently lack a permanent formalised facility to pursue their sport in the lower Great Southern region.

By their nature, motorsports are very capital intensive, requiring significant investment in equipment and facilities by participants, clubs and supporting organisations such as local and state governments. Recently, an independent proposal has been advanced by the Great Southern Motorplex Group Inc. (GSMG) to develop a multi-use Albany Motorsport Park (AMP) near the Mirambeena timber processing precinct on Down Road. This proposal aims to:

- Promote and facilitate multiple motorsports on a club and state level in Albany and the Great Southern region,
- Provide a safe environment and venue for multiple motorsports clubs (and other compatible sports, such as cycling),
- Provide a venue to promote and facilitate commercial driver education and training,
- Provide a safe environment for companies to test and tune their vehicles,
- Promote Albany and the Great Southern region by attracting participants and tourists, and
- Boost the regional economy through increased visitors, funding and sponsorship for events.



### State Government commitment

Recognising the interest in motorsports in the Great Southern, the Western Australian Government has committed \$250,000 to undertake preliminary planning for a motorplex (Watson, 2018) and a further commitment of \$5.75 million in the 2020/21 forward estimates (GoWA, 2017) for its development.

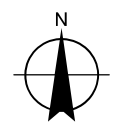
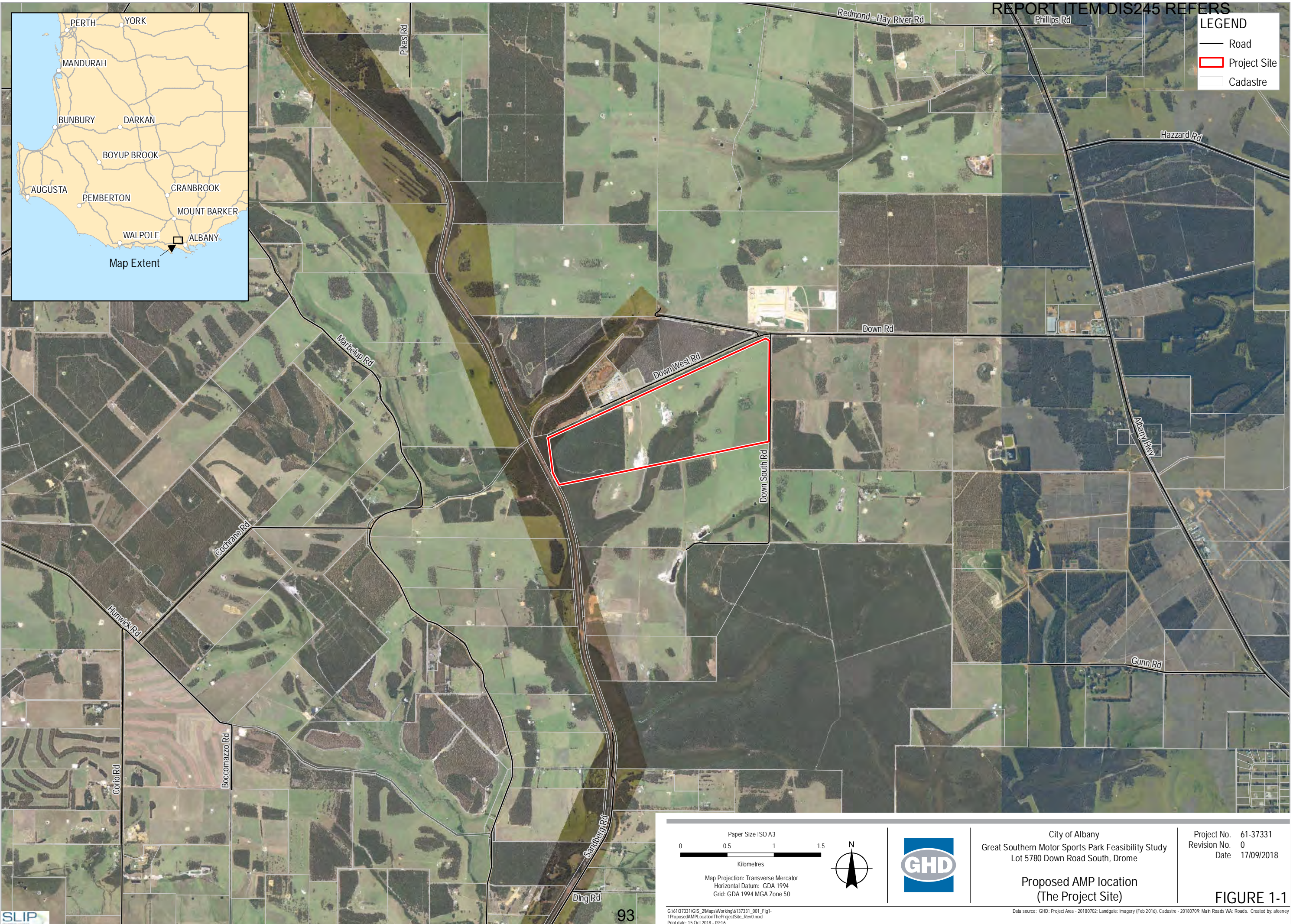
In cooperation with the Western Australian Department of Local Government, Sport and Cultural Industries (DLGSCI), the City of Albany has commissioned GHD to undertake this technical site feasibility assessment as part of the preliminary planning for the proposed AMP at Lot 5780, Down Road South, Drome.

## 1.2 Purpose of this report

The purpose of this report is to document the technical site feasibility assessment for the proposed Albany Motorsport Park at Lot 5780 Down Road South, Drome (Figure 1-1) (the Project Site).

**LEGEND**

-  Road
-  Project Site
-  Cadastre



Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 50



City of Albany  
Great Southern Motor Sports Park Feasibility Study  
Lot 5780 Down Road South, Drome

Project No. 61-37331  
Revision No. 0  
Date 17/09/2018

Proposed AMP location  
(The Project Site)

FIGURE 1-1

## 1.3 Scope of works

The scope of works for the project included three main elements:

### 1. Site concept development

- The AMP concept design has been developed by the GSMG (including Roberts Gardiner Architects). Basic 3D earthworks design development has been undertaken by City of Albany. GHD has liaised and coordinated with the City of Albany and GSMG to assist with the concept design development.
- GHD has prepared a preliminary capital budget estimate, based on the GSMG concept design, the technical feasibility investigations outlined below and civil works quantities advised by City of Albany.

### 2. Site technical feasibility investigations

GHD has undertaken the following technical investigations, with support from the City of Albany and other relevant agencies:

1. Collation of background information, existing and surrounding land uses, planning restrictions (including bushfire planning provisions), approvals and buffer requirements,
2. Traffic investigation for Down Road and the intersection with Albany Highway,
3. Desktop geotechnical investigation of anticipated ground and groundwater conditions,
4. Desktop investigation into anticipated power demands and servicing requirements,
5. Desktop hydro(geo)logy investigation, including analysis of available data from the GSMG's groundwater and surface water monitoring program,
6. Preliminary Water Management Plan for the site, particularly addressing the requirements of *Water Quality Protection Note (WQPN) 100: Motor sport facilities near sensitive waters* (DoW, 2007),
7. Preliminary desktop Environmental Impact Assessment (EIA) and site walkover, and
8. Preliminary desktop noise investigation and management plan.

The following elements were undertaken by the City of Albany, and outcomes provided to GHD:

- Site feature / topographical survey, and
- Liaison with Department of Fire and Emergency Services (DFES) regarding compliance with *State Planning Policy (SPP) 3.7: Planning in Bushfire Prone Areas* (WAPC, 2015), and
- Liaison with Department of Aboriginal Affairs (DAA) and Wagyl Kaip.

Further detail on the study's scope of works is provided in the City of Albany Request for e-Quote P18008 (25 June 2018).

### 3. Stakeholder consultation

Regular consultation with a small working group has occurred throughout the study period. This group comprised representatives from the GSMG, City of Albany and DLGSCI.

A broader consultation workshop was also held on 17 August at City of Albany with representatives from City of Albany, DLGSCI, GSMG, Department of Planning, Lands and Heritage (DPLH), Department of Water and Environmental Regulation (DWER), Great Southern Development Commission (GSDC), the office of Peter Watson MLA.

Minutes of the consultation workshop are attached in Appendix A.



## 1.3.1 Limitations

This report: has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and the City of Albany as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

## 1.4 Previous studies and strategies

Significant work, over several years, has already been invested in the concept of a multi-use motorsports facility in the lower Great Southern region. Summarised below are some of the key findings and outcomes from the most recent and relevant studies, which have helped to inform the current AMP proposal and this site feasibility study.

### 1.4.1 City of Albany: Motor Sport in the Lower Great Southern – Feasibility Study (GHD, November 2016)

#### ***Motorsport user demand***

- There are approximately 800 motorsport participants in the Lower Great Southern (LGS), of which about half are members of formal clubs. A wide variety of motorsport disciplines is enjoyed, with social events, burn-outs, circuit racing and drag racing being the most popular. On average, a typical participant is involved with 15 – 25 motorsport activities per year.
- Some local clubs and motorsport disciplines (i.e. speedway and karting) enjoy high quality facilities and minimal constraints to their sporting activities. Other clubs and motorsport disciplines, especially motorcycle / motocross, are significantly constrained by lack of suitable facilities in the local area. It is highly likely that user demand for these disciplines would increase, if suitable facilities were available.
- For circuit racing and drag racing, many participants are willing to travel to venues in Perth and Collie. Overall, there is a high “willingness to travel” to participate in motorsport events.
- At an appropriately designed facility, cycling could be a compatible sport and would increase the volume and frequency of user demand at the facility.

## *Motorsport infrastructure needs in the Lower Great Southern*

The following table provides a concise 'traffic light' assessment of the adequacy of current facilities in the LGS region to meet user demand and support expanded future participation.

Table 1-1: Assessment of LGS facilities to meet user demand

Motorsport discipline	User demand	Adequacy of facilities	Comments
Circuit racing	High	Inadequate	No circuit racing venue in Study Area. High demand and high potential for expanded participation with improved facilities. Participants currently travel to Collie and Perth (Barbagallo Raceway).
Speed (hill climb, autocross, sprints, super sprints, drifting, regularity)	High	Inadequate	No sealed (non-street) racing venue in Study Area. High demand and high potential for expanded participation with improved facilities. Participants currently travel to Collie and Perth (Barbagallo Raceway).
Drag racing	High	Inadequate	No drag racing venue in Study Area. High demand and high potential for expanded participation with improved facilities. Participants currently travel to Collie and Kwinana (Perth Motorplex).
Rally or off-road racing	Low	Adequate	Low demand. Not identified during survey as a high priority.
Go-karting	Medium	Adequate	State-level facility meets local user demand, and also attracts intrastate competitors. Current venue is not significantly constrained.
Speedway	High	Adequate	National-level facility meets local user demand, and also attracts intrastate, interstate and international competitors. Current venue is not significantly constrained.
Motocross	High	Partially adequate	High demand and medium potential for expanded participation with improved facilities. No permanent / formalised venues in the Study Area. Current temporary venue is significantly constrained. Participants currently access / travel to Cranbrook and South West venues for competition events.
Other motorcycling	Medium	Partially adequate	No circuit racing venue in Study Area. No formalised areas for other off-road events, such as enduro motorcycling. Medium demand and medium potential for expanded participation with improved facilities. Participants currently access / travel to Cranbrook and South West venues for competition events.
Burn-outs and Social events – e.g. “Show ‘n shine”	High	Inadequate	No / limited formalised areas for all weather burn-out events. High demand and high potential for expanded participation with improved facilities. No formalised areas for large scale social events, with supporting facilities – e.g. workshops, pits, burn-out pad.

## *Recommendations for motorsport development in the LGS region*

In the long-term, it was recommended that the City of Albany support the development of a regional multi-use motorplex that could accommodate most motorsport disciplines, in a location that is properly zoned, planned and managed. Adopting a long-term planning approach will minimise the typical constraints faced by motorsport clubs and venues, as well as maximising the commercial benefits of shared facilities.

However, a regional multi-use motorplex will require appropriate commercial management and cannot be sustained by relying only on the expected revenue from local motorsport participants. To be successful, such a facility will need to attract significant and consistent revenue from outside of the Great Southern region – i.e. through activities such as driver training, vehicle testing and ‘experiential’ motorsports tourism. It was recommended that a regional multi-use motorplex should be operated as a business, which alongside its key commercial revenue-generating activities, is also able to provide a venue (for a fee) to local motorsports clubs.

To support the identified motorsport user demand in the Study Area, it was recommended that a multi-use motorplex consists of:

1. Sealed, lighted and configurable racing circuit for:
  - Four-wheel and two-wheel circuit racing,
  - Speed events, inc. drifting,
  - Driver education, and
  - (Bi)cycling (as a compatible sport).
2. Drag strip (min. 1/8<sup>th</sup> mile) and burn-out pad (40 m × 25 m) for:
  - Four-wheel and two-wheel drag racing,
  - Burn-out competitions,
  - Social / display events, and
  - Driver education.
3. Motocross (dirt) track, potentially with associated enduro track(s).

### ***Desirable characteristics of a multi-use motorplex site***

1. A site should be in reasonable proximity (15 – 20 km) to the Albany Health Campus.
2. A site should be securable and sectionable, such that it is able to host multiple events simultaneously.
3. A site should be sufficiently large to accommodate and contain major event crowds, with appropriate spectator areas, competitors’ and officials’ facilities, function rooms, parking, ablutions and catering facilities. This will minimise impacts on surrounding properties.
4. Access to the site, particularly for major events, should be planned in cooperation with City of Albany and Main Roads to minimise road network impacts.
5. A site should be appropriately located and zoned in the Albany Local Planning Scheme No.1 to minimise long-term encroachment by incompatible land uses.
6. The environmental setting of a site should seek to minimise vegetation clearing, noise and lighting impacts, and surface and groundwater impacts.

### ***Potential socio-economic impacts of a regional multi-use motorplex***

- The social / community nature of motorsport clubs is highly valued by participants. Local motorsport enthusiasts will have a permanent, formalised venue to enjoy their passion – avoiding the need to travel to Collie, Perth or other venues across the state – and potentially reduce dangerous driving behaviour on local streets.
- Local motorsport and cycling clubs will be able to share the facilities, lowering their running costs, providing a great venue for social / community / family events, and fostering increased sports participation for young people in the region.

- Commercial driver training / vehicle /component testing business(es) could be established, attracting new revenue and visitors to the region.
- National and international motorsport events would be hosted at the motorplex.
- The local economy would be boosted through increased visitors for motorsport events, and by increased expenditure by local motorsport participants:
  - Direct value added (DVA) of motorsports in the region could grow from \$3.3 million currently to \$3.7 million over 10 years. This is a small percentage (<<1%) of Gross Regional Product and total household expenditure on “recreation and culture”.
  - Total expenditure by local motorsport participants could be expected to grow through increased participation rates and increased rates of expenditure. This could grow from an estimated \$5.6 – \$8.8 million currently, to \$12.0 – \$15.0 million in 10 years. Motorsport participants in the LGS Study Area spend \$7,000 – \$11,000 per year on their sport (compared to a national average of \$12,000 - \$15,000 per year).
  - There is presently insufficient information to estimate the potential boost caused by a motorplex to the Study Area’s \$90 million tourism industry. However, data suggests that sports-related tourists spend up to 30% more than typical ‘holiday’ tourists.

#### 1.4.2 DLGSCI: WA Motorsport Strategy (DRAFT) (Dave Lanfear Consulting, August 2018)

Sport and Recreation WA (a division of DLGSCI) recently commissioned a state-wide motorsport strategy to guide the state government’s planning and investment decisions in the industry. The stated objectives of the Western Australian (WA) Motorsport Strategy are to:

1. Identify the infrastructure needs of road/track based motorsport activities,
2. Develop a hierarchy of motorsport facilities from State level (Wanneroo Raceway), regional level and district level of functionality and catchment,
3. Provide a plan that supports future investment in road/track based motorsport infrastructure,
4. Leverage the current financial commitments, and
5. Identify appropriate representative governance and management structures including sanctioning and licensing.

In relation to the proposed AMP, the WA Motorsport Strategy identifies it as a “regional” or “local” level facility and makes the following recommendations:

- Undertake more detailed planning and feasibility of developing a motorsport precinct at Down Road for regional based motorsport activity by:
  - a. Undertaking an initial assessment of the viability of developing a motorsport precinct for bitumen and no-bitumen activities, focusing on water monitoring and assessment for a two year period and environmental assessment based on advice from the Department of Water and Environmental Regulation. This will need to consider the implications on the capital and ongoing operational costs of operating a motorsport precinct, having regard to potential operational restrictions.

- b. Rationalise current proposed infrastructure to limit activity to:
- (1) Small multi-functional bitumen circuit which can be subdivided to provide hill climb, driver and rider training/experience and club based competition. Initially the circuit should be developed between 1.6 km and 2.2 km to provide an effective club and driver/rider training circuit.
  - (2) Burnout areas within a controlled affiliated facility – sanctioned by an appropriate body.
  - (3) Motocross.
  - (4) Clubhouse and maintenance shed.
  - (5) Fenced competitors pit area with water and power supply, roofed assembly area, enclosed wash bays with concrete floor and silt traps.
  - (6) Starting grid and starter's control tower, and public address system.
  - (7) Bitumen car parking areas adjacent to the bitumen racing circuit (to potentially double up for additional driver and rider training).
  - (8) Spectator infrastructure (banking incorporating limestone blocks).
- c. Develop and implement an environmental management plan for the site. To be led by the City of Albany. Ensure that a long-term management plan is established and implemented to protect and enhance the natural environment within the Motorsport Complex.
- The above is predicated on the ability to develop the site. Should the site not be capable of being developed due to the high quality drinking water and potential environmental issues and/or the capital and lifecycle costs of the water mitigation strategies, alternative options will need to be explored across the Great Southern region to identify an alternative site which may accommodate a range of motorsport disciplines.

## 2. Site description

### 2.1 Location

The Project Site is located approximately 20 km to the north of the Albany CBD, at Lot 5780, Down Road South, Drome within the City of Albany municipality (refer Figure 1-1).

The Project Site is bounded by:

- Down Road West to the north,
- Down Road South to the east,
- Lot 5781, Down Road South to the south (private owner), and
- A local road reserve and the Avon-Albany rail reserve to the west.

Lot 5780 is 192.34 ha in size, of which approximately 52 ha at the western end is covered with well-established vegetation and not considered available for development.

### 2.2 Ownership

The freehold owner of the property is Susan Elizabeth Page, as executor of the Will of Audrey Helen Old who died on 20 June 2015, registered 1 December 2015. Certificate of Title of the property is Lot 5780, on Plan 206199 Volume 1352 Folio 224, located on Down Road South, Drome, Western Australia.

Redacted text

A pending Mining Tenement also exists over a large portion of Lot 5780. This Mining Tenement is an Exploration Licence (E 7005016) held by Australian Silica Quartz Pty Ltd since 22 August 2017, and currently has a status of 'unsurveyed' (DMIRS, 2018).

### 2.3 Zoning and existing buffers

Under the City of Albany Local Planning Scheme No. 1 the Project Site is zoned as '*Priority Agriculture*' and is located within an Industrial Buffer Area (IA4BA) surrounding the Mirambeena Timber Processing Precinct (TPP – i.e. Albany Plantation Export Company (APEC) and Plantation Energy) to the north of Down Road West (Figure 2-1) (DoP, 2014).

The land immediately adjacent to the Project Site is also predominantly zoned '*Priority Agriculture*' with the exception of the Albany Plantation Export Company (APEC) wood chip mill and Plantation Energy wood pellet production facility, which are zoned '*General Industry*'. The western boundary of the Project Site lies adjacent to a local road reserve and railway line which is zoned '*Major road, Rail*'. Land to the south-west of the railway is zoned '*General Agriculture*' (DPLH, 2018).

The Project Site is also located within a Priority 2 (P2) public drinking water sources special control area within the Marbelup Brook Catchment Area (DoP, 2014). This public drinking water source area (PDWSA) is gazetted under the *Country Areas Water Supply Act 1947*, however is not currently used. It has been identified as a potential future water source option in the *Great Southern Regional Water Supply Strategy 2014* (DoW, 2014). The Minister for Water has formally provided advice to the City of Albany (Kelly, 2018) that while a motorsport facility is incompatible with a P2 PDWSA (DoW, 2016), "there are measures that can be put in place to protect water quality should the City proceed to approve the development". These measures are further discussed in section 8 – Preliminary water management plan.

Approximately 900 m to the south of the Project Site, the Down Road Nature Reserve (Lot 7388 on P091191 and Lot 7676 on P217695) is zoned '*Parks and Recreation*' (DPLH, 2018).

### 2.4 Surrounding land uses

The immediately surrounding land uses include a railway to the west of the Project Site, APEC and Plantation Energy to the north of Down Road West and '*Priority Agriculture*' to the south and east. The CBH Mirambeena grain storage facility is also north of the site, on Down Road.

Further afield land uses are also largely '*Priority Agriculture*', or '*General Agriculture*'. The Down Road Nature Reserve is located approximately 900 m to the south; and the Water Corporation's Gunn Road tree plantation is located approximately 2,500 m to the east. The Mirambeena Strategic Industrial Area (SIA) is located approximately 2,000 m to the east on Albany Highway.

### 2.5 Existing services

The Project Site is currently unserviced, with no connections to scheme water, sewerage, power or wired telecommunications. The site does receive reasonable 4G and 3G mobile phone coverage (refer to section 11.1.2).

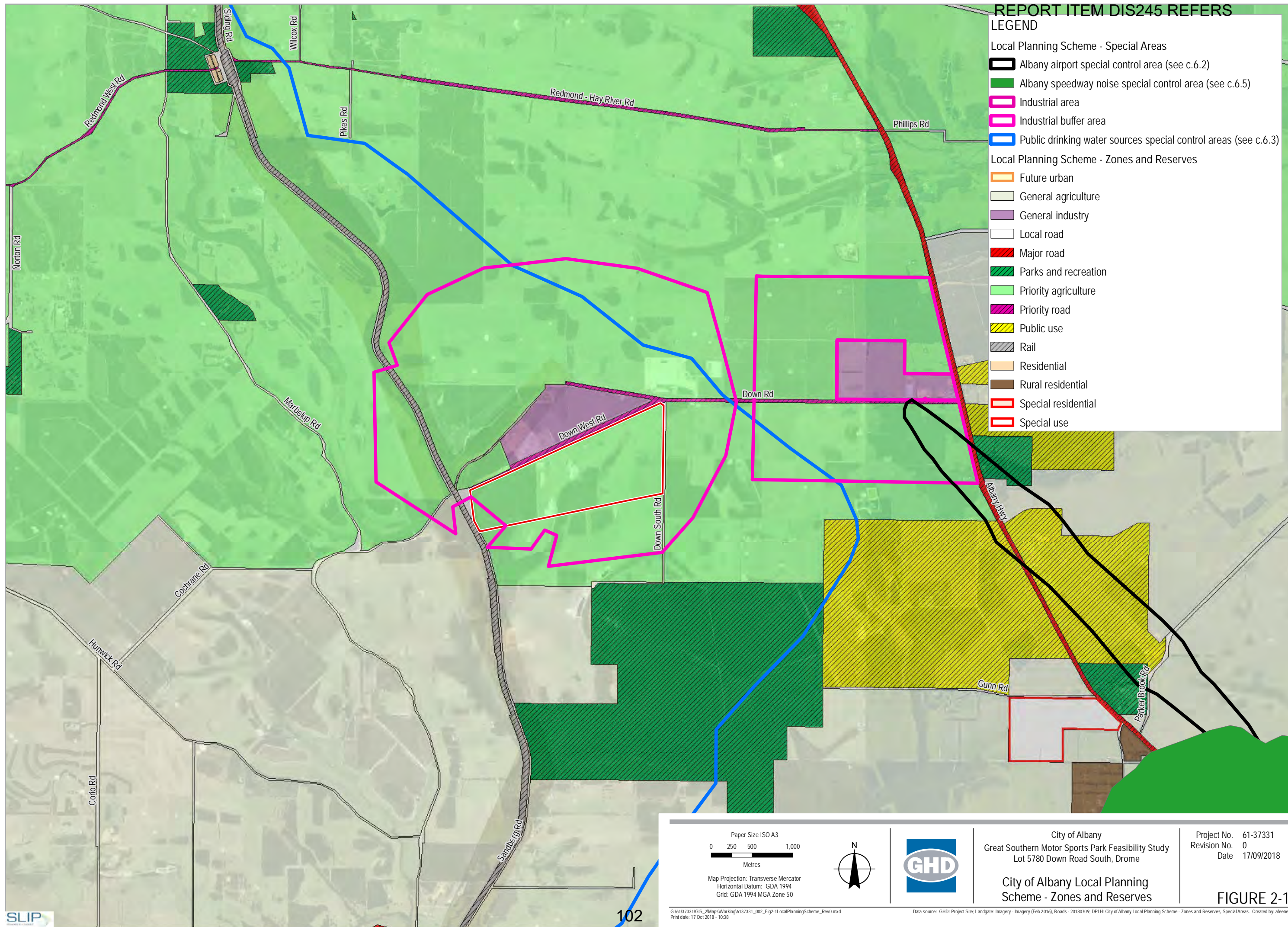
The Water Corporation's Lower Great Southern Towns Water Supply Scheme (LGSTWSS) runs along Albany Highway, with the nearest connection point approximately 4 km to the east at 66 Down Road (fertiliser distribution warehouse) (Water Corporation, 2018). Drinking water supply is further discussed in section 8.1.

The Water Corporation's Albany sewerage scheme is not in close proximity to the site, with the nearest connection point being at Lancaster Road, McKail (being some 10 km distant).

Wastewater management will require on-site solutions and is discussed further in section 8.4.

Western Power high voltage power lines currently run along the eastern boundary of the Project Site. Connection to power is further discussed in section 11.

Telstra fibre optic communications cables currently run along the northern side of Down Road West. Connection to telecommunications is discussed in section 11.2.1.



**REPORT ITEM DIS245 REFERS LEGEND**

**Local Planning Scheme - Special Areas**

- Albany airport special control area (see c.6.2)
- Albany speedway noise special control area (see c.6.5)
- Industrial area
- Industrial buffer area
- Public drinking water sources special control areas (see c.6.3)

**Local Planning Scheme - Zones and Reserves**

- Future urban
- General agriculture
- General industry
- Local road
- Major road
- Parks and recreation
- Priority agriculture
- Priority road
- Public use
- Rail
- Residential
- Rural residential
- Special residential
- Special use

<p>Paper Size ISO A3</p> <p>0 250 500 1,000</p> <p>Metres</p> <p>Map Projection: Transverse Mercator Horizontal Datum: GDA 1994 Grid: GDA 1994 MGA Zone 50</p>			<p>City of Albany</p> <p>Great Southern Motor Sports Park Feasibility Study Lot 5780 Down Road South, Drome</p>	<p>Project No. 61-37331</p> <p>Revision No. 0</p> <p>Date 17/09/2018</p>
			<p>City of Albany Local Planning Scheme - Zones and Reserves</p>	<p><b>FIGURE 2-1</b></p>



2.6 Existing and historical uses

The perimeter of the Project Site is entirely fenced and is currently used for the primary purpose of cattle grazing. Historically the Project Site is likely to also have been used solely for the purpose of agriculture. The western end of the property consists of 52 ha of native vegetation that will be retained. An unnamed creek line runs from the north-east corner of the property through to the south-west corner, from where it joins into Marbelup Brook. A number of small dams are located across the property for stock watering. These will be retained and maintained for the AMP.

The Plantation Energy sub-leased area consists of a small retention basin, connected to their site drainage system on the other side of Down Road West. The sub-lease area is powered, and Plantation Energy operates a pump from the retention basin. This area is unfenced, although there is a locked access gate on the site perimeter fence, off Down Road West.

Adjacent to the Plantation Energy retention basin, there is presently a significant amount of rubbish (comprising of what appears to be decommissioned process vessels, oil drums, scrap metal, electrical cable, plastic, chemical containers, etc.), which will need to be removed prior to any property transactions. Several large stockpiles of woodchips are also present, which will also need to be removed. It is understood that the woodchip stockpiles are owned by Plantation Energy and the stockpile area sub-leased by Plantation Energy from Lindsay and Joy Black (although it is noted that the Black’s formal lease over the property is expired). The GSMG understand that this area will need to be cleared and made good prior to the sale of the property.



Figure 2-2: Images of Plantation Energy sub-lease area

## REPORT ITEM DIS245 REFERS

Mr Lindsay Black also has a current Planning Consent over two locations on this site for the purpose of extracting sand. Both sand pits are covered under the same Consent (No. P275225), which was approved on 14 September 2007. Access is via Down Road West, using the same gate as the Plantation Energy sub-lease area. The GSMG understand the Mr Black is imminently ceasing the quarrying activities and will make good the affected area (as required under the conditions of the Planning Consent).

### 3. Albany Motorsport Park concept design

#### 3.1 Layout and facilities

The concept design for the Albany Motorsport Park (AMP) has been developed by the non-for-profit Great Southern Motorplex Group (GSMG) and Roberts Gardiner Architects. The GSMG has undertaken significant research into the requirements for track licensing by the Confederation of Australian Motor Sport (CAMS) and the specifications of:

- Fédération Internationalé de l'Automobile (FIA),
- Fédération Internationalé Motocyclisme (FIM),
- Motorcycling Australia (MA), and
- Australian National Drag Racing Association (ANDRA).

The proposed AMP will consist of:

1. Sealed, configurable multi-use track (3.2 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with CAMS' *Track Operator's Safety Guide* (CAMS, 2012) and MA's *Track Guidelines* (MA, 2011), and
  - To be licensed by CAMS for FIA Grade 2 and FIM Grade B (i.e. up to second-tier international motor racing).
2. A motocross circuit:
  - Designed and constructed in association with MA guidelines.
3. A 1/8<sup>th</sup> mile drag racing strip:
  - Designed and constructed in accordance with FIA specifications for drag strips and in association with ANDRA.
4. A 1,300 m<sup>2</sup> burnout area,
5. An off-road four wheel drive (4WD) and all-terrain vehicle (ATV) training area,
6. Allowance for future speedway;
7. Allowance for future go-karts.

At full development, the AMP will also include associated facilities, such as:

- Toilets,
- Medical / first aid station,
- Manager's office,
- Meeting / briefing room
- Kitchen / canteen,
- Storage / grounds maintenance workshop,
- Vehicle scrutineers' workshop,
- Control tower,
- Spectators viewing areas,
- Grassed spectators' picnic area with shade and BBQs,
- Competitors parking, and
- Spectators parking.



Figure 3-1: AMP concept site layout

### 3.2 Events and usage

Outlined below in Table 3-1 is the expected usage of the AMP, as conceptualised by the GSMG. For the purposes of sizing facilities and servicing infrastructure, **a typical / frequent site attendance of 500 persons has been assumed** (i.e. competitors + officials + spectators). This was determined through discussion with the GSMG on the nature and size of expected typical events. For special events that anticipate a greater number of site attendees, additional management measures will need to be implemented – for example:

- Community notices,
- Portable generators,
- Porta-loos,
- Drinking water carts,
- Temporary seating, and
- Traffic and parking management controls.

Table 3-1: Indicative AMP event profile

Use	Level	Frequency	Duration	Entrants	Spectators
Driver training, schools, manufacturer testing		Week days	Day	50	0
Car test & tune day	Club	4 week days / month	Day	30	30
Car speed events	Club	1 weekend / month	Day	100	200 – 500
Car speed events	State	1 weekend / month	Day	100 – 200	200 – 1,000
Car speed events	National	1 weekend / year	Day	200 – 300	2,000 – 5,000
Super cars events	National	1 × 3 day weekend / year	Day	200 – 300	10,000 – 20,000
Bike test and tune day	Club	4 week days / month	Day	50	50
Bike speed events	Club	1 weekend / month	Day	100	200 – 500
Bike speed events – Champions Ride Day	State	1 weekend / month	Day	100	200 – 1,000
Bike speed events	National	1 weekend / year	Day	200	1,000 – 5,000
Motocross events	Club	3 days / week training 4 single days / month	Day	100 – 200	200 – 400
Motocross events	State	1 weekend / month	Day	200 – 300	500 – 1,000
Drifting day	Club	2 days / month	Day and evening	30	30
Drifting day	State	1 weekend / month	Day and evening	50	200 – 500
Burnout day	Club	1 weekend / month	Day or evening	30	30
Burnout day	State	1 × 3 day weekend / year	Day or evening	50	1,000 – 2,000

Use	Level	Frequency	Duration	Entrants	Spectators
Drag racing practice day	Club	4 week days / month	Day	30	100
Drag racing competition	Club	1 day / month	Day and evening	30	200 – 500
Drag racing competition	State	4 weekends / year	Day and evening	50	500 – 1,000
Drag racing competition	National	1 weekend / year	Day or evening	50	1,000 – 5,000
Motorkhana	Club	1 day / month	Day	50	200
Tractor pull	State	2 weekends / year	Day	50	1,000 – 2,000

Duration of events:

- Typical day operation is 8:00 am – 6:00 pm, and
- Typical evening operation is 6:00 pm – 10:00 pm and only conducted if fixed or mobile lighting is available.

### 3.3 Governance

Governance and ownership arrangements for the AMP are still subject to further investigation, but for the purposes of this study it is assumed that the property will be owned by the City of Albany, as will the tracks and all permanent facilities constructed on the property. The AMP will be leased to an operator-manager by the City of Albany, with all operational and maintenance activities to be conducted by the operator-manager.

The operator-manager of the AMP will be a “not-for-profit” company consisting of a Board of Management and no other shareholders. The Directors will be representatives from the following:

- City of Albany Council,
- DLGSCI,
- The Member for Albany,
- Any other authority nominated by the City of Albany,
- A representative of the motorsports clubs involved in the AMP.

### 3.4 Servicing requirements

To successfully operate the AMP, the following servicing requirements are anticipated:

- Power – for buildings, control tower, lighting, security and competitors’ requirements (e.g. tools, motorcycle tyre warmers, battery chargers etc.),
- Telecommunications for office buildings,
- Lighting – either fixed or mobile lights for burnout pad, drifting circuit and drag strip,
- Parking – sealed or gravel hardstand for approx. 200 – 250 vehicles (competitors + officials + spectators), including single trailers and trucks,
- Drinking water – either by rainwater collection and/or water carts, and
- On-site wastewater treatment and disposal.

The deployment of these services is likely to occur in a staged delivery, commensurate with the progressive development of the Project Site.

### 3.5 Preliminary capital cost estimate

GHD has prepared the preliminary capital cost estimate set out in this section (“Cost Estimate”) using information reasonably available to the GHD employee(s) who prepared this report; and based on assumptions and judgments made by GHD. The Cost Estimate has been prepared for the purpose of budget setting and must not be used for any other purpose.

The Cost Estimate is a preliminary estimate only. Actual prices, costs and other variables may be different to those used to prepare the Cost Estimate and may change. Unless as otherwise specified in this report, no detailed quotation has been obtained for actions identified in this report. GHD does not represent, warrant or guarantee that the project can or will be undertaken at a cost which is the same or less than the Cost Estimate.

Outlined in Table 3-2 is a summary of the capital cost estimate for the AMP, including the likely staging of development. An estimate for a similar concept design was independently prepared for the WA Motorsports Strategy (Lanfear, 2018) and came to \$35.65 million.

Table 3-2: Preliminary capital cost estimate

Area	TOTAL (\$)	In-kind contribution	Stage 1 (\$)	Stage 2 (\$)	Stage 3 (\$)
Motocross	2,973,000	382,000	437,000	1,673,000	449,000
Multi-use track	11,426,000	151,000	7,379,500	2,772,500	1,111,000
Drag strip	3,726,000	0	0	2,968,000	513,000
4WD / ATV area	444,000	133,000	0	300,000	0
Common / general items	5,261,000	270,000	3,016,000	1,189,200	436,800
<b>TOTAL</b>	<b>23,830,000</b>	<b>936,000</b>	<b>10,832,500</b>	<b>8,902,700</b>	<b>2,509,800</b>

The full detail and assumptions contained in the estimate are attached in Appendix B. Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected as the planning level, there remains a chance that the cost will be greater than the planning estimate, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the user and the nature of the project. The City of Albany should therefore select appropriate confidence levels to suit their particular risk profile.

### 3.5.1 Priorities and staging plan

Outlined below is Table 3-3 is an indicative staging plan for the AMP development. The priority facilities in Stage 1 are:

1. The motocross track – to resolve the lack of safe, permanent, easily accessible facilities for the Albany Motorcycle Club and enable rider training, Club and State level competitions to be held on a track that is to be accredited and licenced by Motorcycling Australia (MA),
2. The multi-use track – to allow the operator-manager to generate revenue through driver training and track rental activities, provide a safe and scrutinised venue to local enthusiasts such as the Great Southern Street Machine Association and provide a high level venue for State motor car, motorcycle and cycling events on a track to be approved and licenced by CAMS, and,
3. Enabling works, such as feasibility / planning / design works, critical environmental controls and access roads.

Stages 2 and 3 contemplate the further development of the AMP site as patronage increases and the range of uses is broadened (for example, to include lighted evening events) and is dependent on further funding from various sources becoming available.



Table 3-3: AMP staging plan

Stage 1 facilities	Stage 2 facilities	Stage 3 facilities
<p>Motocross track, plus:                      Associated civil works (i.e. drainage, fencing, unsealed parking area, etc.),                      Scrutineers and first aid temporary building,                      Portable toilets for events,                      Portable power generator,                      Rainwater tank for drinking water, and                      Portable communications / public address system.</p>	<p>Motocross clubrooms, plus:                      Sealed parking area,                      On-site wastewater treatment plant,                      Power connection, and                      Public address system.</p>	<p>Motocross maintenance and storage shed.</p>
<p>Multi-use track (inc. drifting and burn-out), plus:                      Associated civil works (i.e. drainage, 1LOP barriers, 2LOP fencing),                      Control tower,                      Temporary pits / control accommodation,                      Temporary first aid accommodation,                      Portable toilets for events,                      Portable power generator,                      Rainwater tank for drinking water, and                      Portable communications / public address system.</p>	<p>Multi-use track buildings for:                      Pits area and control room,                      First aid room,                      Clubrooms and briefing room,                      Scrutineers workshop,                      On-site wastewater treatment plant,                      Power connection, and                      Public address system.</p>	<p>Multi-use track maintenance shed, and                      Multi-use track lighting.</p>
	<p>Drag strip (1/8th mile), plus:                      Associated civil works (i.e. drainage, fencing, barrier protections, etc.),                      Control tower,                      Rainwater tank for drinking water, and                      Communications / public address system.</p>	<p>Drag strip grandstand and landscaping, and                      Drag strip lighting.</p>

Stage 1 facilities	Stage 2 facilities	Stage 3 facilities
4WD / ATV training area, plus: Associated civil works (i.e. drainage, fencing, etc.).	4WD / ATV maintenance shed, plus: Power connection, and Rainwater tank for drinking water.	
Common / general items: Feasibility, planning and design costs, Property purchase costs, Secondary emergency access road, Internal (unsealed) access road and (unsealed) parking area, Perimeter fencing and gates, and Down Road access and gatehouse.	Common / general items: Asphalt seal to parking area, Asphalt seal to access road, and Overflow parking area.	Site revegetation, landscaping and beautification.

## 4. Planning approvals

### 4.1 Scheme amendment

As identified in section 2.3, the proposed Project Site is currently zoned *Priority Agriculture* and hence a motorsport park would not be a permissible use. Based on advice from the DPLH and City of Albany Planning Department, the proposed site would need to be re-zoned as *Special Use* within the Albany Local Planning Scheme No.1. This change will require a formal Scheme amendment, which has a defined process and timeline under the Western Australian Planning Commission (WAPC) (refer to Figure 4-1). Key points to note in the Scheme amendment process are:

- Amendments can be defined as *basic*, *standard* or *complex*. The AMP proposal would likely be regarded as *standard* (particularly if the motorsports park concept is incorporated into the current draft of the Albany Local Planning Strategy).
- The amendment process is to be initiated by the relevant local government (i.e. City of Albany) and requires significant preparatory effort.
- All proposed amendments are referred to the Environmental Protection Authority (EPA), whom then determines whether the amendment needs to be assessed under the *Environmental Protection Act 1986*.
- Following advice from the EPA, the local government must then advertise the proposed amendment and accept public submissions for at least 42 days. This period extends to 60 days if the amendment is defined as *complex*.
- Following receipt and resolution of public submissions, the proposed amendment is then submitted by the local government to the WAPC, whom then has 60 days to make recommendations to the Minister.
- The Minister for Planning has final approval.

Given this defined approval process and the required consultation periods, it can be expected that a Scheme amendment process could take 6 – 12 months.

### 4.2 Development application

Once the Albany Local Planning Scheme No.1 is appropriately amended, the AMP proposal would then need to proceed with the normal development application process with City of Albany. For regional development applications, a project with value greater than \$10 million would also be mandatorily referred to the Southern Joint Development Assessment Panel (JDAP).

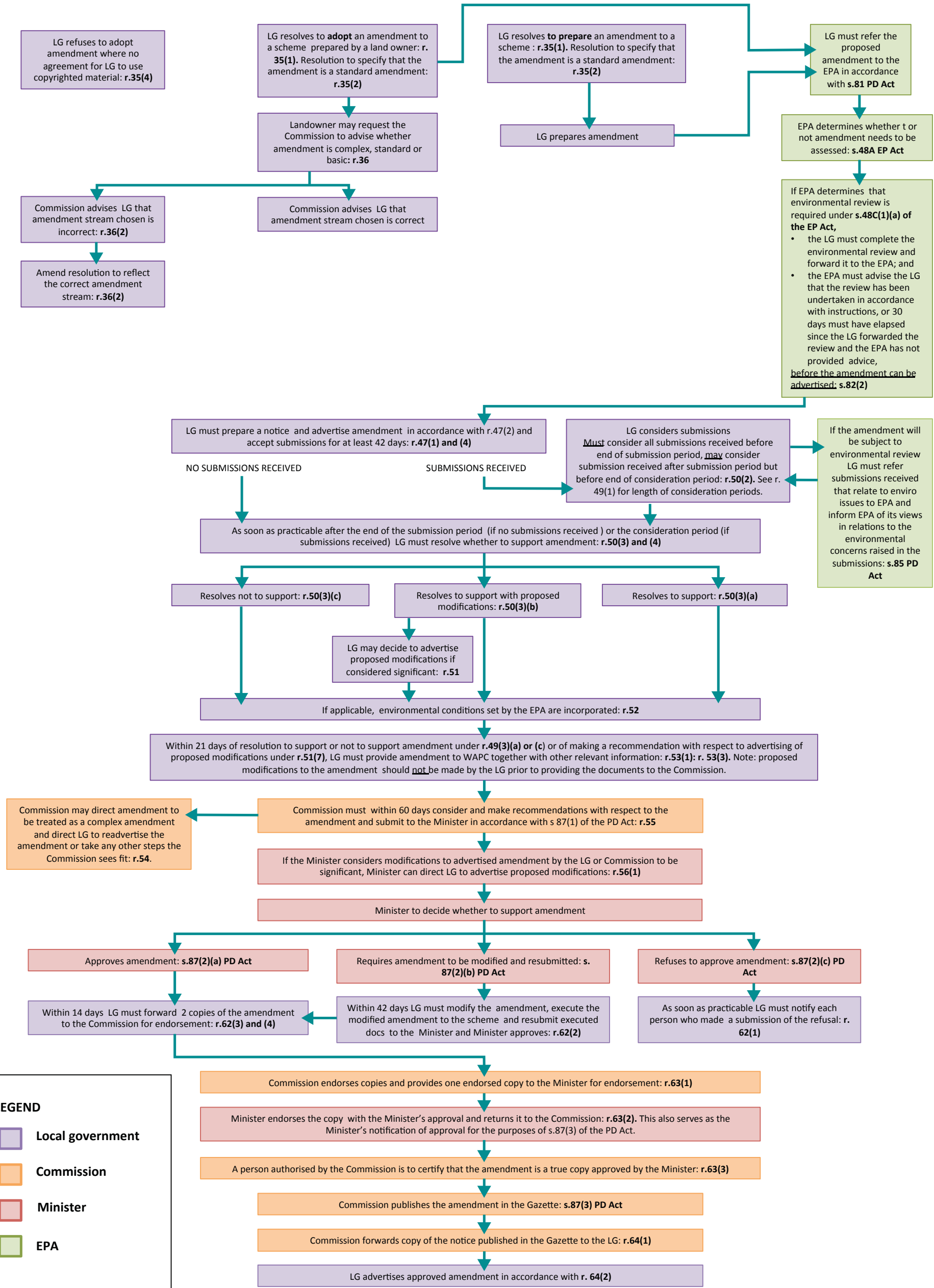
As per usual practice and prior to any decision by Council, the AMP development application would be referred to relevant state government agencies, such as Main Roads, DFES, Department of Health and Department of Water and Environmental Regulation (e.g. for noise, vegetation clearing, impacts on PDWSAs, etc.) for advice.

Based on formal correspondence and discussions, it is expected that DWER would provide advice to Council opposing any motorsport development within a PDWSA. This is consistent with DWER policy, as expressed in:

- WQPN 76 (March 2006): Land use planning in Public Drinking Water Source Areas,
- WQPN 25 (April 2016): Land use compatibility tables for PDWSAs, and
- WQPN 100 (April 2007): Motor sport facilities near sensitive waters.

Process for basic amendments to local planning schemes flowchart | Process for standard amendments to local planning schemes flowchart | Process for complex amendments to local planning schemes flowchart

Process for standard amendments to local planning schemes flowchart



**LEGEND**

- Local government
- Commission
- Minister
- EPA

Under WQPN 25 (DoW, 2016), a permanent motorsport facility is listed as 'incompatible' with P1 and P2 areas, and 'compatible with conditions' for P3 areas. WQPN 100 provides advice on the environmental risks to water resources posed by motorsport facilities, such as:

- Clearing of native vegetation,
- Leaks / spills of chemicals and hydrocarbons,
- Turbid / contaminated stormwater runoff,
- Solid waste and wastewater from workshops and washdown areas, and
- Toilet amenities for large numbers of people.

WQPN 100 provides further advice on the measures (through design and operation of the facility) that could be deployed to manage and monitor the above environmental risks. Any development application for a motorsport facility in a PDWSA would need to address the issues raised in WQPN 100 for a reasonable assessment to be made by Council. The development application should also include consideration of the facilities required to meet the provisions of the *Draft Country Sewerage Policy* (1999).

Under Western Australian planning legislation, any decision made by Council on a development application cannot be appealed by a third party.

### 4.3 Bushfire

The Department of Fire and Emergency Services (DFES) Map of Bush Fire Prone Areas indicates the Project Site is located in a 'Bush Fire Prone Area' and additional planning and building requirements may apply to development on the site (DFES, 2018).

Initial consultation with DFES by the City of Albany (*pers. comms.* J. Van Der Mescht, Manager Planning and Land Information Services, City of Albany 29 August 2018) indicates the Project Site will likely be classified as a 'vulnerable land use' with a tourism benefit and therefore a Bushfire Management Plan (BMP) will be required to be developed in accordance with AS 3959-2009: *Construction of buildings in bushfire prone areas* and the *Guidelines for Planning in Bushfire Prone Areas* (WAPC, 2017).

DFES have recommended that, as a component of the BMP, a precinct-wide strategic secondary access is developed to provide connection to Redmond-Hay River Road to the north, as shown in Figure 4-2. This has been suggested as a preferred alternative to a secondary east-west connection to Albany Highway, as this would terminate in the same general area as the intersection of Down Road and Albany Highway.

The potential alignment shown in Figure 4-2 minimises the number of properties impacted, and minimises vegetation clearing. The relevant properties are:

- Lot 22 Down Road (CBH site), and
- Lot 5774 Redmond-Hay River Road (private owner).

No consultation has yet been undertaken with these property owners.

Given the strategic nature of this secondary access road for the broader precinct, it is proposed that the easement (approx. 3.5 km × 14 m wide) be acquired by the City as 'local road reserve'. Alternatively, 'easements in gross' could be negotiated as a short term solution, but this is not preferred.

As the Project Site is proposed to be a tourism use DFES have suggested it may also be considered a place of refuge in the event of a fire.



Figure 4-2: Potential secondary access to Redmond-Hay River Road

The Bushfire Management Plan will be a critical element in securing planning approvals for the proposed site. Development of the AMP layout and concept design will need to give close consideration to the requirements of the *Guidelines for Planning in Bushfire Prone Areas* (WAPC, 2017). Further site investigations, such as Bushfire Hazard Level (BHL) and Bushfire Attack Level (BAL) assessments, will also be required to support the BMP once the AMP site layout and buildings design are refined.

## 5. Preliminary environmental impact assessment

### 5.1 Assessment of environmental aspects and impacts

The key environmental factors considered relevant to the AMP project are outlined in this section. For each aspect, a baseline environmental description is included and, where appropriate, is followed by an assessment of potential environmental impacts. The aspects assessed include:

- Acid sulfate soils (ASS),
- Hydrology and hydrogeology – surface water, wetlands, drainage, groundwater and public drinking water sources,
- Reserves and conservation areas,
- Environmentally sensitive areas,
- Terrestrial flora and vegetation – vegetation type, vegetation extent and status, vegetation condition, clearing, significant flora, Threatened Ecological Communities (TEC) and Priority Ecological Communities (PEC),
- Weeds and Declared Plants,
- Fauna – threatened fauna, habitat values, habitat linkages,
- Dieback,
- Aboriginal heritage,
- European heritage,
- Contaminated sites, and
- Construction and operational phase impacts – dust emissions, noise and vibration, visual amenity, fire, pollution, waste and hazardous materials, traffic management, topsoil management, revegetation and landscaping.

Where relevant, recommendations are provided for additional investigations and mitigation measures.

#### 5.1.1 Relevant legislative requirements

Key Commonwealth and Western Australian environmental legislation that may be relevant to the AMP project is listed in Table 5-1.

Table 5-1: Key environmental legislation relevant to the AMP project

Legislation	Responsible agency	Aspect
<b>Commonwealth legislation</b>		
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Department of the Environment and Energy (DEE)	Matters of National Environmental Significance including threatened flora and fauna
<i>Native Title Act 1993</i>	National Native Title Tribunal	Native title
<b>State legislation</b>		
<i>Aboriginal Heritage Act 1972</i>	Department of Lands, Planning and Heritage (DPLH)	Archaeological and ethnographic sites
<i>Biodiversity Conservation Act 2016</i>	DBCA	Protection of native flora and fauna
<i>Biosecurity and Agricultural Management Act 2007</i>	Department of Primary Industries and Regional Development (DPIRD)	Weeds and feral animals
<i>Conservation and Land Management Act 1984</i>	Department of Biodiversity, Conservation and Attractions (DBCA)	Use, protection and management of public lands and waters and its flora and fauna
<i>Contaminated Sites Act 2003</i>	Department of Water and Environment Regulation (DWER)	Management of contaminated sites
<i>Environmental Protection Act 1986</i>	Environmental Protection Authority (EPA) (Part IV) DWER (Part V)	Environmental impact assessment and management
<i>Environmental Protection (Noise) Regulations 1997</i>	DWER	Noise standards
<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>	DWER	Clearing of native vegetation
<i>Heritage of Western Australia Act 1990</i>	Heritage Council of Western Australia	European heritage protection
<i>Land Administration Act 1997 Department of Regional</i>	DPLH	Administration of State Land
<i>Rights in Water and Irrigation Act 1914</i>	DWER	Access to and use of water resources; protection and management of river flows and drainage
<i>Soil and Land Conservation Act 1945</i>	DPIRD	Protection of soil and prevention/management of soil erosion

### 5.1.1 Methodology

#### **Desktop assessment**

A desktop assessment of the AMP project and Project Site was undertaken by viewing GIS spatial files and reviewing information from publically available, government managed databases. The information sources utilised in this assessment are presented in Table 5-2.



Table 5-2: Information sources

Aspect	Information source
Climate	Bureau of Meteorology (BoM) Climate Data Online (BoM, 2018).
Geology, landform and soils	DPIRD Soil landscape mapping (GoWA, 2018).
Acid Sulphate Soils	DWER Acid Sulfate Soil Risk Map, Albany – Torbay (GoWA, 2018).
Land use and reserves	DBCA Legislated Lands and Waters (GoWA, 2018). City of Albany Local Planning Scheme No. 1 (Department of Planning (DoP, 2014).
Environmentally Sensitive Areas	DWER Clearing Regulations – Environmentally Sensitive Areas (GoWA, 2018).
Vegetation	Beard vegetation mapping (1979). DPIRD Pre-European Vegetation (GoWA, 2018). Statewide Vegetation Statistics (GoWA, 2018). DBCA NatureMap (DBCA, 2018). Albany Regional Vegetation Survey (ARVS) (Sandiford & Barrett, 2010). FloraBase (WA Herbarium, DBCA, 1998)
Threatened and Priority Ecological Communities	DBCA Threatened Ecological Communities (TEC) (GoWA, 2018). <i>Pers. comms</i> Sandra Maciejewski, Reserves (Natural) Officer, City of Albany 8 August 2018. EPBC Act Protected Matters Search Tool (DEE, 2018).
Conservation Significant Flora and Fauna	DBCA NatureMap database (DBCA, 2018). EPBC Act Protected Matters Search Tool (DEE, 2018).
Surface water and Groundwater	DWER data layers (GoWA, 2018): Groundwater Salinity Statewide Hydrographic Catchments – Catchments Hydrographic Catchments – Sub-catchments Public Drinking Water Source Areas RIWI Act, Groundwater Areas RIWI Act, Rivers RIWI Act, Surface Water Areas and Irrigation Districts Surface Water Allocation Areas Surface Water Allocation Subareas. DBCA data layers (GoWA, 2018): Ramsar Sites South Coast Significant Wetlands.
Contaminated sites	DWER Contaminated Sites Database (DWER, 2018).
Heritage	DPLH Heritage Inquiry System Search Tool (DPLH, 2018). EPBC Act Protected Matters Search Tool (DEE, 2018). Heritage Council InHerit database (GoWA, 2018). State Register of Heritage Places (DPLH, 2018).
Matters of National Environmental Significance (MNES)	EPBC Act Protected Matters Search Tool (DEE, 2018).

**Site walkover**

A GHD Senior Environmental Scientist and Principal Engineer conducted a site walkover on 3 July 2018. The site walkover included a visual assessment of native vegetation, observations on drainage / flow paths and the presence of existing disturbances such as waste dumping within the Project Site. Photographs were taken at key points within the Project Site.

The findings from the site walkover have been incorporated (where appropriate) into the relevant following sections. The photographs from the site walkover have been included as Appendix I.

## 5.1.2 Physical environment

**Climate**

Albany is located on the south coast of Western Australia and the climate is broadly described as Mediterranean, with warm dry summers and mild wet winters. The nearest Bureau of Meteorology (BoM) official recording station is Albany Airport (Station No. 9741). A summary of climatic data for this station is provided in Table 5-3 (BoM, 2018).

Table 5-3: Climatic data for the Albany Airport (Station No. 9741) for years 1960 to 2014 (BoM 2018)

Climatic variable	Statistic
Mean annual maximum temperature range	15.8°C in July to 24.9°C in February
Mean annual minimum temperature range	7.5°C in July to 14.5°C in February
Mean annual rainfall	798.1 mm
Mean annual rain days per year	83.1

**Topography, geology, landform and soils**

The surface elevation of the Project Site ranges from approximately 41 m AHD to 73 m AHD. The lowest elevation is on the southern boundary and extends through the centre of the Project Site within a gully (a tributary to Marbelup Brook) that lies in a north-easterly direction. The highest elevation occurs on the eastern boundary of the Project Site.

The regional geology is discussed in section 6.1.1. The local geology is further delineated by DPIRD Soil Landscape Mapping identified in Table 5-4 and illustrated in Figure 5-1.

Table 5-4: Soil map units within the Project Site (GoWA, 2018)

Map unit symbol	Name	Landform	Geology	Soil
242KgDMc	Dempster Crest phase	Broad convex crests of sandy and lateritic spurs and ridges	Deeply weathered siltstone	Duplex sandy gravels; Grey deep sandy duplexes; Pale deep sand; Shallow gravels
242KgS7f	Minor Valleys S7 floor phase	Foot slopes and swampy valley floors of minor valleys	Colluvial and alluvial deposits over weathered sedimentary rocks	Wet and semi-wet soils; Pale deep sands; Grey deep sandy duplexes
242KgS7h	Minor Valleys S7 slope phase	Side slopes of minor valleys	Colluvium sedimentary rocks	Pale deep sands; Grey deep sandy duplexes
242ReDMc	Dempster Crest phase	Elongate crests	No information recorded	Sands and laterite

### Acid sulfate soils

A review of the DWER ASS risk mapping for Albany-Torbay indicates the Project Site is located outside of the boundary of this dataset. Tributaries of Marbelup Brook located approximately 750 m to the south of the Project Site are mapped within areas of “*Moderate to Low Risk*” of ASS occurring within 3 m of the natural soil surface (Figure 5-2).

Therefore it is considered reasonable to assume that the tributaries of Marbelup Brook within the Project Site may also have a “*Moderate to Low Risk*” of ASS occurring within 3 m of the natural soil surface.

### Potential impacts

The AMP project will potentially result in impacts to the physical environment. These impacts are expected to occur during the construction phase and are likely to be minor and temporary given appropriate management measures. Potential impacts include:

- Temporary risk of water and wind erosion as a consequence of the proposed works. Areas of the Project Site with lighter-texture soils (e.g. sandy soils) are likely to be vulnerable to water and wind erosion. Areas of the Project Site with dispersive soils (e.g. clay soils) may also be prone to water erosion, particularly during high intensity rainfall events.
- Undisturbed ASS does not pose a risk, and only become an issue where excavation occurs, works are required below the water table, or lowering of the water table is required. The AMP project will likely include excavations and dewatering. ASS investigations and an ASS management plan (if required) should be undertaken once further construction details are defined.

### Management

It is anticipated that the potential impacts to the physical environment can be adequately managed for the construction and operational phase of the AMP project using standard techniques to maintain existing environmental conditions through the detailed design phase and the Preliminary Water Management Plan outlined in Section 8 including:

- Spill control and pollution management,
- Water sensitive urban design,

## REPORT ITEM DIS245 REFERS

- Erosion and sediment control, and
- On-site wastewater management and operational controls.

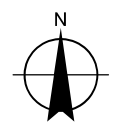
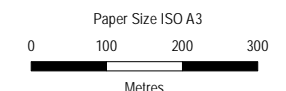
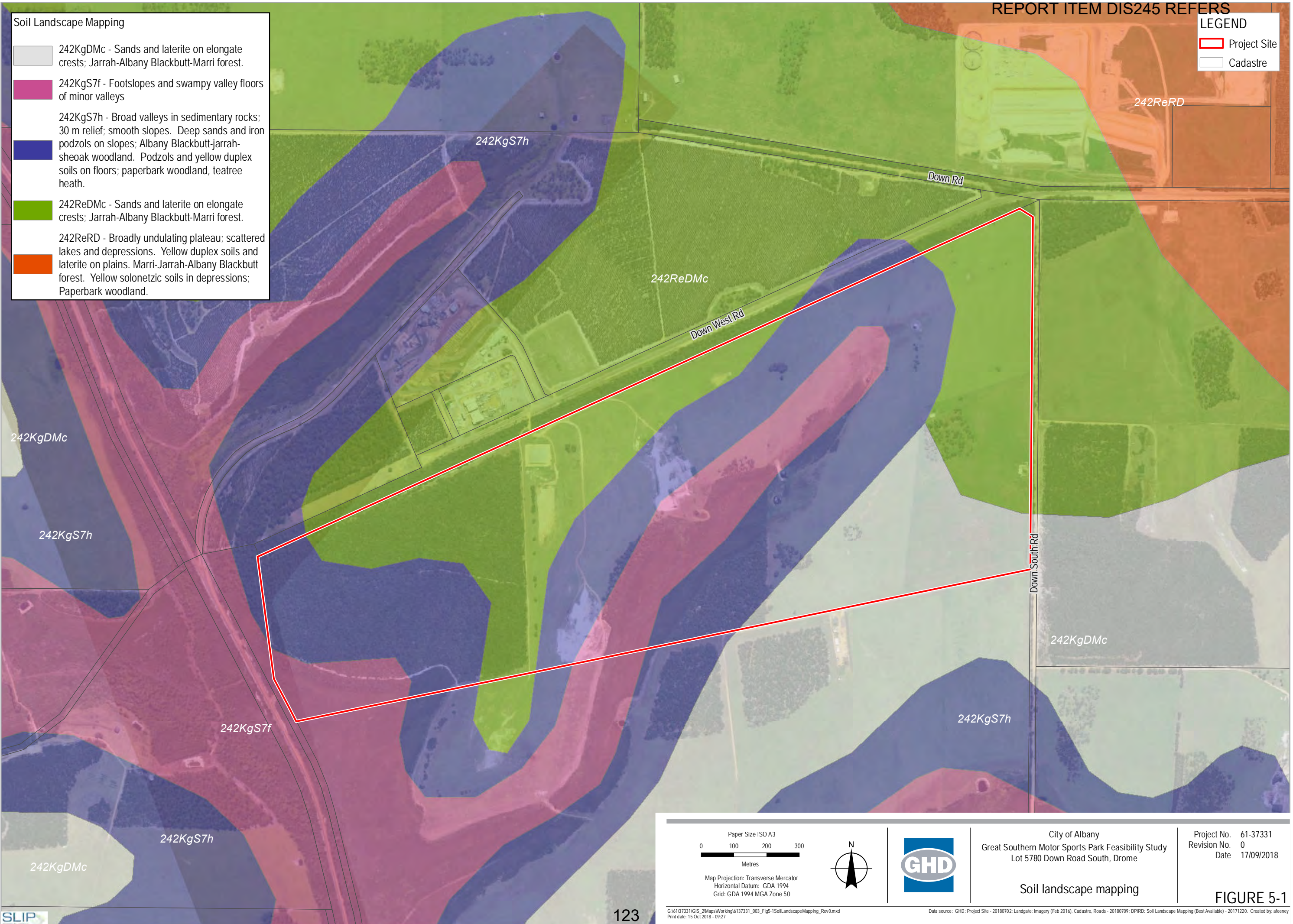
Once ASS investigations are deemed required and subsequently completed, an ASS (and if required – dewatering) management plan should be prepared, if ASS is identified. The ASS (and dewatering) management plan is to be prepared in accordance with DWER guidelines *Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes* (DER, 2015).

Soil Landscape Mapping

- 242KgDMc - Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri forest.
- 242KgS7f - Footholds and swampy valley floors of minor valleys
- 242KgS7h - Broad valleys in sedimentary rocks; 30 m relief; smooth slopes. Deep sands and iron podzols on slopes; Albany Blackbutt-jarrah-sheoak woodland. Podzols and yellow duplex soils on floors; paperbark woodland, teatree heath.
- 242ReDMc - Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri forest.
- 242ReRD - Broadly undulating plateau; scattered lakes and depressions. Yellow duplex soils and laterite on plains. Marri-Jarrah-Albany Blackbutt forest. Yellow solonchic soils in depressions; Paperbark woodland.

LEGEND

- Project Site
- Cadastre



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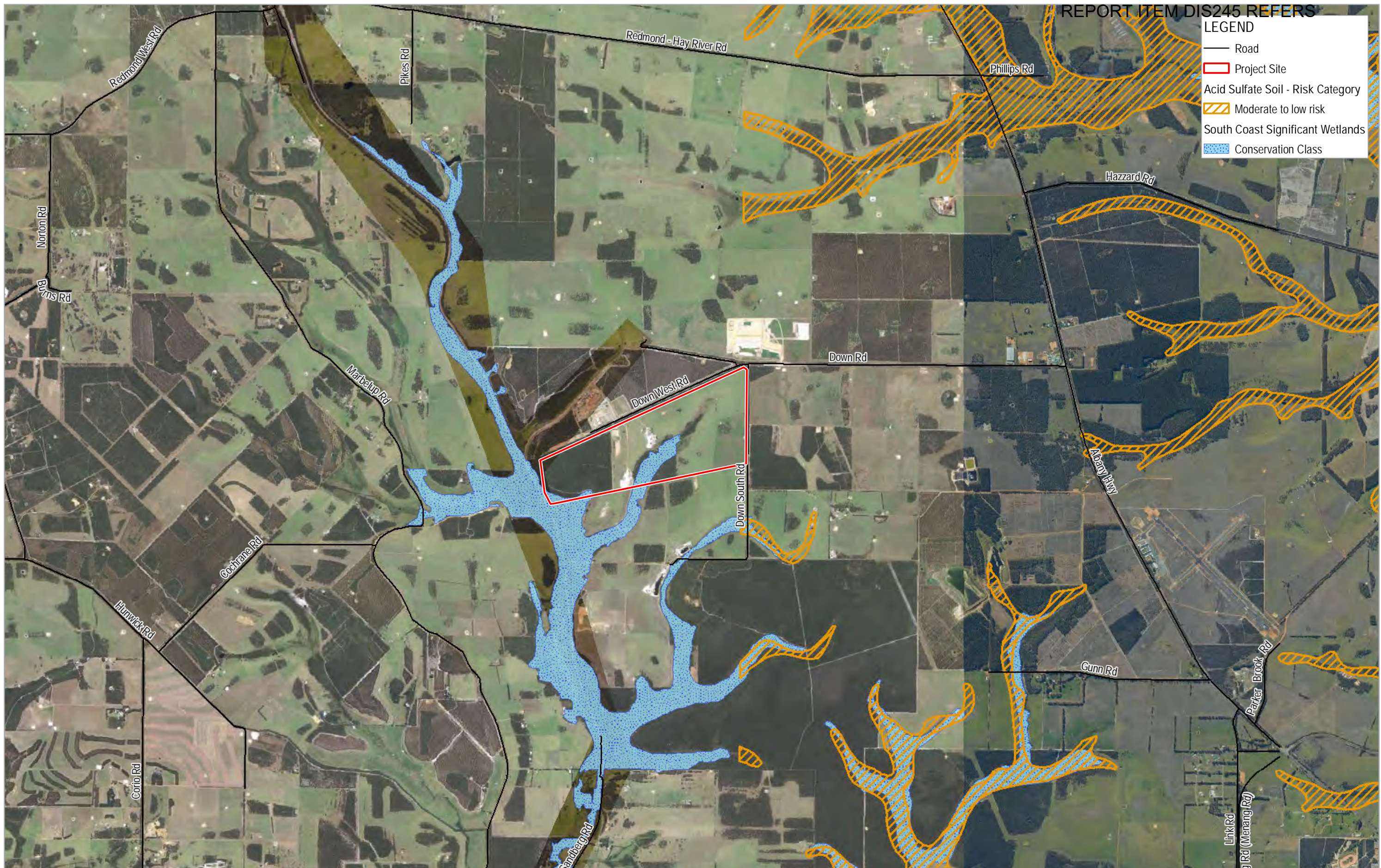
Project No. 61-37331  
Revision No. 0  
Date 17/09/2018

Soil landscape mapping

FIGURE 5-1

LEGEND

- Road
- ▭ Project Site
- Acid Sulfate Soil - Risk Category
  - ▨ Moderate to low risk
- South Coast Significant Wetlands
  - ▨ Conservation Class



<p>Paper Size ISO A3</p> <p>Kilometres</p> <p>Map Projection: Transverse Mercator Horizontal Datum: GDA 1994 Grid: GDA 1994 MGA Zone 50</p>		<p>City of Albany Great Southern Motor Sports Park Feasibility Study Lot 5780 Down Road South, Drome</p> <p>Acid sulfate soil risk map and South Coast significant wetlands</p>	<p>Project No. 61-37331 Revision No. 0 Date 17/09/2018</p> <p><b>FIGURE 5-2</b></p>
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## 5.1.3 Hydrology and hydrogeology

Desktop searches of the DWER hydrology layers were undertaken and are summarised in Table 5-5.

Table 5-5: DWER data queries within the Project Site (GoWA, 2018)

Aspect	Details	Result
Public Drinking Water Source Areas (PDWSA)	PDWSA is a collective term used for the description of Water Reserves, Catchment Areas and Underground Pollution Control Areas declared (gazetted) under the provisions of the Metropolitan Water Supply, Sewage and Drainage Act 1909 or the Country Area Water Supply Act 1947.	Project Site lies within the Priority 2 Marbelup Brook Catchment Area (Figure 5-3).
Groundwater Areas	Groundwater areas proclaimed under the Rights in Water and Irrigation Act 1914 (RIWI).	Project Site lies within Albany Groundwater Area (Figure 5-4).
Surface Water Areas	Surface water areas proclaimed under the RIWI Act 1914.	None present.
Irrigation District	Irrigation Districts proclaimed under the RIWI Act 1914.	None present.
Rivers	Rivers proclaimed under the RIWI Act 1914.	None present.
Waterways Management Areas	Areas proclaimed under the Waterway Conservation Act 1976.	None present within the Project Site, however the Albany Waterways Management Area is located approx. 800 m to the north.
Clearing Control Catchments	Country Area Water Supply Act 1947 Part 2A.	None present.

### Groundwater and hydrology

On a regional scale, the 250K Map Series – Hydrogeology identifies a “*sedimentary aquifer within intergranular porosity – extensive aquifers, major groundwater resources*” underlying the Site (DoW, 2002). Groundwater salinity in the local area is in the range of 500 – 1000 mg/L, which is considered to be marginal for productive uses (GoWA, 2018).

Bio Diverse Solutions has undertaken groundwater investigations for the Project Site, which are summarised in section 6.1.3.

### Surface water and drainage

The Project Site lies in the Marbelup Brook sub-catchment which forms part of the wider Torbay Inlet Catchment in the Denmark Coast Basin within the South West Division (GoWA, 2018).

The entire Project Site and surrounds are located within the Marbelup Brook Surface Water Allocation Sub Area (SWASA), which is a sub area of the Albany Coast Surface Water Allocation Area (SWAA) (GoWA, 2018).

An unnamed water course is present within the Project Site, draining from the north-east and centre of the site to the south across the southern boundary to the Marbelup Brook, which ultimately drains to Lake Powell. However the natural drainage of the lower part of Marbelup Brook catchment has been modified which diverts the lower part of Marbelup Brook away from Lake Powell to the Torbay Inlet (DoW, 2007).

During the site visit the watercourse was observed to be in a modified state, with cattle currently having access to the watercourse. Erosion was evident, particularly in the eastern extent of the watercourse. This area was also mostly devoid of native vegetation, with the exception of some sedges (*Juncus* spp) (Plate 5-1). The western section of the watercourse contains native shrubs / sedges and had a defined bed / banks.



Plate 5-1: Eastern extent of the watercourse showing evidence of erosion and cattle access

### ***Wetlands***

#### **International and nationally important wetlands**

Desktop searches identified no internationally important (Ramsar) or Nationally Important listed wetlands within 5 km of the Project Site (GoWA, 2018).

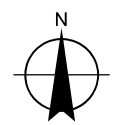
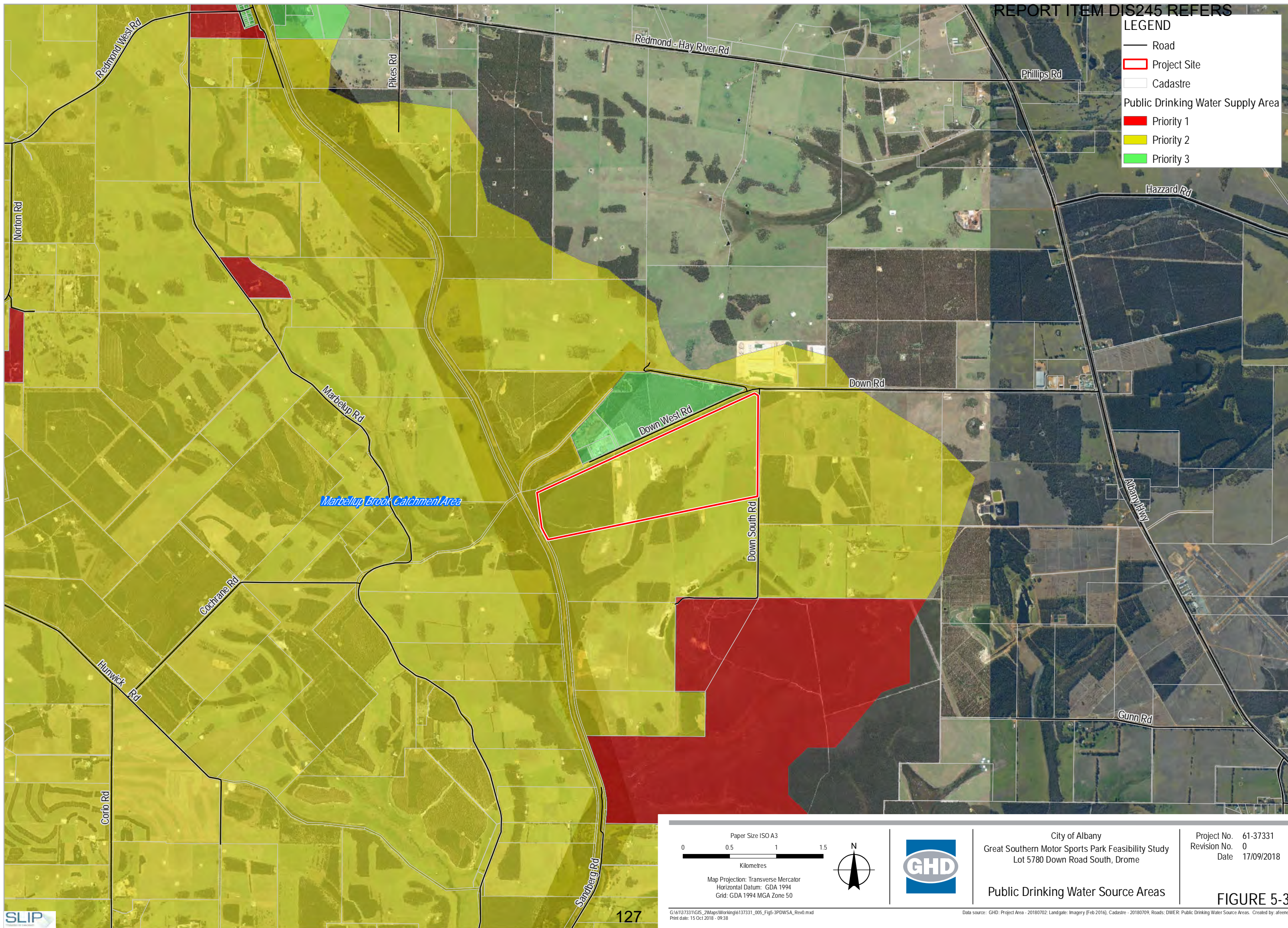
#### **South Coast Significant Wetlands**

The unnamed water course located within the Project Site is a tributary of Marbelup Brook and is a Conservation Class wetland (Figure 5-2) (GoWA, 2018).



LEGEND

- Road
- ▭ Project Site
- ▭ Cadastre
- Public Drinking Water Supply Area
- ▭ Priority 1
- ▭ Priority 2
- ▭ Priority 3



Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 50







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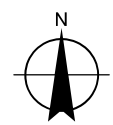
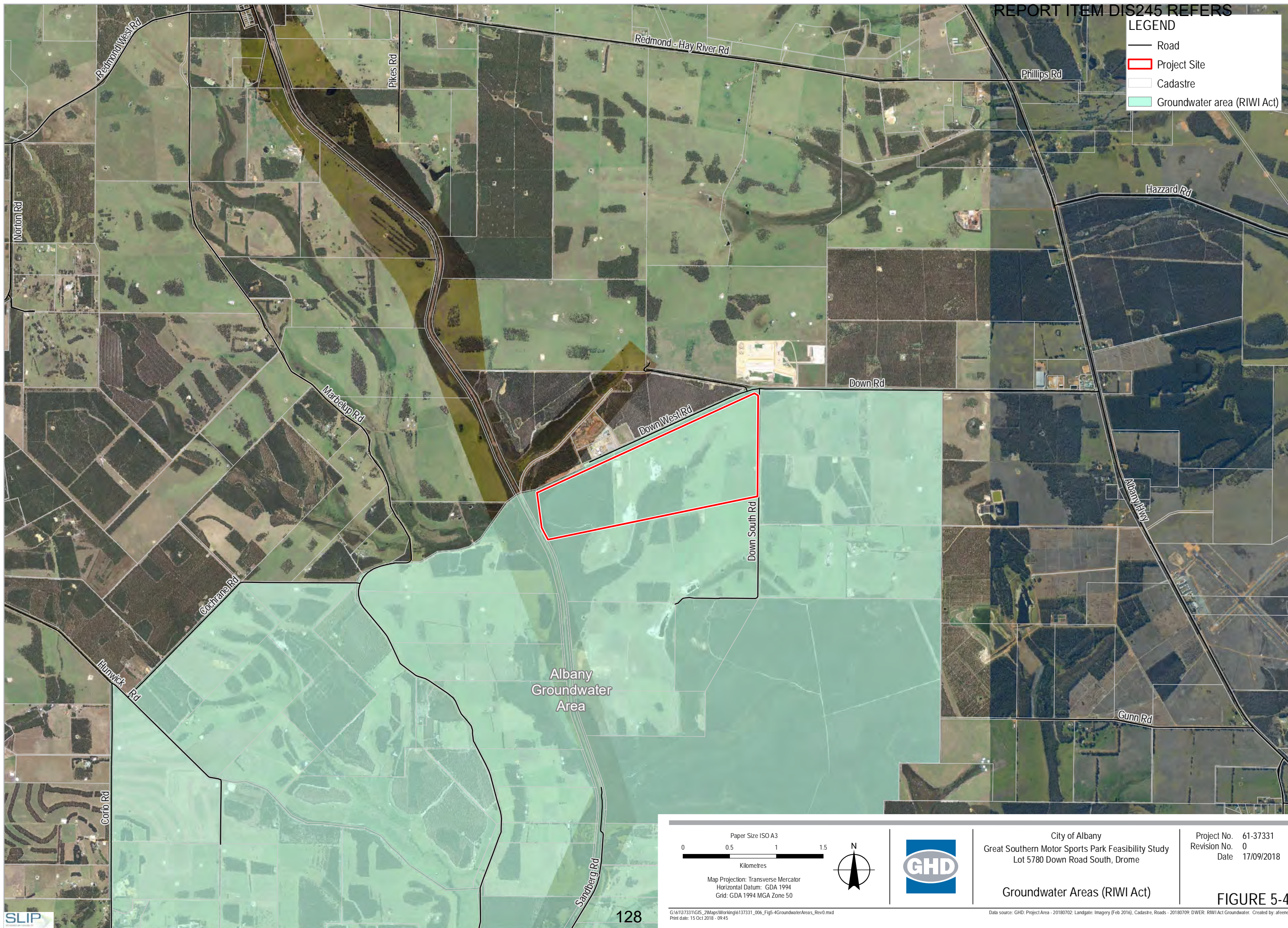
Public Drinking Water Source Areas

Project No. 61-37331  
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FIGURE 5-3

LEGEND

-  Road
-  Project Site
-  Cadastral
-  Groundwater area (RIWI Act)



Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 50



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Groundwater Areas (RIWI Act)

Project No. 61-37331  
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 Date 17/09/2018

FIGURE 5-4

### *Potential impacts*

The AMP project may cause disturbance or interruption to the natural drainage and surface run-off patterns, resulting in run-off to watercourses and wetlands potentially leading to issues in relation to contamination and sedimentation. However, the drainage design will aim to maintain existing hydrological regimes (refer to section 8).

Potential impacts to hydrology include:

- Groundwater – There may be the need for temporary lowering of groundwater levels during the construction phase of the AMP project. If so, a dewatering management plan should be prepared (generally included within the ASS management plan, if ASS is identified). No ongoing dewatering or abstraction of groundwater is considered likely during the operational phase of the AMP.
- Surface water – Marbelup Brook and associated tributaries. It is expected that the AMP project will utilise drainage features such as drains, basins, culverts and kerbing to avoid direct discharge of hardstand run-off into waterways. It is expected that the surface water hydrology will be maintained in its current regime with appropriate drainage design.
- Erosion/ sedimentation – During the construction phase and until revegetation has achieved a stable landform there is the potential for erosion and sedimentation. This is likely to be more pronounced in drainage areas.
- Vegetation – Clearing will not be undertaken within the watercourse. A 50 m development exclusion buffer will be maintained around the water course. Positive impacts on vegetation (improved vegetation health) within this buffer may be associated with removal of cattle (grazing/ trampling) and revegetation works.
- Pollution impacts associated with construction/ operational phase – The storage and handling of chemicals and hydrocarbons will require management to prevent pollution of soil, surface water and groundwater. Impacts associated with the operation phase of the AMP include runoff from hardstand areas, however, it is expected that with appropriate drainage design and management this can be minimised.

### *Management*

It is anticipated that the potential impacts to hydrology can be adequately managed for the construction and operational phase of the AMP project using standard techniques to maintain existing environmental conditions through the detailed design phase and the Preliminary Water Management Plan outlined in section 8 including:

- 50 m development exclusion buffer around the water course,
- Site revegetation and removal of cattle access,
- Spill control and pollution management,
- Non-structural measures (refer section 8.3.4),
- Erosion and sediment control, and
- On-site wastewater management and operational controls.

## 5.1.4 Conservation reserves and Environmentally Sensitive Areas

### **Conservation reserves**

There are no DBCA Legislated Lands and Waters intercepted by the Project Site. However there are two sites within 5 km of the Project Site including the following (GoWA, 2018):

- Down Road Nature Reserve located approximately 900 m to the south, and
- Phillips Brook Nature Reserve located approximately 4.4 km to the north east.

### **Environmentally Sensitive Areas**

The unnamed water course located within the Project Site is a tributary of Marbelup Brook and is a Conservation Class wetland (Figure 5-2) (GoWA, 2018). As per DWER guidance (DER, 2014), a conservation category wetland is “a defined wetland and the area within 50 m of the wetland” and is declared to be an Environmentally Sensitive Area (ESA) under the *Environmental Protection Act 1986*.

There is also one mapped ESA located within 5 km; approximately 4.7 km to the north-east of the Project Site (Figure 5-5) (GoWA, 2018).

### **Potential impacts**

A 50 m development exclusion buffer will be maintained around the water course to help mitigate potential impacts during the construction and operational phases of the AMP project.

It is anticipated that the potential impacts to this ESA can be managed through the implementation of a project-specific Construction Environmental Management Plan (CEMP) and EMP for construction and operational phases of the AMP.

## 5.1.5 Vegetation and flora

### **Regional biography**

The Project Site is located in the South West Botanical Province of Western Australia (Beard, 1990). The Southern Jarrah Forest IBRA subregion is characterised by “*Jarrah-Marri forest on laterite gravels and, in the eastern part, by Wandoo - Marri woodlands on clayey soils. Eluvial and alluvial deposits support Agonis shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands*” (Hearn, Williams, Comer, & Beecham, 2002, p. 382).

### **Pre-European vegetation**

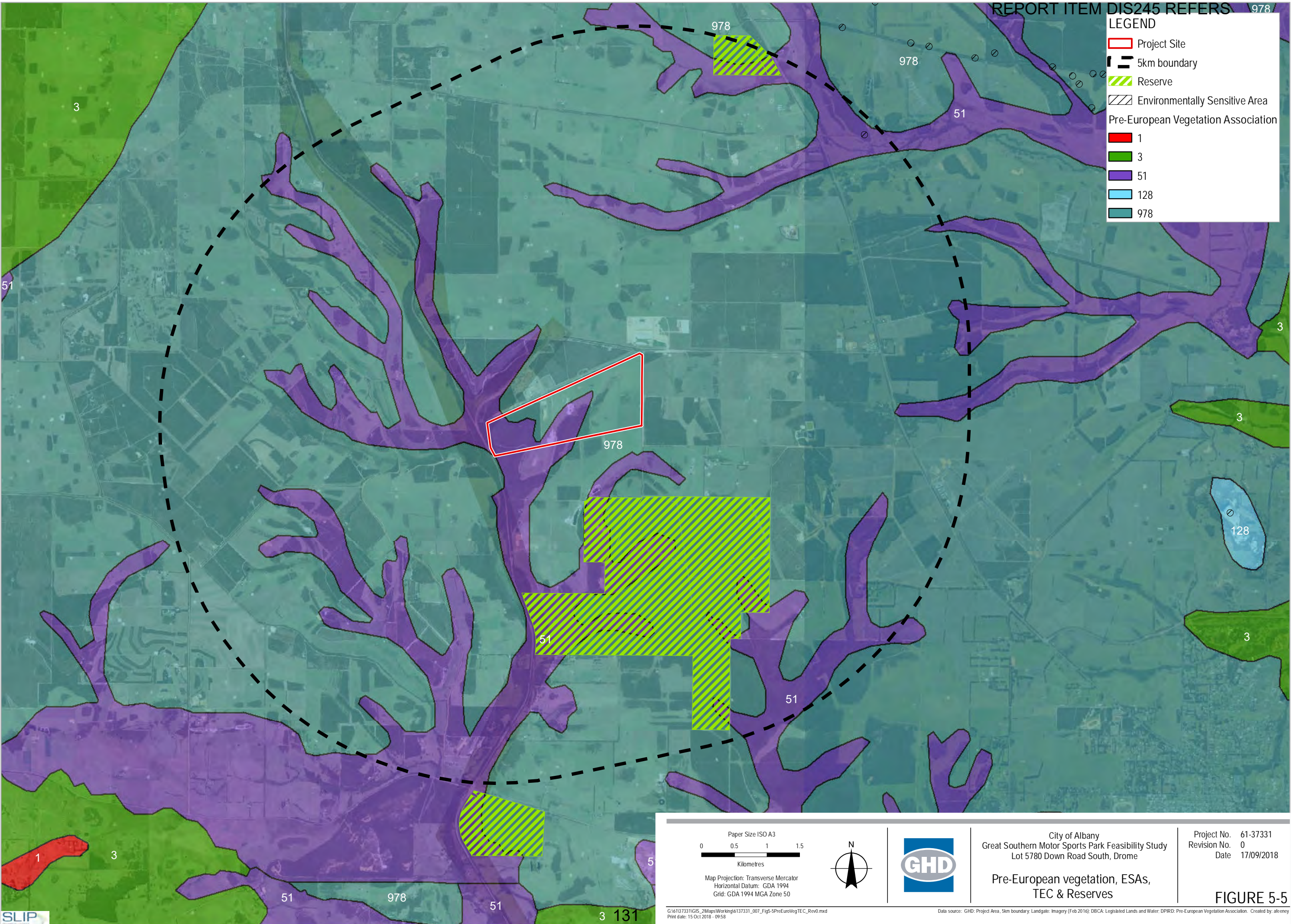
Broad scale pre-European vegetation mapping of the Southern Jarrah Forest IBRA Region was completed by Beard (1979) at an association level. The mapping indicates that two vegetation associations are present within the Project Site and lie within the Albany System Association (Table 5-6 and Figure 5-5).

**LEGEND**

- Project Site
- 5km boundary
- Reserve
- Environmentally Sensitive Area

Pre-European Vegetation Association

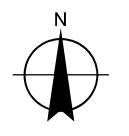
- 1
- 3
- 51
- 128
- 978



Paper Size ISO A3

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Kilometres

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 50



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Pre-European vegetation, ESAs,  
TEC & Reserves

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**FIGURE 5-5**

Table 5-6: Vegetation associations present within the Project Site (Beard 1979)

Vegetation association	Flora description	Structure description	Extent within the Project Site (ha)	Extent within the Project Site (%)
51	Cyperaceae, Restionaceae, Juncaceae (mainly in the South-West)	Sedgeland	66.34	34.5
978	Jarrah, banksia or casuarina <i>Eucalyptus marginata</i> , Banksia spp., Allocasuarina spp.	Low forest, woodland or low woodland with scattered trees	125.87	65.5
Total			192.21	100.00

### Albany Regional Vegetation Survey

The Albany Regional Vegetation Survey (ARVS) (Sandiford & Barrett, 2010) provides a local and regional overview of the native vegetation within a 124,415 ha area to the east, west and north of Albany. This survey described, mapped and assessed the conservation status of native vegetation within the ARVS area.

The Sandiford and Barrett (2010) mapping indicates that three ARVS vegetation units occur within the Project Site (Table 5-7).

Table 5-7: ARVS vegetation units present within the Project Site (Sandiford and Barrett 2010)

Map code	Vegetation unit	Soil type description	Extent within the Project Site (ha)	Extent within the Project Site (%)
12	Jarrah/ Marri/ Sheoak Laterite Forest	Well drained shallow loamy/ sandy soil, with outcropping laterite, usually occurring on the crests and middle slopes of low relief hills and plateaus with occasional occurrences on lower slopes	44.80	23.3
13	Jarrah/ Sheoak/ <i>E. staeri</i> Sandy Woodland	Usually found on gentle middle to lower slopes on sandy soil overlying laterite	8.14	4.2
47	Homalospermum firmum/ <i>Callistemon glaucus</i> Peat Thicket	Occurs in drainage depressions below the seepage zone on dark brown peat or sandy peat that is waterlogged in winter and moist in summer	16.39	8.5
Total			69.33	36.0

The remaining extent (64%) within the Project Site aligns with cleared/ agricultural land.

## Site Visit – Observed Vegetation

During the site visit the on-ground vegetation was compared to the ARVS mapping and considered to be consistent with the ARVS vegetation units and their mapped boundaries. The exception being a stand of marri / jarrah forest within the cleared paddocks that is not shown on the ARVS mapping but should be mapped as ARVS unit 12 (Plate 5-2, Figure 5-6).

The majority of the Project Site is cleared of native vegetation, and is currently used for cattle grazing. There are some stands of Marri / Jarrah Forest (aligning to ARVS Unit 12) within the paddocks (Plate 5-3). These were devoid of any native understorey and were in a Degraded condition. Within the Project Site there are some remnant patches of Marri / Jarrah Forest in Very – Good to Excellent condition, with a native shrub and understorey layer. These occur in the western extent of the Site and in a patch through the central section and along Down Road West.

Along Down Road South and along the northern side of the watercourse contains Jarrah / Sheoak / *Eucalyptus staeri* Woodland (ARVS Unit 13, Plate 5-4). This was generally in Very Good to Excellent condition.

The watercourse is mapped as ARVS Unit 47, the condition of vegetation along the watercourse varies depending on the degree of disturbance (Plate 5-5).



Plate 5-2 Stand of Marri / Jarrah Forest within cleared paddock.



Plate 5-3 Marri / Jarrah Forest (ARVS Unit 12).



Plate 5-4 Vegetation along Down Road West Reserve that aligns with ARVS Unit 13.



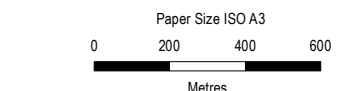
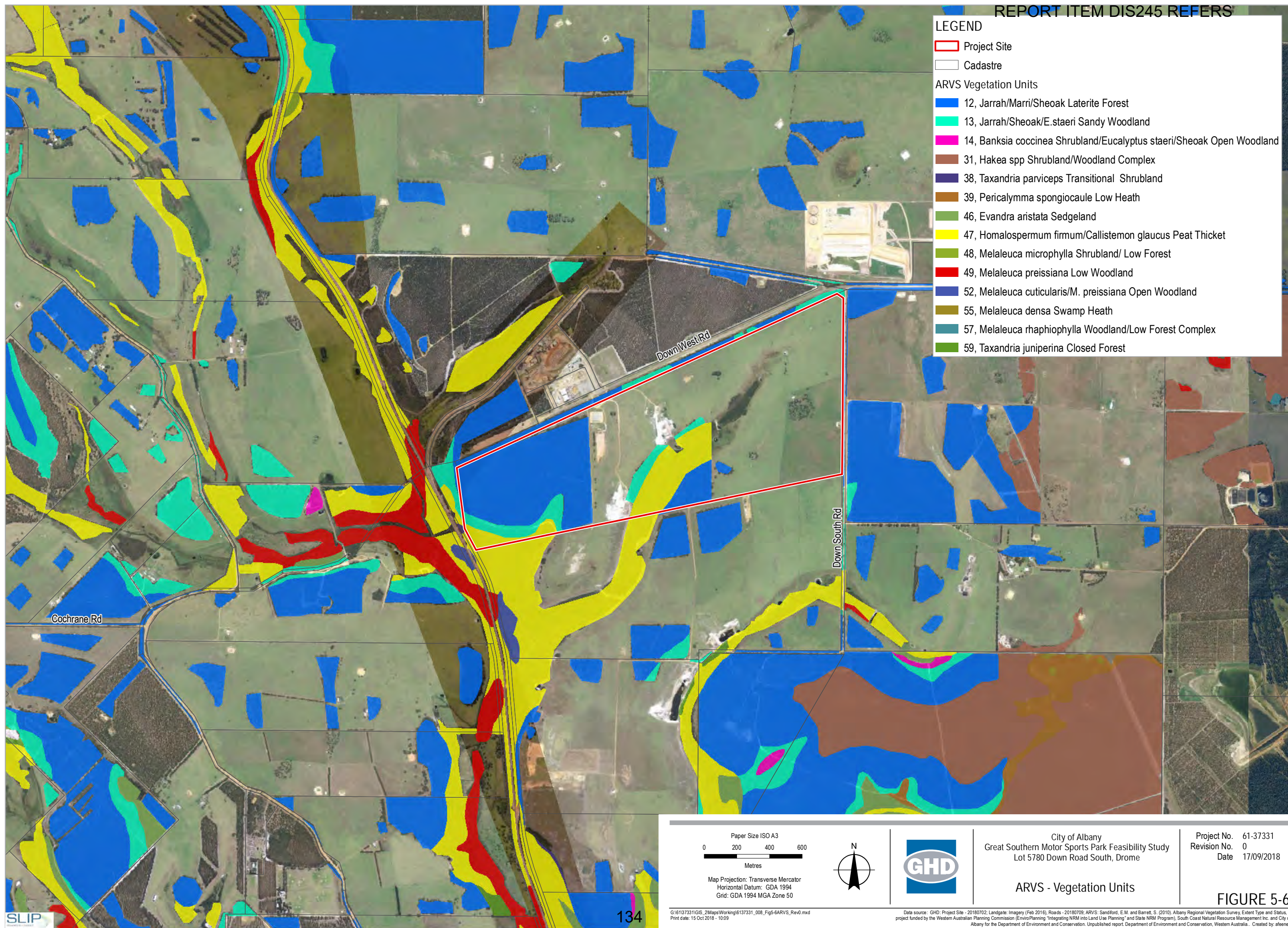
Plate 5-5 Watercourse vegetation that aligns with ARVS unit 47.

**LEGEND**

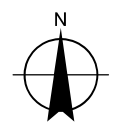
- Project Site
- Cadastre

ARVS Vegetation Units

- 12, Jarrah/Marri/Sheoak Laterite Forest
- 13, Jarrah/Sheoak/E.staeri Sandy Woodland
- 14, Banksia coccinea Shrubland/Eucalyptus staeri/Sheoak Open Woodland
- 31, Hakea spp Shrubland/Woodland Complex
- 38, Taxandria parviceps Transitional Shrubland
- 39, Pericalymma spongiocaula Low Heath
- 46, Evandra aristata Sedgeland
- 47, Homalospermum firmum/Callistemon glaucus Peat Thicket
- 48, Melaleuca microphylla Shrubland/ Low Forest
- 49, Melaleuca preissiana Low Woodland
- 52, Melaleuca cuticularis/M. preissiana Open Woodland
- 55, Melaleuca densa Swamp Heath
- 57, Melaleuca raphiophylla Woodland/Low Forest Complex
- 59, Taxandria juniperina Closed Forest



Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 50



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ARVS - Vegetation Units

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FIGURE 5-6



### Pre-European vegetation extent

The pre-European mapping has been adapted and digitised by Shepherd *et al.* (2002). The extent of the vegetation association has been determined by the State-wide vegetation remaining extent calculations maintained by the DBCA (latest update December 2017) (GoWA, 2018). As shown in Table 5-8, the current extents remaining of these vegetation associations are all greater than 30 per cent (%) of their pre-European extents at various levels (State, IBRA Bioregion, IBRA Subregion and Local Government Area (LGA)).

Table 5-8: Extent of Beard (1979) vegetation association within the Project Site (GoWA 2018)

Vegetation association	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	Current extent remaining in all DBCA managed lands (%)
51	Jarrah Forest IBRA Bioregion	4,506,660.26	2,406,938.58	53.41	69.52
	State: Western Australia	59,085.59	32,867.25	55.63	69.21
	IBRA Bioregion: Jarrah Forest	19,962.06	7,187.97	36.01	32.26
	IBRA Subregion: Southern Jarrah Forest	19,899.01	7,124.92	35.81	31.66
978	LGA: City of Albany	17,586.13	5,751.05	32.70	21.54
	State: Western Australia	53,230.64	18,855.77	35.42	26.75
	IBRA Bioregion: Jarrah Forest	53,016.57	18,751.03	35.37	26.79
	IBRA Subregion: Southern Jarrah Forest	53,016.57	18,751.03	35.37	26.79
	LGA: City of Albany	52,154.39	18,719.90	35.89	26.94

### Conservation significant ecological communities

Desktop searches did not identify any Threatened or Priority Ecological Communities within the Project Site. However one DBCA-listed Priority Ecological Community (PEC), "*Banksia coccinea* Shrubland/ *Eucalyptus staeril* Sheoak Open Woodland (ARVS Community type 14a)", was identified within a 5 km buffer of the Project Site (Figure 5-6) (GoWA, 2018).

This PEC has been further delineated in the ARVS mapping and has been previously identified in small populations to the south and west of the Project Site. The closest population is located approximately 800 m from the Project Site on the western side of the railway (Figure 5-6). The ARVS identified that this PEC has less than 30% of its total pre-clearing extent remaining in Western Australia (Sandiford & Barrett, 2010).

This DBCA-listed PEC forms part of the EPBC Act-listed Threatened Ecological Community (TEC) "Proteaceae dominated kwongan shrublands of the southeast coastal floristic province of Western Australia" (DotE, 2014).

### Flora diversity

The EPBC Act Protected Matters Search Tool (PMST) (DEE, 2018) and DBCA *NatureMap* (DBCA, 2018) database searches identified 108 vascular flora species (including subspecies and varieties) that have been previously recorded or have habitat likely to occur within 5 km of the Project Site. This total is comprised of 99 native species and nine introduced and/or naturalised species.

### Conservation significant flora

Searches of the EPBC Act PMST (DEE, 2018) and DBCA *NatureMap* (DBCA, 2018) database identified the presence/potential presence of 14 conservation significant flora within 5 km of the Project Site (Table 5-9). The desktop searches recorded:

- Eight EPBC Act and/ or WC Act listed species,
- One Priority 1 species, and
- Five Priority 4 species.

Table 5-9: Flora of conservation significance within the Project Site

Scientific name	Common name	WA status/ rank	EPBC Act status
<i>Banksia brownii</i>	Feather-leaved Banksia	T – CR	EN
<i>Banksia goodii</i>	Good's Banksia	T – VU	VU
<i>Banksia serra</i>	Serrate-leaved Dryandra	P4	-
<i>Caladenia harringtoniae</i>	Harrington's Spider-Orchid	T – VU	VU
<i>Centrolepis caespitosa</i>		P4	-
<i>Chordifex abortivus</i>	Manypeaks Rush	T – VU	EN
<i>Conostylis misera</i>	Grass conostylis	T – VU	EN
<i>Drakaea micrantha</i>	Dward Hammer Orchid	T – EN	VU
<i>Gonocarpus simplex</i>		P4	-
<i>Isopogon uncinatus</i>	Albany cone bush	T – CR	EN
<i>Laxmannia jamesii</i>	James' Paperlily	P4	
<i>Lysinema lasianthum</i>		P4	
<i>Sphenotoma drummondii</i>	Mountain paper heath	T – EN	EN
<i>Synaphea incurva</i>		P1	

Information regarding conservation codes is provided in Appendix F.

### Introduced flora

Eight Weeds of National Significance (WoNS) were identified in the desktop assessment as having habitat likely to occur within 5 km of the Project Site (DEE, 2018). These species include:

- *Asparagus asparagoides*,
- *Chrysanthemoides monilifera*,
- *Genista monspessulana*,
- *Lantana camara*,
- *Rubus fruticosus aggregate*,
- *Sagittaria platyphylla*,
- *Salix* spp. except *S. babylonica*, *S.x calodendron* and *S.x reichardtii* , and
- *Ulex europaeus*.

## Potential impacts

Based on the current concept design the AMP project will result in direct loss of native vegetation. The Clearing Impact Area is approximately 2.05 ha and is required for a cross over on Down Road West, multi-use track and public parking areas. However the AMP is largely located within existing cleared areas which are currently used for agricultural purposes (cattle grazing) (Figure 3-1).

The pre-European vegetation association located within the Clearing Impact Area is 978: “Jarrah, banksia or casuarina, Eucalyptus marginata, Banksia spp Allocasuarina spp.” (GoWA, 2018).

The ARVS mapping (Sandiford and Barrett, 2010) does not map all vegetation within the Clearing Impact Area however the vegetation units previously mapped include the following which are also shown in Figure 5-6:

- Jarrah/ Marri/ Sheoak Laterite Forest, and
- Jarrah/ Sheoak/ *E. staeri* Sandy Woodland.

There will be no clearing of riparian vegetation and there is a 50 m development exclusion buffer surrounding the watercourse as per DWER requirements for motorsports development sites near Conservation Category wetlands (DoW, 2007).

If not appropriately managed, the AMP project could potentially result in a range of indirect impacts on vegetation including:

- Introduction and/or spread of weeds and dieback into adjacent vegetation: given historical clearing and current level of disturbance within the Project Site, this is not likely to be a significant issue.
- Indirect impacts such as dust, surface water/ groundwater contamination (see section 5.1.3) and sedimentation of downstream drainage areas during the construction and operational phases of the AMP.

## Management

Management will be required during design and construction of the AMP project to minimise both direct and indirect impacts on vegetation. Clearing will be kept to the minimum necessary to safely construct and operate the AMP.

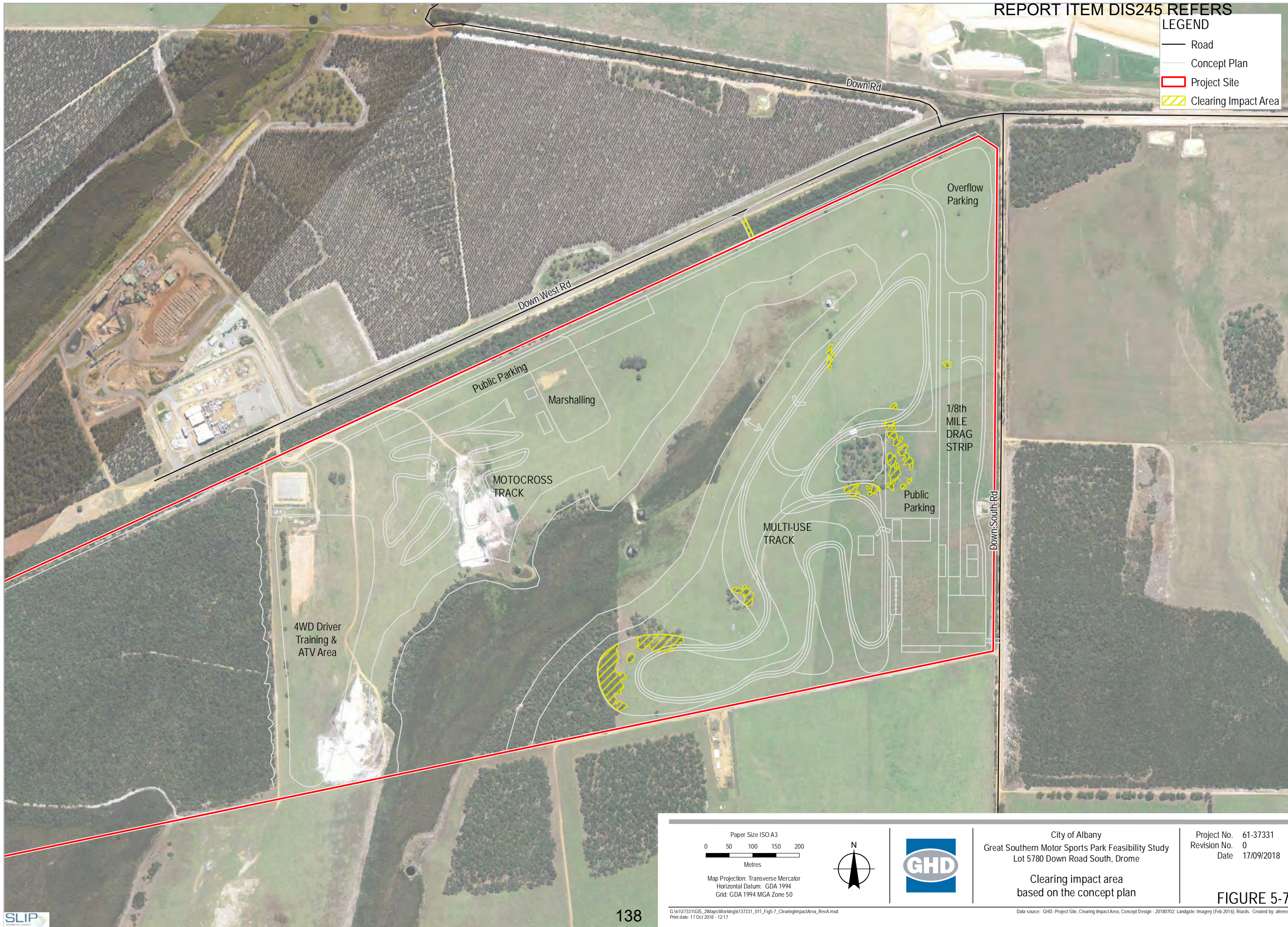
No clearing is proposed for temporary work areas, such as site offices, storage areas or access tracks.

A baseline flora and vegetation survey is recommended to be undertaken prior to commencement of construction works so as to further delineate the vegetation types, species and condition within the Project Site. This will provide baseline information for any future vegetation and flora monitoring within the Project Site.

It is anticipated that the potential impacts to vegetation and flora can be managed through the implementation of a project-specific CEMP and EMP for construction and operational phases of the AMP.

**LEGEND**

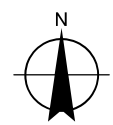
- Road
- Concept Plan
- ▭ Project Site
- ▨ Clearing Impact Area



Paper Size ISO A3

0 50 100 150 200  
Metres

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 50



City of Albany  
Great Southern Motor Sports Park Feasibility Study  
Lot 5780 Down Road South, Drome

Clearing impact area  
based on the concept plan

Project No. 61-37331  
Revision No. 0  
Date 17/09/2018

FIGURE 5-7

## 5.1.6 Fauna

**Fauna diversity**

Searches of the EPBC Act PMST (DEE 2018) and DBCA *NatureMap* (DBCA 2018) databases identified 92 vertebrate fauna species (excluding marine species) that have previously been recorded within a 5 km buffer of the Project Site. This total is comprised of 80 native species and 12 introduced and/or naturalised species, including 70 birds, 12 mammals, six fish, three amphibians, and one reptile.

**Conservation significant fauna**

Searches of the EPBC Act PMST (DEE 2018) and DBCA *NatureMap* (DBCA 2018) database identified the presence/potential presence of 22 conservation significant fauna within 5 km of the Project Site (Table 5-10). The desktop searches recorded:

- 15 species listed under the EPBC Act and/or the WC Act,
- Nine migratory birds protected under international agreement (Schedule 5), and
- One DBCA Priority listed species.

Marine and migratory marine species have been excluded from further consideration as the Project Site is entirely terrestrial and not suitable habitat for these species.

Table 5-10: Fauna of conservation significance within the Project Site

Scientific name	Common name	WA status/ rank	EPBC Act rank	Type of presence
<b>Birds</b>				
<i>Actitis hypoleucos</i>	Common Sandpiper	IA	MI	Species or species habitat may occur within area
<i>Botaurus piciloptilus</i>	Australasian Bittern	T – EN	EN	Species or species habitat known to occur within area
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	IA	MI	Species or species habitat may occur within area
<i>Calidris canutus</i>	Red Knot	IA (& VU at subsp level)	EN & MI	Species or species habitat may occur within area
<i>Calidris ferrunginea</i>	Curlew Sandpiper	T – VU & IA	CR & MI	Species or species habitat may occur within area
<i>Calidris melantos</i>	Pectoral Sandpiper	IA	MI	Species or species habitat may occur within area
<i>Calyptorhynchus banksia naso</i>	Forest Red-tailed Black-Cockatoo	T – VU	VU	Species or species habitat known to occur within area
<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo	T – EN	EN	Breeding likely to occur within area
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	T – EN	EN	Breeding likely to occur within area A flock of approximately 15 birds were observed during the site visit in the watercourse.
<i>Cereopsis novaehollandiae</i> subsp. <i>Grisea</i>	Cape Barren Goose (south-western)	T – VU	VU	Species or species habitat may occur within area

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Scientific name	Common name	WA status/ rank	EPBC Act rank	Type of presence
<i>Dasyornis longirostris</i>	Western Bristlebird	T – VU	EN	Species or species habitat known to occur within area
<i>Motacilla cinerea</i>	Grey wagtail	IA	MI	Species or species habitat may occur within area
<i>Numenius madagascariensis</i>	Eastern Curlew	T – VU & IA	CR & MI	Species or species habitat may occur within area
<i>Pandion haliaetus</i>	Osprey	IA	MI	Species or species habitat may occur within area
<i>Tringa nebularia</i>	Common Greenshank	IA	MI	Species or species habitat likely to occur within area
<b>Mammals</b>				
<i>Dasyurus geoffroii</i>	Chuditch	T – VU	VU	Species or species habitat likely to occur within area
<i>Isoodon obesulus fusciventer</i>	Quenda, south-western brown bandicoot	P4	-	-
<i>Parantechinus apicalis</i>	Dibbler	T – EN	EN	Species or species habitat likely to occur within area
<i>Pseudocheirus occidentalis</i>	Western Ringtail possum	T – CR	CR	Species or species habitat known to occur within area
<b>Fish</b>				
<i>Galaxiella munda</i>	Mud Minnow	T – VU	-	-
<i>Galaxiella nigrostriata</i>	Black-stripe Minnow	T – EN	EN	-
<i>Nannatherina balstoni</i>	Balston's pygmy perch	T – VU	VU	Species or species habitat likely to occur within area
<b>Invertebrates</b>				
<i>Westralunio carteri</i>	Carter's Freshwater Mussel		VU	Species or species habitat may occur within area

Information regarding conservation codes is provided in Appendix F.

### Introduced fauna

Twelve introduced species were identified in the desktop searches with species or species habitat likely to occur within a 5 km radius of the Project Site. These species include:

- *Anas platyrhynchos* (Mallard),
- *Columba livia* (Domestic pigeon),
- *Streptopelia senegalensis* (Laughing Turtle-dove),
- *Sturnus vulgaris* (Common Starling),
- *Canis lupus* (Dog),
- *Felis catus* (Cat),
- Feral Deer,
- *Mus musculus* (House mouse),

- *Oryctolagus cuniculus* (European Rabbit),
- *Rattus rattus* (Black Rat),
- *Sus scrofa* (Pig), and
- *Vulpes vulpes* (Fox).

### Potential impacts

The potential impacts to fauna as a consequence of developing the AMP project are:

- Habitat loss – Based on the concept design the AMP project will result in the loss of approximately 2.05 ha of native vegetation of varying condition.

The fauna habitat that may be impacted by the construction of the project includes:

- Up to 2.05 ha of potential breeding, foraging and roosting habitat for Black Cockatoos.
  - There is also approximately 170 ha of fauna habitat that is considered highly modified, of low habitat value (cleared paddocks) that will be impacted by the AMP project. This habitat may be used opportunistically by fauna.
- Landscape fragmentation – the AMP is unlikely to have a significant impact on any important local or regional linkages.
  - Injury and mortality – The detrimental impacts of roads on wildlife has been documented in Australia and abroad. Native fauna may be susceptible to injury/death during the construction and operational phases of the AMP project (e.g. habitat clearance).
  - Secondary impact from dust, light, noise and vibration during construction and operation the Project Site. As activities undertaken during the operation of the Project Site will be intermittent it is considered that this will temporarily scare fauna away from the Project Site but is considered unlikely to have a permanent impact on fauna.

### Management

Management will be required during design and construction of the AMP project to minimise both direct and indirect impacts on fauna habitat. Clearing will be kept to the minimum necessary to safely construct and operate the AMP.

A fauna survey including a targeted assessment for Black Cockatoo species is recommended to be undertaken prior to commencement of construction works. This will provide baseline information for any future fauna monitoring within the Project Site.

It is anticipated that the potential impacts to fauna habitat can be managed through the implementation of a project-specific CEMP and EMP for construction and operational phases of the AMP project.

#### 5.1.7 Dieback

*Phytophthora cinnamomi* threatens over 2,300 different plant species in Western Australia. Once the pathogen infects the roots, the plant may begin to show symptoms of 'dying back', hence the common name used for the pathogen: Dieback. Dieback has a widespread but discontinuous range in areas with an annual rainfall above 400 mm (Dieback Working Group, 2016).

No site-specific dieback assessments or detailed mapping has been undertaken of the Project Site to date. However, given the level of previous disturbance it is expected that much of the Project Site will be considered dieback infested and/ or un-interpretable.

**Potential impacts**

The AMP project has the potential to spread dieback into adjacent and nearby areas of native vegetation during construction.

**Management**

Dieback will need to be managed through a project-specific CEMP.

## 5.1.8 Aboriginal heritage

A search of the Aboriginal Heritage Inquiry System found that there are no Registered Sites of Aboriginal heritage significance within the Project Site or within a 5 km buffer of the Project Site. There are also no sites lodged as 'Other Heritage Places' which intersect the Project Site, however three 'Other Heritage Places' are located within 5 km of the Project Site (Appendix G).

The search of the Aboriginal Heritage Inquiry System provided the following information regarding Indigenous Land Use Agreements in the South West:

*“On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).*

*The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site” (DPLH, 2018).*

**Potential impacts**

The AMP project does not impact upon any Registered sites of Aboriginal heritage significance. However, as part of these Feasibility Study investigations, the City of Albany has liaised with the Department of Aboriginal Affairs and advised Wagyl Kaip and Southern Noongar Group of the AMP proposal. Comments on the proposal have been invited.

At this stage, no further Aboriginal heritage investigations are seen to be necessary, pending feedback from Wagyl Kaip and Southern Noongar groups.

Due to the extent of earthworks required to complete the AMP project, there is low potential for sub-surface materials to be uncovered.

## 5.1.9 Heritage (non-indigenous)

A search of the EPBC Protected Matters Search Tool did not identify any Commonwealth listed heritage sites within, or within a 5 km buffer of the Project Site.

A search of the Western Australian State Heritage Office Inherit database did not identify any State Registered Places within the Project Site (DPLH, 2018). The closest known site of heritage significance (Albany Airfield and 'Sigint' Radar System Place No 15574) was identified approximately 4.5 km from the Project Site (Appendix G).



## Potential impacts

No non-Indigenous heritage sites are considered likely to be impacted by the AMP project. As a result, no impacts were identified or recommendations warranted for this project factor.

### 5.1.10 Contamination

A review of the DWER Contaminated Sites Database undertaken in August 2018 indicates there are no sites currently classified under the *Contaminated Sites Act 2003*, within 5 km of the Project Site (including the Project Site itself) (DWER, 2018).

Potentially contaminating activities undertaken within the Project Site, as observed during the site walkover, include the following:

- A portion of the Project Site is currently leased by Plantation Energy for the purpose of a retention dam however it is understood that no water is discharged from this dam onto the Project Site (Plate 5-6),
- Storage/ dumping of materials was noted during the site visit; this includes used chemical drums and equipment (Plate 5-7 and Plate 5-8),
- Stockpiling of wood chips (Plate 5-9),
- Dumping of waste materials such as building rubble and possibly a risk of asbestos containing materials in previously excavated areas within the Project Site (Plate 5-10 and Plate 5-11).



Plate 5-6 Retention dam with area leased by Plantation Energy on the northern boundary.



Plate 5-7 Dumping of materials with the Project Site to the south of the retention dam.



Plate 5-8 Dumping of materials with the Project Site to the south of the retention dam.



Plate 5-9 Wood chip stockpiles to the south of the retention dam.



Plate 5-10 Sand excavation undertaken through the central part of the Project Site.



Plate 5-11 Dumping of waste materials (building rubble) within previously excavated areas.

There are also a number of industries in the surrounding area which may undertake potentially contaminating activities/ land uses as summarised in Table 5-11.

Table 5-11: Potentially contaminating land uses/ activities within 5 km of the Project Site

Industry	Distance from Project Site	Potential contaminating activities and associated potential contaminants of concern (DER, 2014)
Railway	Located immediately adjacent to the west of the Project Site (approx. 50 m)	Railway yards/marshalling yards and transport corridors: <ul style="list-style-type: none"> <li>• Petroleum hydrocarbons</li> <li>• Monocyclic aromatic hydrocarbons (e.g. benzene, toluene, ethylbenzene &amp; xylenes)</li> <li>• Phenolics (creosote)</li> <li>• Metals (e.g. arsenic, cadmium, chromium, iron, lead, zinc) Nutrients (e.g. nitrates, ammonia)</li> <li>• Carbamates</li> <li>• Organochlorine pesticides (e.g. pentachlorophenol) Organophosphates pesticides</li> <li>• Herbicides Asbestos</li> <li>• Additional contaminants according to what has been transported by rail</li> </ul>
Plantation Energy and APEC	Plantation Energy is approx. 80 m and APEC is approx. 240 m to the north of the Project Site	Timber preserving/storage/saw mills wood product manufacturing: <ul style="list-style-type: none"> <li>• Solvents (e.g. trichloroethene)</li> <li>• Polycyclic aromatic hydrocarbons (e.g. creosote, naphthalene) Organochlorine pesticides (e.g. chlordane, endosulfan, pentachlorophenol)</li> <li>• Aldrin and dieldrin</li> <li>• Metals (e.g. arsenic, copper, chromium VI, zinc) Boron</li> <li>• Ammonia Cresols</li> </ul>

Industry	Distance from Project Site	Potential contaminating activities and associated potential contaminants of concern (DER, 2014)
United Farmers fertiliser	Approx. 3.0 km to the north-east of the Project Site	Fertiliser manufacture or storage: <ul style="list-style-type: none"> <li>• Calcium phosphate, calcium sulfate, nitrates, ammonium sulfate, carbonates, potassium, copper, chloride, sulfur, sulfuric acid, nitrates, ammonia</li> <li>• Pentachlorophenol</li> <li>• Metals (e.g. boron, cadmium, cobalt, copper, magnesium, molybdenum, potassium, selenium, zinc)</li> </ul>
Water Corporation wastewater irrigation tree farm	Approx. 2.4 km to the east of the Project Site	Biosolids application, organic fertiliser application: <ul style="list-style-type: none"> <li>• Nutrients (e.g. nitrogen, phosphorus)</li> <li>• Metals (aluminium, arsenic, cadmium, chromium, cobalt, lead, nickel, potassium, zinc)</li> <li>• Phenols</li> <li>• Pathogens (e.g. <i>E. coli</i>, Enterococci)</li> </ul>
Mount Romance Sandalwood Factory	Approx. 3.4 km to the north east of the Project Site	Production of sandalwood oil: <ul style="list-style-type: none"> <li>• Distillation process</li> <li>• Water recycling facility</li> <li>• Biomass boiler (renewable energy)</li> </ul>

### **Potential impacts**

The Project Site largely traverses farmland and remnant vegetation. However based on a visual assessment of the Project Site it is evident that there has been previous stockpiling and dumping of materials predominantly confined to the north-west area of the Project Site.

It is the responsibility of the current Lessees to remove/ clean up materials stockpiled, stored or dumped within the Project Site prior to sale of the Site under the *Contaminated Sites Act 2003*. It is unknown if there has been any previous burial of waste materials within the Project Site.

Plantation Energy also currently lease a portion of the Project Site which is anticipated to continue if the AMP project goes ahead.

Project construction and ongoing operation may result in minor, localised contamination from the use and storage of hazardous substances.

### **Management**

Prior to sale of the Project Site the existing dumped materials located within the Project Site will be removed by the Lessees and/ or previous owners.

In particular, it is recommended that any cement sheeting building materials (or other suspected materials) dumped onsite are sampled for asbestos identification by a NATA accredited laboratory. All waste materials on site will need to be managed in accordance with the *Landfill Waste Classification and Waste Definitions* (DWER, 2018) prior to removal offsite.

It is recommended that following removal of waste materials from the Project Site, the clean-up is confirmed via visual assessment of exposed soils (i.e. green waste removed during the clean-up) and sampling of soils to determine whether there are any residual contamination impacts (DER, 2014). If any contamination is identified during this process, it is recommended that further investigation and management is undertaken as per DWER guidelines for *Assessment*

*and Management of Contaminated Sites* (DER, 2014). If deemed warranted, this should also be reported to the DWER through a Form 1 submission as a suspected contaminated site.

Materials used within the Project Site will be handled, used and disposed of in accordance with their Materials Safety Data Sheet (MSDS) during the construction and operational phases of the AMP project. Any contamination identified during project works should be managed in accordance with a project-specific CEMP and if required reported to DWER Contaminated Site Branch under the *Contaminated Sites Act 2003*.

Furthermore, any pollution generating activities such as refuelling or storage of chemicals during construction works and ongoing site operation should also be managed in accordance with a project-specific CEMP and EMP for construction and operational phases of the AMP project.

Unexpected finds during the construction phase should be managed in accordance with the Unexpected Finds Protocol in the CEMP.

### 5.1.11 Construction and operational phase potential impacts

A range of impacts requiring consideration and management during the AMP project's construction and operational phases are predicted or possible. These include:

- Dust emissions,
- Noise and vibration,
- Visual amenity,
- Fire, and
- Pollution through the use of fuels, chemicals or from general construction litter (or unexpected finds).

The Project Site is located in an area which is zoned as "*Priority Agriculture*" and "*General Agriculture*" and is located within an Industrial Buffer Area surrounding the *General Industry* timber processing precinct to the north of Down Road West (refer section 2.4). The closest sensitive receptor is a residential dwelling approximately 1.4 km from the Project Site (refer section 9.2).

These impacts have the potential to be management issues during both the construction and operational phases of the AMP project. Management of these issues should be clearly defined through the preparation and implementation of a project-specific CEMP and EMP for construction and operational phases of the AMP project.

#### ***Dust emissions***

Dust is likely to result from construction and materials cartage and storage operations, with impacts expected to be localised to the Project Site.

Dust lift may result from construction activities, particularly during summer. Dust emissions may result from traffic movement, vegetation clearing, earth moving, operation of vehicles and plant equipment, excavation and stockpiled materials. These are typically localised, short term impacts during construction.

#### ***Noise and vibration***

It is expected there will be elevated noise and vibration during construction activities, from earth works, vehicle and machinery movement. However it is considered that noise and vibration during construction activities would be similar to those undertaken by the nearby APEC and Plantation Energy during their operational activities using heavy vehicles and wood processing machinery.

The construction phase of the AMP project will be temporary and is regulated under the *Environmental Protection (Noise) Regulations 1997*, which under Regulation 13, provide an exemption from compliance with the requirements of Regulation 7, for noise emitted from construction works on a construction site. Construction noise is managed by limiting working hours and the implementation of a CEMP for works outside of normal working hours.

Noise and vibration will be generated during the operational phase of the AMP and have been considered in Section 9 addressing a Preliminary Noise Assessment and Management Plan.

### **Visual amenity**

The existing amenity of the Project Site includes remnant vegetation, agricultural areas, existing roads and railways and previously cleared areas.

Construction and operation of the AMP has the potential to impact on the amenity of the local area as a consequence of vegetation clearing, machinery movements, traffic noise exposure, light spill from street lighting and traffic, changes to the local road systems and some property access, and visibility of the AMP.

Residual amenity impacts are expected to be permanent, however the nearest residence is 1.4 km from the Project Site. Native vegetation present on the east, west and north of the Project Site also provides an existing visual barrier on these sides. To the south lies agricultural land.

Management of these issues should be clearly defined through the preparation and implementation of a CEMP and EMP. Operational impacts will be considered during the detailed design phase and may include additional landscaping, if required.

### **Fire ignition**

Fire can pose a threat to human life, property and livestock as well as flora and fauna. The vegetation adjacent to the Project Site is considered to be susceptible to fire. The CEMP should give consideration to fire risk activities and preventative measures.

A Bushfire Management Plan (BMP) is also to be developed in accordance with AS 3959 and the *Guidelines for Planning in Bushfire Prone Areas* (WAPC, 2017) as per section 4.3.

### **Waste, litter and hazardous materials**

There is a risk that the construction works will create temporary or localised pollution/contamination as a result of fuel or chemical spills or mismanagement of construction materials. Construction works are likely to generate general waste and construction wastes. Poor management of waste materials may lead to litter or contamination of the Project Site and surrounds. This in turn may impact on the aesthetics of the area (e.g. visual amenity) and the health of terrestrial ecosystems.

Hazardous materials, including hydrocarbons, will be used during construction and operation of the Project Site. Spills and discharges of these hazardous materials may result in small scale contamination of soil, or may result in contamination of adjacent land. Consequently, hazardous materials will require management during construction. This should be managed through the following general actions:

- Any bulk fuel and oil stores should be bunded and managed in accordance with relevant Australian Standards, and
- All litter and construction waste should be contained in lidded bins and removed regularly to an approved waste facility.

5.2 Commonwealth aspects and impacts

Matters of National Environmental Significance (MNES) are factors that require legislated protection in order to conserve biodiversity, protect World Heritage and National Heritage Places, and comply with international treaties. An assessment, based on the findings of the desktop searches (DEE, 2018) and site visit, was undertaken to determine whether the AMP project will impact upon MNES and require referral to the Commonwealth (Table 5-12).

Table 5-12: Assessment of the Project Site against Matters of National Environmental Significance

MNES	Present	Impact and justification
World Heritage Properties	No	None
National Heritage Properties	No	None
Wetlands of International Significance	No	None
Listed Threatened Ecological Communities (TEC)	No Commonwealth or State listed TECs were identified within Project Site. The closest TEC is located approximately 800 m to the west of the Project Site. The ARVS mapping did not identify this TEC within the Project Site.	None
Listed Threatened Species	<p><b>Fauna</b></p> <p>The following EPBC Act listed threatened fauna species and their habitats are 'Known to occur' and 'Breeding likely to occur' within the Project Site:</p> <p>Birds</p> <ul style="list-style-type: none"> <li>• Australasian Bittern (<i>Botaurus poiciloptilus</i>) (Endangered)</li> <li>• Baudin's Black Cockatoo (<i>Calyptorhynchus baudinii</i>) (Endangered)</li> <li>• Carnaby's Cockatoo (<i>Caluptyorhynchus latirostris</i>) (Endangered)</li> <li>• Forest Red-tailed Black Cockatoo (<i>Calyptorhynchus banksii naso</i>) (Vulnerable)</li> </ul>	<p>The Clearing Impact Area is approximately 2.05 ha and, based on the ARVS mapping (Sandiford and Barrett, 2010) and site visit the vegetation types are considered to be suitable Black Cockatoo habitat.</p>
	<p>Mammals</p> <ul style="list-style-type: none"> <li>• Western Ringtail Possum (<i>Pseudocheirus occidentalis</i>) (Critically Endangered)</li> </ul> <p>An additional nine EPBC Act listed threatened fauna species were identified as 'Likely to occur' or 'May occur' within the Project Site.</p>	

MNES	Present	Impact and justification
	<p><b>Flora</b></p> <p>One EPBC Act threatened flora was identified as species or species habitat is known to occur within the Project Site:</p> <ul style="list-style-type: none"> <li>Brown’s Banksia (<i>Banksia brownii</i>) (Endangered)</li> </ul> <p>Seven EPBC Act listed threatened flora species are ‘Likely to occur’ or ‘May occur’ within the Project Site.</p>	<p>Conservation significant flora may occur in areas of remnant vegetation, which should be confirmed as part of a baseline spring flora and vegetation survey.</p>
Listed Migratory Species (excluding marine species)	<p>There are no listed migratory terrestrial or wetlands species known to occur within the Project Site.</p> <p>Nine conservation significant species were identified as ‘Likely to occur’ or ‘May occur’ within the Project Site.</p>	<p>These species may pass through the Project Site, on an opportunistic basis (for resting/ foraging), but loss of the vegetation is considered unlikely to have a significant impact on available local or regional habitat.</p>
Great Barrier Reef Marine Park	No	None
Commonwealth Marine Areas	No	None

The key MNES identified from the desktop searches and site visit relates to the clearing of approximately 2 ha of potential foraging habitat for Black Cockatoos. The relevant DEE guidance statement (SEWPaC, 2012) suggests 1 ha of clearing as a guide for high risk of referral for Federal assessment. However, it is likely that if the AMP proposal was referred to the DEE for assessment, the likely outcome would be ‘not a controlled action’.

### 5.3 Summary of the assessment

This section provides an assessment of the impacts to the factors as described in section 5.1 as a result of construction and operation of the AMP project.

It is recommended a project-specific CEMP and EMP is prepared prior to construction of the AMP project and ongoing environmental management during operation of the AMP. The CEMP will address the environmental requirements for the construction works and include all regulatory environmental conditions that are required to be met.

An assessment of the potential impacts identified in section 5.1 was undertaken, considering likely duration and magnitude and the residual impact post mitigation. The following categories were applied:

- Low Risk Impacts: those considered to be temporary and/or not significantly different to existing site conditions and that can be appropriately managed to prevent long term environmental impacts. These impacts are unlikely to need to be offset.
- Medium Risk Impacts: those aspects that have the potential to have significant environmental impacts should management measures not be sufficient. Depending on the level of mitigation and management, these impacts may require offsets.
- High Risk Impacts: those aspects that result in a significant impact to the environment that cannot be mitigated. These impacts may still be acceptable, but will most likely require an offset for residual environmental impacts.

As shown in Table 5-13, many of the aspects assessed are considered to be minor risks once management is applied.

Table 5-13: Environmental impact risk assessment

Aspect	Discussion
<b>Low risk impacts</b>	
Physical environment (landform, soils, ASS)	These aspects are considered to be temporary and/or will not be substantially different from existing site conditions. It is expected that they can be appropriately managed through the preparation and implementation of a project-specific CEMP and EMP for construction and operational phases of the AMP.
Land use	
Conservation reserves and ESAs	
Dieback	
Weeds	
Aboriginal heritage	
Heritage (non-indigenous)	
Contamination	
Dust	
Noise and vibration	
Pollution	
<b>Medium risk impacts</b>	
Surface water and drainage	The project is likely impact to surface water flow and groundwater. Design and implement a drainage strategy to maintain existing surface water flows. Requires management during construction and operational phases through a Water Management Plan (Section 8).
Groundwater	
Wetlands	The Conservation Category waterway requires a 50 m development exclusion buffer which will be refined during the detailed design phase.
Visual amenity	The AMP will permanently alter the amenity of the Project Site. Requires management during construction and operational phases.
Fire	A Bushfire Management Plan will be required to be developed and implemented as per WAPC (2017) guidelines including the provision of a strategic precinct-wide secondary access.
<b>High risk impacts</b>	
Vegetation	The AMP will result in the permanent loss of approximately 2.05 ha of native vegetation.
Fauna	The AMP will result in the permanent loss of native vegetation that provides fauna habitat, potentially including habitat for the conservation significant Black Cockatoos and other species as discussed in Section 5.1.6 Fauna.



## 6. Geotechnical assessment

### 6.1 Ground and groundwater conditions

#### 6.1.1 Regional geology

Reference to the 1:50,000 Environmental Geology series map (Albany sheet) and the 1:250,000 Geological Series map (Mt Barker – Albany sheet) indicates the Project Site is underlain by Cainozoic sand of colluvial origin – “Qc: *Colluvium – Sand, silt and clay*” on the slopes and within the low lying areas of the Marbelup Brook “QA – *Clay, silt, sand and gravel in watercourses*” (Allen & Sofoulis, 1984).

The sand is described as pale grey, fine to coarse, angular to sub-rounded quartz that is loose and moderately sorted and contains occasional pebbles of laterite. The thickness of the sand unit is not indicated on the maps, however the 1:250,000 map sheet indicates sand unit generally overlays laterite.

The local geology is further delineated by DPIRD Soil Landscape Mapping identified in Table 5-4 and illustrated in Figure 5-1.

#### 6.1.2 Available information

##### **GHD – 2014/15**

GHD was appointed by CBH to carry out a site investigation for the new Mirambeena grain handling facility on Down Road, to the north-east of the Project Site.

The CBH site investigation comprised four boreholes, 27 test pits and a number of Dynamic Cone Penetrometer tests. The ground conditions observed at the CBH site are summarised in Table 6-1.

Table 6-1: Generalised subsurface profile at CBH Mirambeena site

Layer / unit	Typical depth to top of layer (m)	Typical layer thickness (m)	Description / remarks
Silty sand (topsoil)	0.0 (ground surface)	0.1	Loose to medium dense, grey / dark grey, fine grained with rootlets
Sand	0.1	0.2 to 0.5	Loose to medium dense, pale grey / brown, fine grained with occasional lateritic gravel
Gravel / clayey gravel	0.1 to 0.8	0.25 to 0.6	Dense to very dense, orange / brown, fine to coarse grained, clay of low to medium plasticity, locally weakly to moderately iron cemented
Sandy clay (locally clayey sand)	0.5 to 1.0	> 6.0	Sandy clay: Stiff to very stiff, orange, mottled white / red, low to high plasticity, fine grained sand. Clayey sand: Medium dense, orange, mottled white / red, fine to medium grained, low plasticity

Geotechnical laboratory tests completed on samples recovered from the CBH site indicate the units described above have the range of geotechnical properties indicated in Table 6-2.

Table 6-2: Summary of soil properties at CBH Mirambeena site

Unit	Group symbol	Particle size distribution			Plasticity		CBR (%)
		% Fines	% Sand	% Gravel	LL (%)	LS (%)	
Sand / gravel	SP/GP	3 - 14	17 - 84	63 - 78	NP	-	15 - 35
Clayey sand / gravel	SC/GC	12 - 37	24 - 63	0 - 62	22 - 23	1.5 – 2.5	8
Sandy clay / clayey sand	CI/CH	58 - 80	18 - 42	1 - 2	47 - 58	9 - 11	2

**Legend:** LL = liquid limit                      LS = linear shrinkage                      NP = non-plastic  
 SP/GP = Poorly graded sand/gravel                      SC/GC = Clayey sand/gravel  
 CI/CH = Medium to high plasticity clay

### Bio Diverse Solutions – 2018

Bio Diverse Solutions Pty Ltd were appointed by the Great Southern Motorplex Group (GSMG) to install 12 shallow monitoring bores within the site at the locations shown in Figure 7-1. The soil profiles noted in Bio Diverse Solutions' letter to GSMG are generally similar to those described in Table 6-1, except the presence of a patchy layer of cemented laterite approximately 500 mm thick, found at a depth of between 0.5 m and 1.2 m of the ground surface.

#### 6.1.3 Groundwater

GHD's investigation on the nearby CBH site intersected groundwater in only one pit at a depth of 2.4 m. Drilling at the site was completed using drilling muds which precluded the observation of groundwater levels.

Monitoring data provided in the Bio Diverse Solutions letter indicates groundwater is present in the boreholes drilled in the lower lying areas, close to the watercourse which bisects the site. When intersected the groundwater was generally observed to be between 0.0 m and 1.0 m below the existing surface. Further discussion is provided in section 7.2.

## 6.2 Geotechnical assessment

### 6.2.1 Proposed development

#### Site facilities

While no details are provided, it has been assumed that the buildings at the Project Site will be single storey, relatively light masonry or steel clad/frame structures and likely to be founded on shallow footings. Significant areas of road pavement will be required for the development, ranging from car park areas to heavier pavements expected to be required for the multi-use track.

#### Site earthworks

Contour information available for the Project Site indicates that some cut to fill earthworks will be required. Differences in elevation in the order of 5 – 10 m are present in the south-east of the site where the drag strip, the multi-use track and their related infrastructure are proposed to be built.

Differences in elevation are greater in the north-western part of the site, however the land uses in this part of the site (4WD area and motocross track) mean that minimal earthworks are likely to be required to develop these areas for their intended use.

## 6.2.2 Excavations

### **Excavation conditions**

The soils at the Project Site comprise an upper layer of generally granular material (sands and gravels) overlying a variably cemented layer of laterite, which in turn overlays generally sandy clay and clayey sand soils to depth.

Excavations within these materials are expected to be within the operating capacity of typical mechanical excavators (nominally 20 tonnes or greater). The majority of the laterite on the site is expected to be excavatable using hydraulic excavators, but may require local ripping or the use of a rock breaker to speed up the rate of excavation.

### **Re-use of excavated materials**

The surficial topsoil layer and other soils containing significant quantities of organic matter should not be re-used as fill material, and should be removed and stockpiled for future landscaping purposes.

Materials excavated from the top 1 m to 2 m during earthworks of the elevated areas of the site are expected to comprise predominantly granular soils such as sand (particularly on the north-western side) and mixes of sand and gravel. These granular soils are considered suitable for re-use as engineered fill provided they are clean, and free of debris, deleterious and oversized (i.e. greater than 100 mm diameter) particles. The gravel soils should be reserved, where possible for use in pavement construction.

The clayey soils at the Project Site are sensitive to variations in moisture content which could result in handling and compaction difficulties if the materials become too wet and shrink / swell behavior with seasonal changes in moisture content. Excavations and stockpiles should be managed to ensure water does not infiltrate the clayey soils. If the clayey soils are re-used as engineered fill, the designer must consider the effects of surface movements due to the shrink / swell potential. To reduce these effects, the clayey soils should be allocated to the base of any fills and kept away from the pavement layers or the bottom of foundations. Alternatively foundations should be designed to tolerate the additional movement.

## 6.2.3 Site classification in accordance with AS 2870

The Project Site was assessed in accordance with *AS 2870-2011: Residential slabs and footings*. The assessment takes into account the differences in the site geology and potential earthworks on the site, both of which will impact the site classification.

AS 2870-2011 assigns a classification to a site based on the expected characteristic surface movement ( $Y_s$ ) caused by the shrink / swell behaviour of reactive clayey soils.  $Y_s$  is impacted by:

- The plasticity of the soil – the more plastic the soil, the more it reacts to changes in moisture content and the worse the site class;
- The climate of the site – the rainfall and temperatures experienced at a site impact the depth to which soils will experience moisture changes. The greater the depth of soil (for a given plasticity) that is impacted by moisture change, the greater the  $Y_s$  and the worse the site class; and

- The amount of non-reactive soil (i.e. sand or gravel) overlying the clayey soils – sand or gravel above a clay layer reduces the depth of clay impacted by moisture change and therefore improves the site class.

For this site four scenarios have been considered. These scenarios allow for variations in the natural thickness of the granular materials above the clays and changes that will occur due to cut to fill earthworks.

- Case 1: Construction on predominantly inert, granular soils (natural or engineered fill) overlying the natural clayey soils at a depth of 1.5 m or greater,
- Case 2: Construction on predominantly inert, granular soils (natural / engineered fill) overlying the natural clayey soils at a depth of 1.0 m,
- Case 3: Construction on predominantly inert, granular soils (natural / engineered fill) overlying the natural clayey soils at a depth of 0.5 m, and
- Case 4: Construction immediately on clayey soils exposed during cut excavation or on clayey soils re-used as engineered fill.

In accordance with Table 2.5 of AS 2870-2011, the depth of design change (Hs) is taken as 1.5 m, corresponding to a Climatic Zone of 1 (wet coastal). A weight Atterberg Limit value has been used to assess the soil plasticity. The expected site classification for each of the four scenarios is summarised in Table 6-3.

Table 6-3: Site classification in accordance with AS 2870-2011

Case	Thickness of granular soils overlying clayey soils (m)	Site classification
Case 1	> 1.5	A
Case 2	1.0	S
Case 3	0.5	M
Case 4	0	M – H

#### 6.2.4 Anticipated foundation conditions

Footings at the Project Site are expected to comprise lightly loaded, pad or strip reinforced concrete footings. The foundation subgrade will be dependent on the location of the structure and the proposed depth of cut/fill earthworks and could comprise sand/gravel or sandy clay.

Both foundation subgrades are suitable for footings, however the foundations proposed for clayey subgrade conditions will require a greater embedment depth and greater reinforcement in order to resist the shrink/swell movements of the clays. The alternative is to place granular fill to a depth of 1 m – 1.5 m below all structures. AS 2870-2011 should be consulted for guidance on suitable footing depths and reinforcement options for each site classification.

Footing widths ranging from 0.5 to 1.0 m have been considered, with a typical minimum embedding depth of 0.3 m below the final formation level for footings on granular soils and 0.6 m for clayey subgrades.

For the range of footing dimensions considered, a maximum allowable bearing pressure of 100 kPa is expected to be appropriate for the site, based on a minimum factor of safety of 3 against bearing capacity failure and a typical settlement tolerance of 20 mm.

Differential settlements under the recommended maximum bearing pressure would generally be anticipated to be less than 10 – 15 mm. A higher bearing capacity may be applicable following site specific investigations.

## 6.2.5 Pavement design consideration

Testing on the nearby CBH site indicates the following soaked CBR values for the various material types found on the Project Site may be appropriate for use in preliminary concept design. The values will require confirmation once site specific investigations are complete.

Table 6-4: Preliminary CBR values

Unit	Group symbol	CBR (%)
Sand / gravel	SP/GP	15/35
Clayey sand / gravel	SC/GC	8
Sandy clay / clayey sand	CI/CH	2

## 6.3 Potentially adverse geotechnical conditions

The Project Site is generally suitable for its intended use. No significant adverse geotechnical conditions are anticipated, however the following issues should be taken into account during design and construction:

- The site contains reactive clay soils which are likely to become more of a factor when the cut to fill earthworks are completed. Footings and pavements at the site must be designed to accommodate the lower bearing capacity/CBR and higher shrink/swell movements expected from these materials.
- The clayey soils on this site will become difficult to handle and compact if water is allowed to enter them. Appropriate drainage of excavations and filled surfaces is required to prevent this during construction.
- A perched water table may briefly develop in the upper layer of granular soils on this site following heavy rainfall. Excavations completed while the perched water table is present may require dewatering and are likely to be unstable if cut too steeply or if they are subject to significant groundwater inflows.
- Excavations at the site should be avoided following periods of high rainfall and no person should enter an excavation if groundwater is flowing into it.

## 6.4 Recommendations for further site investigations

Site specific investigations are required for the Project Site to confirm the geotechnical, ASS and groundwater conditions. GHD envisages these investigations would comprise a program of test pitting, supplemented by boreholes in areas where significant cuts are anticipated, where heavily loaded structures are proposed and where future drainage basins are proposed. A program of selective soil sampling and laboratory testing of the materials to confirm their ASS risk, and suitability for re-use as fill and founding soils is also recommended. A more definitive scope of work can be devised once the site layout and details of the structures are confirmed.

## 7. Hydrology and hydrogeology assessment

### 7.1 Site assessment

As previously highlighted in section 5.1.3 the site is located within the Marbelup Brook catchment on an unnamed upper gully/creek line which traverses the site from north-east to south-west. A summary of regional site geology and geotechnical conditions is detailed in section 6.1. A site visit was undertaken on 3 July 2018 by a GHD environmental scientist and engineer to observe and where possible verify any site specific features, natural or man-made, that might affect the overall understanding and conceptualisation of the site hydrology and hydrogeological conditions.

Further desktop review of available data was undertaken, which included:

- Site survey and AMP conceptual layout,
- Groundwater well data (DWER Water Information Reporting (WIN) database),
- Groundwater sampling by Biodiverse Solutions on 27 February and 4 September 2018,
- Aerial photography and topographical data, and
- Available hydrogeological information from adjacent sites.

The site has existing features such as dams and quarries that need to be considered during development, some of which may offer potential flow and treatment opportunities from a stormwater management perspective. Preliminary drainage catchments have been delineated for the site and are shown in Figure 7-1. Lot 5780 has an area of 192.34 ha, with the estimated area being considered for development comprising of approximately 143 ha. There is a significant upstream catchment, of approximately 132 hectares, to the north and east. It is believed that these areas drain into the site via culverts along Down Road and Down Road West, particularly in larger storm events. Upstream land uses include agriculture and industrial sites with both woodlots and developed hardstand. Within the external upstream catchments is the CBH Mirambeena grain storage facility which may have a potential impact. Within Lot 5780's development area, the topography ranges from a maximum of 73 m AHD on the eastern boundary to a minimum of 41 m AHD in the creek line that bisects the southern boundary.

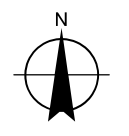
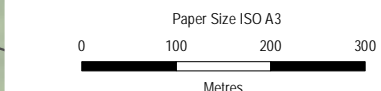
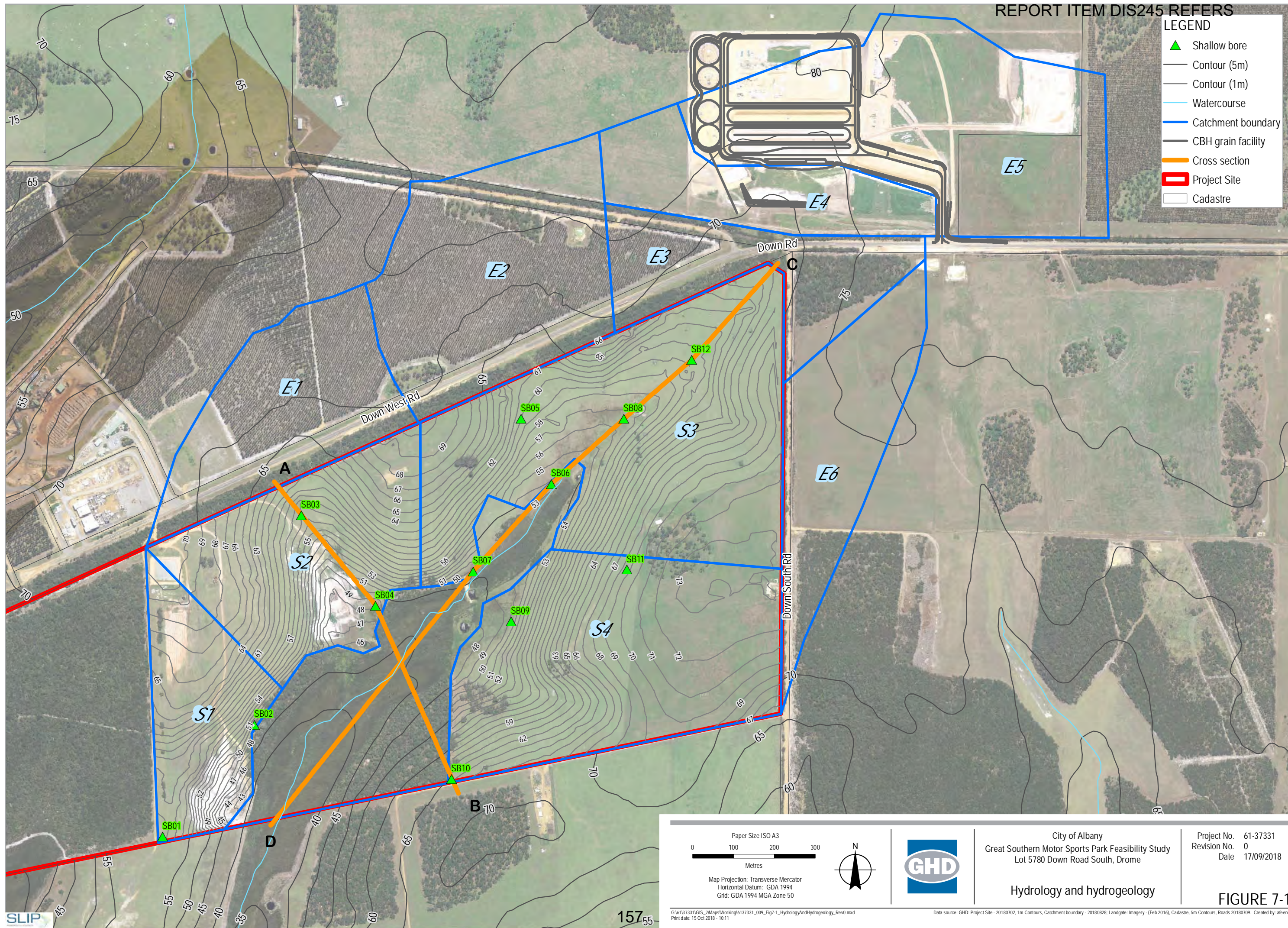
### 7.2 Groundwater monitoring results

GHD has an appreciation for the general site context in the surrounds, having undertaken previous studies in the Mirambeena Strategic Industrial Area and to the north of Lot 5780. A geotechnical study was undertaken in 2014 and 2015 for CBH Mirambeena grain storage facility to the north (shown on Figure 7-1).

As noted in section 6.1.3, GHD received monitoring bore installation information from Bio Diverse Solutions, which included a basic site lithological description of the soils on site to around 2 m depth. GHD has also received groundwater monitoring data, undertaken by Bio Diverse Solutions, in February, May and September 2018. The information provided is included in Appendix D and summarised in Table 7-1. The information at this stage is limited by the shallow nature of the investigation (approximately 2 m depth).

A search of DWER's WIN reporting online system for available bore data (within a 3 km radius) revealed no other relevant time series data.

- LEGEND**
- ▲ Shallow bore
  - Contour (5m)
  - Contour (1m)
  - Watercourse
  - Catchment boundary
  - CBH grain facility
  - Cross section
  - Project Site
  - ▭ Cadastre



City of Albany  
Great Southern Motor Sports Park Feasibility Study  
Lot 5780 Down Road South, Drome

Project No. 61-37331  
Revision No. 0  
Date 17/09/2018

Hydrology and hydrogeology

**FIGURE 7-1**

G:\6137331\GIS\_2\Maps\Working\6137331\_009\_Fig7-1\_HydrologyAndHydrogeology\_Rev0.mxd  
Print date: 15 Oct 2018 - 10:11

Data source: GHD, Project Site - 20180702, 1m Contours, Catchment boundary - 20180828, Landgate: Imagery - (Feb 2016), Cadastre, 5m Contours, Roads 20180709. Created by: afeeney

Table 7-1: Site bores and groundwater levels

Bore ID	Easting (m)	Northing (m)	Ground level – est. RL (mAHD)	Depth to Groundwater (m BGL) Feb 2018	Depth to Groundwater (m BGL) May 2018	Depth to Groundwater (m BGL) Sep 2018
SB01	567179.967	6133615.868	58.4	> 2.0	> 2.0	> 2.0
SB02	567404.995	6133889.541	49.6	> 2.0	> 2.0	> 2.0
SB03	567519.139	6134401.422	56.8	> 2.0	> 2.0	1.21
SB04	567700.649	6134179.907	48.2	> 2.0	0.91	0.30
SB05 (not surveyed)	568056.306	6134636.37	60.0	> 2.0	> 2.0	> 2.0
SB06	568131.287	6134478.244	53.6	0.87	0.70	0.00
SB07	567939.672	6134264.362	51.6	0.64	0.54	0.44
SB08	568308.576	6134637.482	56.5	> 2.0	1.55	0.18
SB09	568032.238	6134141.798	50.3	0.66	0.57	0.44
SB10	567886.921	6133756.724	62.7	> 2.0	> 2.0	> 2.0
SB11 (not surveyed)	568314.202	6134267.661	68.6	> 2.0	> 2.0	> 2.0
SB12	568474.386	6134781.396	60.2	> 2.0	> 2.0	1.04

Notes: BGL – below ground level - Where results shown as “> 2.0”, this means the groundwater table was not intersected by the shallow groundwater monitoring bore (being only 2 m deep)



### 7.3 Conceptual hydro(geo)logical model

A conceptual model was developed for the site to gain an initial understanding of surface and groundwater water flows and potential linkages. The development of this model was limited by the first round of shallow bore data that was made available (refer Appendix D). As previously discussed in section 7.2 there were no relevant public data available for the Project Site (DWER WIN database) as the site and surrounding area is relatively undeveloped. Soil landscape mapping shown in Figure 5-1 and regional geology mapping were used to infer geological units and soil types in the absence of deeper borehole data. Cross sections showing the conceptual site geology and flow directions are shown below in Figure 7-2 (across the valley) and Figure 7-3 (down the line of the central waterway). Refer to Figure 7-1 for the location in plan of the cross sections.

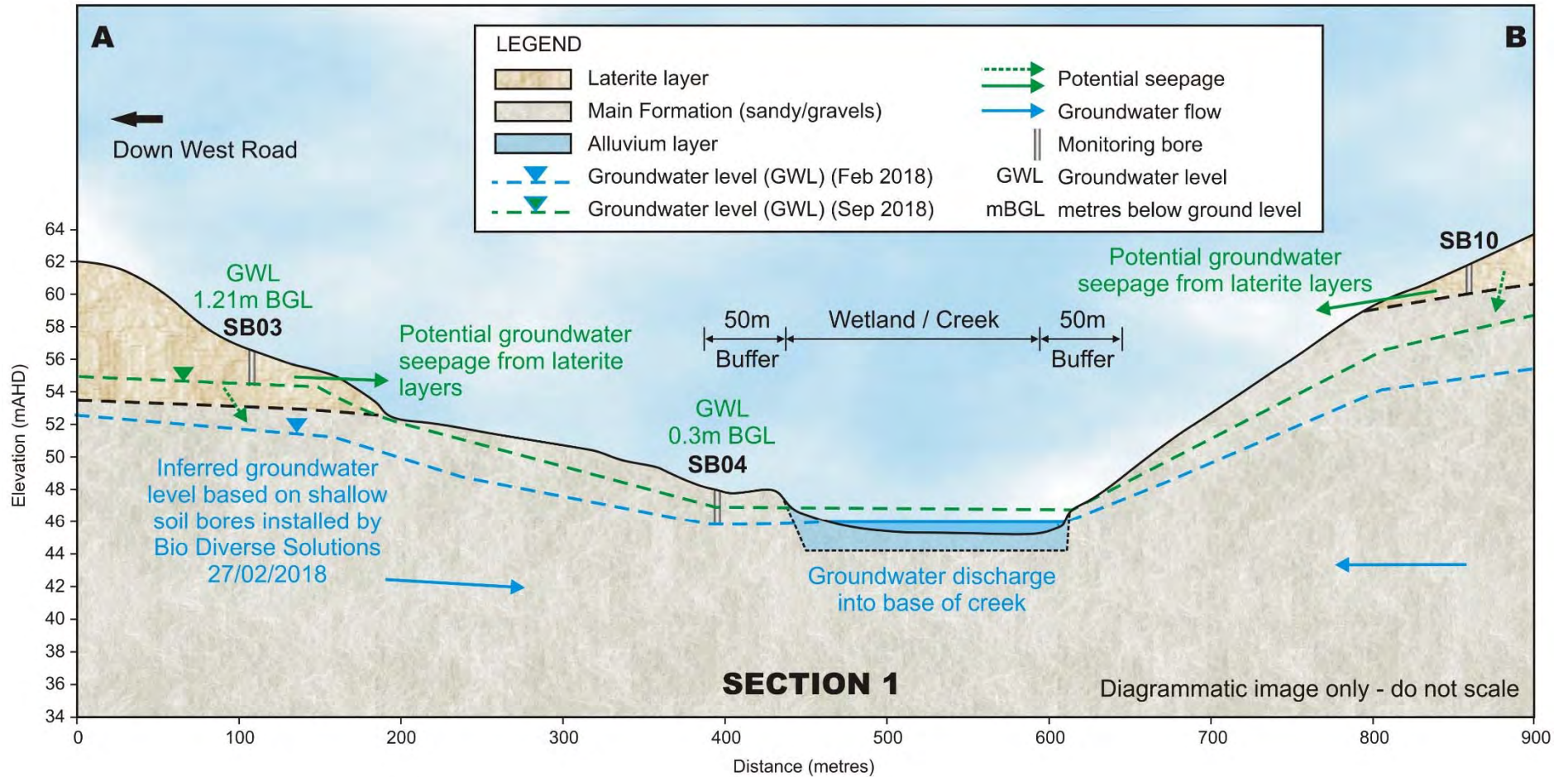


Figure 7-2: Preliminary hydrogeological section 1 (A-B)

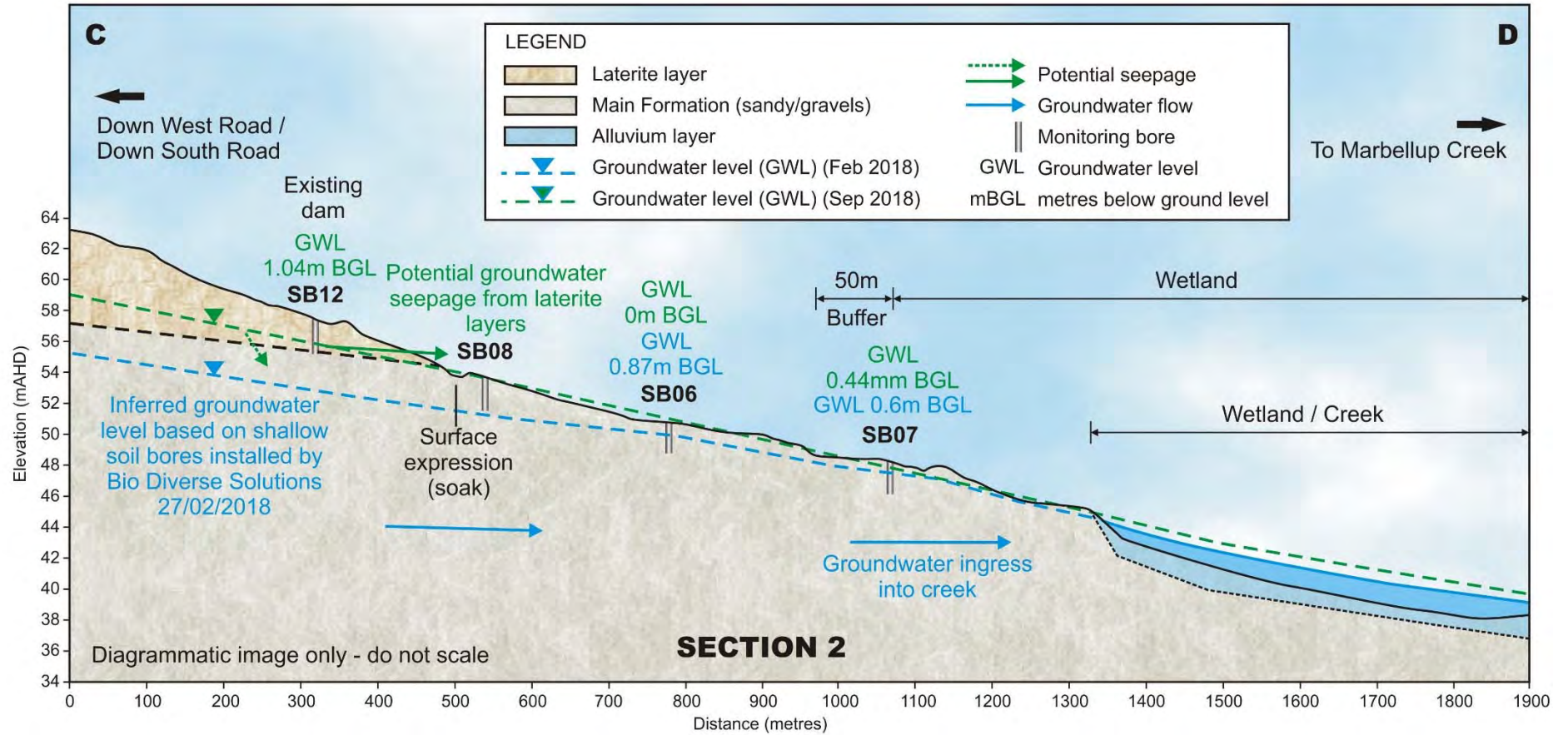


Figure 7-3: Preliminary hydrogeological section 2 (C-D)

The following key hydrogeological features are noted in the conceptual model:

- The groundwater levels observed in the shallow bores indicate that groundwater is present in the lower lying areas nearer the creek and will be most likely be supplying the creek with groundwater inflow.
- The groundwater levels and gradient, inferred from topography, supports that groundwater discharges into the creek.
- Shallow/perched groundwater may discharge and resurface via sandier layers that sit on top of more impermeable lateritic, coffee rock or clay layers; especially when there is significant slope.
- The discharging groundwater is either expressed as surface water, or migrates within the deeper more permeable deposits.

## 8. Preliminary water management plan

### 8.1 Drinking water supply and risk assessment

The Project Site is within a Priority 2 area of the Marbelup Brook public drinking water source area (see Figure 5-3 and section 2.3). A risk assessment for the proposed development was undertaken in accordance with the Australian Drinking Water Guidelines (ADWG) (NHMRC, NRMCC, 2011) and *Water Quality Protection Note 77: Risk Assessment of Public Drinking Water Source Areas* (DoE, 2005). The purpose of the risk assessment is to understand the hazards and events that could compromise drinking water quality. The assessment will help to identify preventative measures to safeguard the future drinking water source. The preliminary risk assessment is included in Appendix E. Recommended remedial measures are incorporated into the broader stormwater quantity and quality control outlined in sections 8.2 and 0.

#### 8.1.1 Drinking water supply to the Project Site

The Water Corporation's Lower Great Southern Towns Water Supply Scheme (LGSTWSS) runs along Albany Highway, with the nearest connection point approximately 4 km to the east at 66 Down Road (fertiliser distribution warehouse) (Water Corporation, 2018). At least in the initial stages of the Project Site's development, it would be cost prohibitive to connect to the LGSTWSS. Hence, it is proposed to service drinking water needs on the site through a combination of collected rainwater and water carts.

Uncontaminated rainwater from the AMP buildings will be collected in standard 110,000 litre rainwater tanks. At source treatment by household-scale filtration and ultraviolet disinfection will be undertaken. This will allow a safe drinking water supply to the AMP facilities (i.e. clubrooms, canteen, etc.) and ablutions.

A preliminary water balance for the site suggests that rainfall alone will be insufficient to meet expected demand for regular attendance of 500 people. Where there is a shortfall, the GSMG will need to purchase and cart water to the site. Water demands for other external uses (i.e. irrigation, dust suppression, etc.) will be met from site dams.

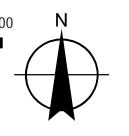
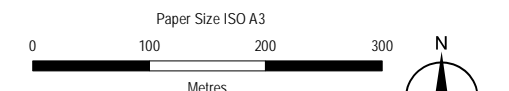
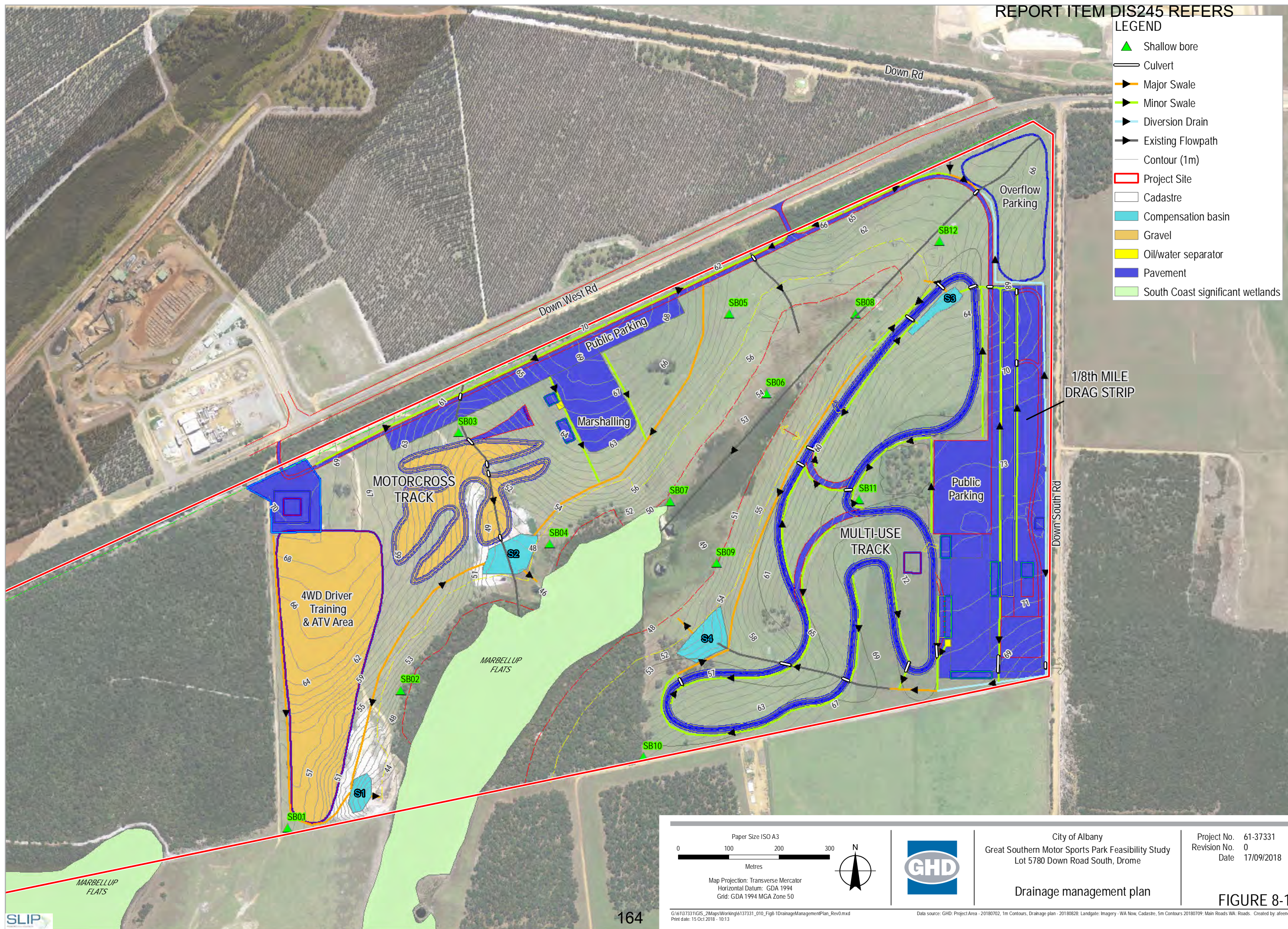
### 8.2 Stormwater quantity management

The proposed stormwater management plan for the site is depicted in Figure 8-1 and consists of the following principles and elements:

- Where possible, uncontaminated runoff from impervious areas will be collected for drinking water, or targeted for infiltration near to the source.
- The release of (potentially) hydrocarbon impacted stormwater from high risk areas (e.g. maintenance areas, pits, etc.) is prevented by suitable engineering controls.
- Drainage swales are used to divert the (upstream) eastern boundary catchment around the drag strip and multi-use track, so as to minimise the potential for this water to impact on the site infrastructure.
- Suitable compensating (detention) basins are used to limit post-development peak discharge rates to pre-development rates from areas subject to development.
- Suitable swales, culverts and pipework are used to convey the runoff generated from the site to engineered locations for treatment / compensation before discharge to the waterway.
- Suitable buffer separations to the wetland/creek are used to minimise the potential for impacts of site-generated water impacting on the wetland.

LEGEND

- ▲ Shallow bore
- Culvert
- Major Swale
- Minor Swale
- Diversion Drain
- Existing Flowpath
- Contour (1m)
- Project Site
- Cadastrate
- Compensation basin
- Gravel
- Oil/water separator
- Pavement
- South Coast significant wetlands



City of Albany  
Great Southern Motor Sports Park Feasibility Study  
Lot 5780 Down Road South, Drome

Project No. 61-37331  
Revision No. 0  
Date 17/09/2018

Drainage management plan

FIGURE 8-1

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 50

Data source: GHD; Project Area - 20180702, 1m Contours, Drainage plan - 20180828; Landgate: Imagery - WA Now, Cadastrate, 5m Contours 20180709; Main Roads WA: Roads. Created by: aleneey

## 8.2.1 Plan outline

The following preliminary plan is proposed in accordance with the principles and objectives of this technical feasibility study, the *Stormwater Management Manual for Western Australia* (DoW, 2007); and the *Subdivision and Development Guidelines 2018* (CoA, 2018).

### **1-year ARI event and smaller (1EY)**

To retain and treat the 1-year ARI (1EY) event:

- Roofs and other impervious areas will be managed via a range of measures including:
  - Targeted infiltration in areas where there is sufficient separation to groundwater (i.e. soakage pits or infiltration galleries),
  - Targeted rainwater (roof water only) capture for potable (i.e. drinking) and non-potable uses (such as toilet flushing or vehicle wash down).
- Drainage swales will convey stormwater to compensation basins and will allow stormwater to be infiltrated as close to source as practical, in accordance with Water Sensitive Urban Design (WSUD) principles. Weirs, and vegetated swales will contribute to achieving WSUD objectives. Culverts will be installed to allow crossings of access tracks and raceway pavements.
- Direction of runoff to compensating basins targeting peak flow management to pre-development levels.

### **10-year ARI event (10% AEP)**

To maintain site serviceability in the 10-year ARI (10% AEP) event:

- The compensating basin will be designed to detain the peak flow to pre-development levels, and maximise opportunities for infiltration prior to discharge from the site.
- Drainage swales will convey stormwater to compensation basins and will allow stormwater to be infiltrated as close to source as practical in accordance with WSUD principles. Weirs, and vegetated swales will contribute to achieving WSUD objectives. Culverts will be installed to allow crossings of access tracks.

### **100-year ARI event (1% AEP)**

To protect from flooding in the 100-year ARI (1% AEP) event:

- Ensure suitable separation is provided between flooding levels and key site infrastructure such that a minimum freeboard of 300 mm is provided to prevent ingress of water into habitable buildings.
- The compensating basins will detain the peak flow to levels that will not adversely impact the downstream system, and maximise opportunities for infiltration prior to discharge from the site.
- Stormwater flows will exceed the capacity of the internal drainage swales, but will be contained within the swales freeboard.
- Ensure suitable overland flow paths are provided to minimise the potential for exposure of publicly accessible areas to flood waters.

## 8.2.2 Drainage swales

Stormwater runoff discharged from the site access roads and proposed facilities areas will be collected by swales located alongside the access track, and on the downstream of the facilities areas. The design levels of the facilities area are expected to generally follow the natural topography of the site, i.e. falling typically towards the wetland/creek. Any trapped low point, such as that associated with pockets of the motor cross track will be captured by pit and piped to discharge into swales or basins as dictated by site topography. Refer to the proposed stormwater management plan in Figure 8-1.

Swales are typically expected to be either V type or trapezoidal in design. Overall drains will, where space and topography permit, have batter slopes of 1V:6H. It is expected that side slopes will be limited to no great slopes than 1V:3H in areas restricted by space or topography. The widths and depths of swales will be determined by hydraulic modelling. A typical freeboard of 0.3 m (over the 10 year design event water level), which allows additional storage and conveyance beyond the 10 year ARI (10% AEP) serviceability is also expected to be required to ensure drains convey the major event flows to the discharge basins. Dimensions of swales likely to be required are summarised in Table 8-1. Typically Type A, B and C drains would be considered major drain/swales and Type C and D as minor drains/swales.

Table 8-1: Example swale dimensions

Swale	Base width (m)	Top width (m)	Side slope (V/H)	Typical gradient (%)	Max depth (m)
Type A	3	12	1:6	0.5 to 3%	0.7
Type B	3	15	1:6	0.5 to 3%	1.0
Type C	0	12	1:6	0.5 to 3%	1.0
Type D	0	6	1:3	0.5 to 3%	1.0
Type E	3	9	1:3	0.5 to 3%	1.0

Drainage swales are proposed in accordance with the Stormwater Management Manual for Western Australia (DoW, 2007), Subdivision and Development Guidelines (CoA, 2018) and *WQPN 52 – Stormwater Management at Industrial Sites* (DoW, 2006) whereby they provide both conveyance and treatment of stormwater, which is suitable for the site being located in an area with sensitive downstream receptors.

Swales will be broad and shallow, with vegetation covering the side slopes and base, perform an important function in disconnecting the impervious environment from the downstream environment, in this case the wetland/creek, protecting it from pollutants carried by frequent storm events. They do this by improving stormwater quality and reducing the peak flow, velocity and volume reaching the receiving environment.

In small rainfall events, swales detain and retain water, promoting infiltration close to source, and reducing volume and flow. The gentle slope and high hydraulic roughness of the swales also reduces stormwater velocity, attenuate peak flows and also prevent scouring. In larger, less frequent rainfall events, the swales protect infrastructure by conveying stormwater away to a central storage or outlet.



The reduced water velocity allows the physical processes for particulate removal to occur; infiltration, deposition and filtration of stormwater through vegetation. As coarse and medium sediments fall out of suspension, associated suspended solids and trace metals are also removed from the stormwater, reducing the pollutant loads from frequent events. Biochemical processes also act to improve water quality reaching the downstream environment, as nitrogen is removed through denitrification, bio storage through plant and bio-film uptake, and changes in soil storage. In addition to their conveyance and water quality functions, swales have the additional benefit over traditional pit and pipe drainage systems, of providing both habitat and aesthetic value to the site.

A summary of the benefits and constraints of swales are listed in Table 8-2.

Table 8-2: Benefits and constraints of swales

Potential benefits	Potential constraints
Provide water conveyance	Uses more land area than conventional piped system Maintenance – vegetation mowing/replacement/weeding, gross pollutant trap emptying, sediment removal (other systems will also require this) Site topography may limit location and size
Retain and detain water	
Allow infiltration	
Reduces stormwater runoff peak flow, velocity and volume	
Removes coarse and medium sediments including suspended solids and trace metals	
Easy access for maintenance	
Protect downstream surface water bodies and receiving environments from frequent storm events	
Disconnect impervious environment from downstream environments	
Habitat value	
Aesthetic value	
Biochemical pollutant (nitrogen) removal	

### 8.2.3 Diversion drains

Diversion drains are proposed to divert surface water runoff from catchments external to the Project Site, around the site or through the site such that it does not impact on the site. The diversion drains also aim to minimise the interaction of this surface water runoff with site runoff which will require treatment. It is expected that due to the nature of the site use it will likely have an increased potential of pollutant generation; in particular sediments and vehicular generated pollutants. Diversion drains may also be utilised to divert external catchments through the site and safely to the wetland/creek.

The external surface water catchments to the site consist of the adjacent APEC and CBH sites to the east and north of site, and areas of uncleared land.

The diversion drains would most likely be similar in size and shape to the major drainage swales proposed in section 8.2.2. The drains are proposed to be earthen utilising in-situ materials.

#### 8.2.4 Compensating basins

Compensating basins are proposed to reduce peak discharge by providing temporary storage for stormwater and encouraging infiltration through permeable walls and floor close to source. The basins are sized such that the post-development peak discharge is maintained at or below pre-development level for the 10% AEP (10-year ARI) and that flows are similar to pre-development flows for the 1% AEP (100-year ARI) event.

Batter slopes of 1V:6H should be adopted where space permits as this will allow for the batter sides and floor to be vegetated and maintained more easily, also reducing potential erosion risks. The purpose of this vegetation is to stabilise banks, and provide water quality treatment by enhancing sedimentation and nutrient removal.

The proposed locations for compensating basins within the site are shown in Figure 8-1. Where possible these should utilise the natural topography of the site and generally have low (piped) and high (suitable overflow structure) outlets.

Where possible, depths of basins should be limited to no greater than 1.5 m (at top water level before the spillway activates) and where possible water depths within the basins should be minimised in minor storm events (10 year ARI/ 10% AEP and less) so as to reduce potential risks to the public but also target infiltration via a large base surface areas. Should this not be possible, consideration should be given to increasing basin side slopes (to 1V:3H) to facilitate an increase base infiltration surface in the basin. Basins with these slopes should be assessed for the possible need for appropriate fencing and signage for safety. Standing water in basins is to be minimised so as to assist with mosquito and midge control during risk periods. With this in mind, onsite infiltration testing at proposed drainage basin sites will be needed to support future design. Currently, basins are designed with an assumed 2 m/day infiltration rate.

The location of compensation basins should be such that they are installed out of the flood impacted area of the adjacent creek/wetland. An assessment of this risk should be undertaken during detailed design.

Basins should also be installed such that the base of the basin has a suitable separation to the maximum expected groundwater level in the location, so as to ensure suitable infiltration can be achieved.

#### 8.2.5 Pit and pipe drainage

It is conceptualised that the use of pit and pipe drainage systems will be minimised wherever possible. However it is expected that use of pipework on buildings and within larger hardstand areas is possible (i.e. pit and marshalling areas along with pedestrian concourse areas). It is also expected that a number of culverts will be needed throughout the site to convey stormwater across access roadways and across parts of the proposed multi-use and motocross tracks as shown in Figure 8-1. Culverts are expected to be designed to convey events up to and including the minor event (10 year ARI/ 10% AEP) without overtopping. Suitable erosion protection should be provided at culvert outlets to ensure structural stability of any receiving waterway.

A significant culvert is likely to be required on the main internal access road to the multi-use track, where it crosses the main drainage line of the creek in the north-east corner of the Project Site.

For areas subject to higher risks of oil spills and hydrocarbons, installation of suitable oil spill separation areas/devices will be required. Currently, this is expected for the pits areas at both the multi-use track and motocross areas.

8.2.6 Hydrologic and hydraulic assessment

**Pre-development**

A preliminary hydrologic and hydraulic assessment has been undertaken to estimate the pre-development stormwater runoff from the Project Site for the future sizing of stormwater management structures.

The hydrological assessment includes mapping of catchments external to and within the site.

Figure 7-1 shows the catchments. A one-dimensional Drains model with ILSAX hydrology was used for calculation of runoff. Model parameters included:

- Paved (impervious) area depression storage = 1 mm,
- Supplementary area depression storage = 1 mm,
- Grassed (pervious) area depression storage = 5 mm, and
- Soil Type 3 (slow infiltration rates).

This assessment was determined in accordance with Australian Rainfall and Runoff (ARR) 2016 (Geoscience Australia, 2016), with design rainfall data from the ARR 2016 data hub and the Bureau of Meteorology (BoM, 2018).

The estimated peak flows for pre-development from various catchments are shown below in Table 8-3.

Table 8-3: Estimates of peak flows pre-development

Catchment	Area (ha)	Impervious fraction (%)	Peak flows (m <sup>3</sup> /s)			
			1EY (1 yr ARI)	0.5 EY (2 yr ARI)	10% AEP (10 yr ARI)	1% AEP (100 yr ARI)
E1	19.8	3	0.06	0.08	0.43	2.44
E2	17.4	3	0.08	0.10	0.39	2.24
E3	15.3	3	0.01	0.02	0.36	1.97
E4	13.9	0	0.00	0.00	0.45	2.27
E5	36.4	60	0.00	0.00	0.00	0.67
E6	17.4	0	0.00	0.00	0.33	1.81
S1	14.1	0	0.00	0.00	0.31	1.64
S2	23.4	0	0.00	0.00	0.57	3.30
S3	44.9	0	0.00	0.00	1.02	6.07
S4	35.0	0	0.00	0.00	0.65	3.64
S5	25.1	0	0.00	0.00	0.90	4.18
TOTAL	262.7	-	0.03	0.03	1.82	17.0

*Note: E denotes an external catchment, S denotes a catchment within the site or with a significant portion of the catchment within the site. TOTAL denotes the flows leaving the site via the creek/wetland which may be different to the individual catchments due to routing and storage within the site/model.*

## Post-development

A conceptual post-development Drains model was also developed to estimate preliminary basin sizes for the development. The basins were sized such that the total post-development flow off the site was equal to or less than the pre-development flow for the minor (10% AEP) design event and targeted appropriate compensation and management of major storms (i.e. the 1% AEP or 100 year ARI). Basin parameters included:

- Nominal depth of 1.5 metres to spillway levels and 2 m to top of wall.
- Basins equipped with a spillway that has sufficient capacity to handle 1% AEP flow.
- 1V:6H side slopes (this could be increased to a max of 1V:3H as required with suitable geotechnical assessment).
- 2 m/day infiltration rate in the absence of testing,
- Each basin would be equipped with a low flow piped discharge, designed to be:
  - Set above the peak 1 EY basin water level such that no discharge occurred for water quality management, and
  - Set and sized so as to ensure that the basin spillway didn't activate in events up to and including the 10% AEP.
- The intent is that basin does not activate the spillway in events up to and including the 10% AEP. Upstream external catchments would be directed into each of the basins as detailed in Figure 8-1.
- Post development flows are those of the combined catchment areas that contribute to the basin location.

The results of the basin sizing are shown below in Table 8-4.

Table 8-4: Preliminary basin sizing

	Cont. Catch	Catch Area (ha)	Predevelopment Flow (m <sup>3</sup> /s)			Post Development Flow (m <sup>3</sup> /s)			Approx. footprint (m <sup>2</sup> )	Approx. storage volume (m <sup>3</sup> )
			1EY	10% AEP	1% AEP	1EY	10% AEP	1% AEP		
S1	S1	14.1	0	0.22	1.64	0	0.13	2.08	2,800	3,000
S2	S2/S3*/ E1	51.5	0	1.06	6.59	0	0.33	6.55	6,200	7,300
S3	S3*	15.3	0	0.29	1.99	0	0.18	2.91	2,600	3,600
S4	S4	35.0	0	0.60	3.55	0	0.18	5.64	6,200	7,200

\*Portion of S3 catchment only contributing to basin

## 8.3 Stormwater quality management

### 8.3.1 Overview

Stormwater quality issues requiring management within the site include:

- **Sediment Load:** Erosion caused by high flow velocity can result in a loss of soil, damage to drainage swales, and increased sediment load to the receiving water body.
- **Nutrient Load:** Increased nutrient loading to the receiving water body may result from over-application of fertilisers to landscaped areas.
- **Gross:** Suspended and dissolved pollutants: Including rubbish, hydrocarbons, dissolved metals, and pesticides.

If not responsibly managed, the development has the potential to negatively affect stormwater quality discharging from the catchment.

### 8.3.2 Best management practices

Best Management Practices (BMPs) are design strategies targeted to manage total suspended solids, gross pollutants, total phosphorous (TP) and total nitrogen (TN) within stormwater discharged from urban catchments (DoW, 2007). Frequently occurring rainfall events are targeted, using source, in-transit and end-of-pipe controls to improve water quality. BMPs considered appropriate for the AMP development include:

- Construction of drainage swales and dry/ephemeral detention basins using weirs and low flow drain system, to reduce flow velocity, thus reducing erosion and sediment mobilisation, allowing sedimentation, reduce total flow discharged from each site, and allowing infiltration to groundwater.
- Construction of suitable bio-retention areas to allow for suitable water quality treatment.
- Planting and regeneration of low-lying native vegetation in swale drains for filtering of particulates and uptake of dissolved nutrients.
- Use of suitable soils within bio-retention areas that target the uptake of nutrients.
- Maximising infiltration by adopting a stormwater retention system to contain, and as a minimum, treat the first 15 mm of rainfall on site.
- Construction of compensating basins/storages to reduce peak flow rates and encourage infiltration.
- Minimising discharge rates, allowing the compensating basin to act as a sediment trap, to capture suspended solids and bound pollutants prior to discharge.

### 8.3.3 Spill control and pollution management

To achieve spill control and pollution management in the high risk areas of the AMP, the following practices from *WQPN 52: Stormwater management at industrial sites* (DoW, 2006) and *WQPN 100: Motor sport facilities near sensitive waters* (DoW, 2007) will be implemented:

- Separation of uncontaminated stormwater from potentially contaminated stormwater (particularly roof water from other trafficked hardstands).
- Fuel / chemical storage and handling areas to be located within secondary containment areas that allow maximum recovery of any spilt materials.

- Paved areas exposed to rainfall where dust, litter or spilt substances accumulate should be regularly cleaned with methods that prevent fluid drainage or leaching into the surrounding environment. Litter, oil and sand traps (as appropriate to the site) are recommended at drain entry points. First-flush water diversion for dusty outdoor areas should be considered to capture initial stormwater run-off after any extended dry period.
- Turbidity should be controlled and where practical, stormwater should be treated (if necessary) then (in order of preference) used as a process water source, irrigated onto well-vegetated areas or infiltrated via on-site soak pits.
- Chemical solvents and non-degradable detergents used to clean equipment or pavements should not be released into stormwater systems.
- Rainwater should not be released from chemical or fuel storage compounds, unless first tested and found to be uncontaminated.
- Where the groundwater table is within five metres of the surface or soil permeability is poor (less than one metre per day), alternatives to water infiltration may be needed to avoid harmful effects due to water table mounding.

### **Water contamination barriers**

The following water contamination barriers are proposed, to prevent any loss of hydrocarbons and chemicals from the site:

- A 50 metre buffer from the unnamed watercourse and Conservation Class wetland.
- A 200 metre from the unnamed water course and Conservation Class wetland to vehicle pits/maintenance and refuelling areas (as per DoW *WQPN 100*).
- Double bunded pit/vehicle services areas for hydrocarbon management. These areas will drain to treatment devices such as oil-water separators and/or interceptor traps prior to outlet to the site-wide drainage system.

### 8.3.4 Non-structural measures

There are a number of temporary and non-structural measures that may also be applied to the development project, as described below.

### **Construction**

Construction sites can be a major source of silt and other pollutants. Proponents and builders should be encouraged to undertake good practice on building sites. Good practice for construction sites are to be documented in a CEMP and should include:

- Temporary bunds and silt fences to prevent silt runoff from sites under construction into the drainage system.
- Litter and waste storage bins to prevent litter to be blown by wind or washed away by rainfall.
- Establishing a washing-down area behind the bund or silt fence.
- Provide a stabilised entry and exit point to prevent vehicle tracking of soil from the building site onto roads.
- Position stockpiles of sand and soil stockpiles to prevent material being tracked, washed, or blown into roads, and then into the stormwater systems.

### **Maintenance**

Regular maintenance of the drainage system should be undertaken prior to the start of the wet season. Cleaning of the stormwater drainage system and detention basins will provide an opportunity to remove gross pollutants and silt build up that may enter the receiving water bodies after heavy rainfall. In addition to transporting pollutants, drains with accumulated pollutants may also overflow, leading to localised flooding and erosion, as well as risks to human safety and constructed assets. Unlined open drains may be reshaped at this time if required.

### **Revegetation**

Revegetation of the degraded creek/wetland area is strongly recommended as part of the development.

#### 8.3.5 Erosion and sediment control

All reasonable and practicable measures need to be taken to protect adjacent properties and downstream environments from the adverse effects of sediment and sediment-laden water displaced from site (IECA, 2008).

It is acknowledged that sediment control measures can be expensive and introduce unwanted initial delays to a project when firstly being installed. Sediment control measures need to be appropriate for the given soil properties, expected weather conditions, required treatment standard, and the type, cost and scope of works.

With these considerations the following sediment control measures should be incorporated in the AMP site design to prevent sediment displacement from site (IECA, 2008):

- Dust control,
- Sediment fences,
- Coir logs, and
- Stockpile management.

The detailed design for the Project Site will need to be developed consistent with the requirements for erosion control in consideration of the site topography. When construction is undertaken the contractor will be required to have a suitable erosion and sediment control plan (within the CEMP) in place prior to works commencing and maintain these during and following construction during the site establishment period.

## 8.4 On-site wastewater management

Given the significant distance of the Project Site from the nearest connection point of Water Corporation's Albany sewerage scheme (refer section 2.5), on-site management of wastewater will be required. On-site wastewater management will need to cater for human sewage as well as grey and blackwater from vehicular activities.

The proposed use of the motorsports park will be mostly periodic (i.e. events based) with several different groups using the site. Preliminary estimates of events, site usage and spectator numbers were provided by GSMG and are discussed in section 3.2. On-site wastewater treatment systems will typically consist of both a treatment system and a disposal system. These were preliminarily sized using the Department of Health's (DoH) *Onsite wastewater system assessment tool* for estimation purposes.

The following inputs were used in the assessment:

- System capacity: 500 people (at each of the two main parts of the AMP – i.e. motocross track and multi-use track).
- Site category: Clubs (licensed), with a hydraulic loading of 35 L/person/day.

- Treatment system type: 'Secondary' wastewater treatment plant, with engineering certification to meet effluent quality of BOD < 20 mg/L; TSS < 30 mg/L; TN < 10 mg/L; TP < 1 mg/L; *E. coli* < 10 cfu/100mL; and free chlorine > 0.5 mg/L. This is to meet the requirements of *WQPN 100* (DoW, 2007).
- Site conditions: Clayey loam soil on a flat slope (< 10%), with a design irrigation rate = 3.5 mm/d.

The calculator tool produced a required demand (hydraulic loading) of 17,500 L/day and aided in the sizing of the treatment and disposal systems.

There are many vendors in the WA market for 'off the shelf' package wastewater treatment plants. For the purposes of the concept design and costing, a budget estimate was sought from MAK Water <sup>(1)</sup>.

Selecting a disposal system and sizing the area needed will require a better understanding of the geotechnical conditions of the chosen location, and the area available. However, for the purpose of this concept design and costing, sub-surface drip irrigation was chosen as the most suitable option. This will require a disposal/irrigation area of approx. 5,000 m<sup>2</sup>, which could be readily accommodated within the track design and facilities area.

The most suitable arrangement will be to have two wastewater treatment systems, one serving the motocross facilities, the other serving the multi-use track, and drag strip. Numbers in excess of system capacity (potentially up to 20,000 for national race events) would need to be catered for with portable facilities.

A minimum clearance of two metres between the maximum groundwater level and the discharge point of the disposal system will also be required. Therefore, wastewater facilities should be located at high ground on the site, where a greater clearance to groundwater is to be expected.

Demand requirements should be further investigated in future design stages, when the usage of the facility is better defined.

### 8.5 On-going water quality monitoring

Initial groundwater and water quality sampling was undertaken by Bio Diverse Solutions in February, May and September 2018. It is understood that DWER has been consulted during the development of this monitoring plan. Further to this, GHD recommends the following;

- There is limited existing site-specific groundwater data, and pre-development data are limited. If the development proposal seeks approval to install a production bore for abstraction of groundwater as a water supply source for the development, then six-monthly groundwater monitoring for water levels and salinity will be a required.
- Groundwater monitoring should be conducted for three years following practical completion, to allow any groundwater level or quality changes as a result of development to be identified, and action taken if necessary.

The program and parameters outlined in Table 8-5 below will provide a suitable representation of groundwater quality at the site. The groundwater bores established for pre-development monitoring will be used for construction phase and post-development monitoring.

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<sup>1</sup> <https://www.makwater.com.au/products/activated-sludge-bioreactor-plus/>



Table 8-5: Summary of groundwater monitoring program

Site	Frequency	Duration	Parameters
Production bore and/or Shallow bores	Monthly	Pre-development 3 years post-development	Water level
	Quarterly	Pre-development 3 years post-development	In-situ pH, EC, temperature Unfiltered sample: pH, EC, TN, FRP, TKN, ammonia, TP, heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg) Filtered sample: NO <sub>2</sub> /NO <sub>3</sub> , PO <sub>4</sub>

8.5.1 Surface water monitoring

It is recommended that surface water sampling is continued to be undertaken prior to the construction of the development. This would be used to develop a baseline for ongoing assessment. This monitoring should continue during construction and then following construction to assess the impact of the development on runoff water quality.

The recommended monitoring parameters are outlined in Table 8-6. Surface water monitoring program will involve the collection of grab samples from the compensating basins and the creek/wetland. Sampling should occur during or immediately following rainfall events. It is assumed the first flush will have the highest level of nutrients and chemicals, therefore sampling should occur at the time/after the first significant rainfall event of each wet season. Field notes should include details of the rainfall events, site conditions, time of sampling and time of sample testing.

While not listed in the below table, in the event of a major water quality incident at the site, it is recommended that increased monitoring be undertaken.

Table 8-6: Summary of surface water monitoring

Site	Frequency	Duration	Parameters
1. Compensating basins (outlet) 2. Upstream of the site (TBC) 3. Downstream of the site (TBC)	Event based	For 3 years post-development	In-situ pH, EC, temperature Unfiltered sample: pH, EC, TN, FRP, TKN, ammonia, TP, heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg) Filtered sample: NO <sub>2</sub> /NO <sub>3</sub> , PO <sub>4</sub>

Samples should be taken and handled in accordance with the following Australian Standards:

- AS/NZ 5667.1:1998 Water quality - Sampling Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.
- AS/NZ 5667.12:1999 Water quality - Sampling Part 12: Guidance on sampling bottom sediments.

### 8.5.2 Reporting

It is recommended that GSMG prepare an annual water quality report for each year of post-development monitoring, which will be presented to the City of Albany and DWER. This report will summarise the sampling results from the previous year.

Reporting and monitoring shall be in accordance with ANZECC *Guidelines* (2000) and the Department of Water quality assurance/quality control systems to allow inclusion into DWER's WIN database.

### 8.6 On-site operational controls

On site operational controls shall include but not limited to the following:

- Vehicle maintenance and refuelling to only be undertaken in the designated pit area where hydrocarbon interception/spill controls are implemented.
- Vehicle wash down to be undertaken on a bunded, impervious pad and runoff directed into a detention area containing a sediment trap and oil separator.
- Clean-up kits to be kept at strategic locations across the site in order to provide an immediate response to fuel, oil or chemical spills.
- On-site wastewater treatment (secondary standard) and disposal from toilets, washrooms and kitchens to be in accordance with the *Draft Government Sewerage Policy 2016* and as noted in section 8.4.
- An adequate number of rubbish and recycling bins to be provided across the site and regularly maintained.
- Any landscaping on the site to be designed to minimise water, fertiliser and pesticide use.
- An emergency response plan to be prepared for situations that could place local water resources at risk.

## 9. Preliminary noise assessment and management plan

### 9.1 Noise criteria

Environmental noise is managed through the *Environmental Protection (Noise) Regulations 1997* (the Regulations). The Regulations specify maximum allowable external noise levels at noise sensitive, commercial and industrial premises.

The Regulations (Regulation 7) define prescribed standards for noise emissions as follows:

*7. (1) Noise emitted from any premises or public place when received at other premises –*

*(a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind*

*(b) Must be free of –*

*(i) Tonality (e.g. whining or droning)*

*(ii) Impulsiveness (e.g. sirens)*

*(iii) Modulation (e.g. banging or thumping)*

The assigned levels for noise sensitive premises (Regulation 8) are shown in Table 9-1.

Assigned noise levels (Table 9-1) are set differently for noise sensitive, commercial and industrial and utility premises. For noise sensitive premises an influencing factor (IF) is incorporated into the assigned noise levels. IF depends on land use zonings within circles of 100 m and 450 m radius from the noise receiver, including:

- Proportion of industrial land use zonings,
- Proportion of commercial zonings, and
- Presence of major roads (more than 15,000 vehicles per day) or secondary (6,000 to 15,000 vehicles per day).

For this assessment, it has been assumed that IF will be zero (based on the absence of major and secondary roads). The resultant assigned levels used for this assessment of the AMP are shown in Table 9-3.

As motorsport events are scheduled to occur during either the day or evening period (refer Table 3-1), the  $L_{A10}$  assigned level of 45 dBA day and 40 dBA evening criteria have been used in this assessment.

In the absence of existing noise level contribution from existing noise sources in the area other than the proposed Albany Motorsport Park, the assessment has been conducted such that the Albany Motorsport Park will not significantly contribute to received noise levels. As such, a 5 dBA penalty has been included, such that compliance with the  $L_{A10}$  assigned level of 40 dBA day and 35 dBA evening demonstrate that the Albany Motorsport Park will not significantly contribute to received noise levels.

Table 9-1: Assigned noise levels (dBA)

Type of premise receiving noise	Time of day	Assigned level		
		LA 10	LA 1	LA Max
Noise sensitive <sup>(2)</sup>	7.00 am to 7.00 pm Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	9.00 am to 7.00 pm Sunday and public holidays (Sunday)	40 + IF	50 + IF	65 + IF
	7.00 pm to 10.00 pm all days (Evenings)	40 + IF	50 + IF	55 + IF
	10.00 pm on any day to 7.00 am Monday to Saturday and 9.00 am Sunday and public holidays (Night)	35 + IF	45 + IF	55 + IF
Noise sensitive <sup>(3)</sup>	All hours	60	75	80

IF = influencing factor

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

- a. The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission.
- b. The noise emission complies with the standard after the adjustments of Table 9-2 are made to the noise emission as measured at the point of reception.

Table 9-2: Adjustment for intrusive or dominant noise characteristics <sup>(4)</sup>

Tonality <sup>(5)</sup>	Impulsiveness <sup>(5)</sup>	Modulation <sup>(5)</sup>
+5 dB	+5 dB	+5 dB

Table 9-3: Assigned noise levels (dBA) for AMP

Type of premise receiving noise	Time of day	Assigned level		
		LA 10	LA 1	LA Max
Noise sensitive	7.00 am to 7.00 pm Monday to Saturday (Day)	45	55	65
	9.00 am to 7.00 pm Sunday and public holidays (Sunday)	40	50	65
	7.00 pm to 10.00 pm all days (Evenings)	40	50	55
	10.00 pm on any day to 7.00 am Monday to Saturday and 9.00 am Sunday and public holidays (Night)	35	45	55

<sup>2</sup> Highly sensitive areas include a building, or a part of a building, on the premises that is used for a noise sensitive purpose and any other part of the premises within 15 metres of that building or that part of the building.

<sup>3</sup> Any area other than highly sensitive area.

<sup>4</sup> Adjustment applies where noise emission is not music.

<sup>5</sup> Adjustments are cumulative to a maximum of 15 dB.

## 9.2 Closest sensitive receptors

Based on a review of aerial photography and site reconnaissance, there are three existing residences in the vicinity of the proposed AMP. These are shown in Figure 9-1, labelled SR01, SR02 and SR03. The red, orange and yellow contours represent 1000 m, 2000 m and 3000 m from the AMP boundary.

- SR01 is approx. 1,400 m from the drag strip and 2,200 m from the motocross track,
- SR02 is approx. 2,600 m from the motocross track and 3,700 m from the drag strip, and
- SR03 is approx. 3,500 m from the motocross track and 4,200 m from the drag strip.



Figure 9-1: Closest receptors for AMP noise assessment

## 9.3 Noise modelling

CadnaA, by Datakustik, is a computer program for the calculation, assessment and prognosis of noise exposure. CadnaA calculates environmental noise propagation according to the ISO 9613-2 algorithm.

The ISO 9613-2 algorithm also takes into account the presence of a well-developed moderate ground based temperature inversion, such as commonly occurs on clear, calm nights or downwind conditions which are favourable to sound propagation. As a result, predicted received noise levels are expected to represent a worst case scenario.

CadnaA considers local characteristics, site sources and the location of the receptor areas to predict noise levels. The method specified consists specifically of octave-band algorithms (with nominal mid band frequencies from 31.5 Hz to 8 kHz) for calculating the attenuation of sound.

## 9.3.1 Topography and ground absorption effects

In line with the location of Albany Motorsport Park, surrounding ground topography was modelled using 5 m ground contours.

A default ground absorption of 1.0 as specified in ISO 9613 was used in the modelling. In GHD's experience this has generally been found to be appropriate.

## 9.3.2 Noise sources

Noise sources from Albany Motorsport Park will be primarily from vehicles competing and preparing for various motorsport events, spectators and public address system.

Proposed events at Albany Motorsport Park include:

- Motocross events, to be held during the day period (between 8:00 am to 6:00 pm).
- Multi use track events, such as car test and tune days, car speed events, bike test and tune days, bike speed events and drifting days, to be held during the day and evening (between 6:00 pm to 10:00 pm).
- Drag racing practice days, drag racing competitions and burnout days, to be held during the day or evening.

It is important to note that no events are proposed to occur during the night period (between 10:00 pm to 7:00 am).

Noise levels for various vehicle types are outlined in Table 9-4. Sound power levels for the various vehicle types are provided in Table 9-5.

Table 9-4: Noise levels for various vehicle types

Vehicle type	Sound power level (dBA)	Operating time
Motocross bike - Seniors	129	Day
Motocross bike – Juniors	114	Day
Stock race car	120	Day/Evening
Drag race car	125	Day/Evening
4WD off road	105	Day

Table 9-5: Sound power levels (dBA) for various vehicle types

Vehicle type	Sound power level (dBA)									
	31.5	63	125	250	500	1000	2000	4000	8000	dBA
Motocross bike - Seniors	-	82	102	113	116	118	120	114	100	129
Motocross bike – Juniors	-	75	81	92	102	103	104	100	91	114
Stock race car	118	122	132	125	109	110	105	91	96	120
Drag race car	123	127	137	130	114	115	110	96	101	125
4WD off road					105					

## 9.4 Noise modelling results

The calculated noise levels at the nearest noise sensitive premises were assessed to determine if predicted noise emissions complied with the assigned night time  $L_{A10}$  day and evening noise levels of 40 and 35 dBA, respectively.

In the absence of existing noise level contribution from other noise sources in the vicinity of Albany Motorsport Park, the assessment has been conducted such that Albany Motorsport Park will not significantly contribute to received noise levels. As such, compliance with the assigned day and evening  $L_{A10}$  noise levels of 40 dBA and 35 dBA demonstrates that Albany Motorsport Park will not significantly contribute to received noise levels.

There are three residences within close proximity to Albany Motorsport Park (Figure 9-1). For the purpose of this assessment, it has been assumed that if compliance is achieved at the nearest residences, compliance would be achieved further away.

Predicted day noise levels from various motorsport events are presented in Table 9-6. These results show that 40 dBA is predicted to be complied with at the closest residences (SR01, SR02 and SR03) for all event types except for at SR01. Noise levels are predicted to marginally exceed (by 1 dBA) the day criterion at SR01 when either a combined motocross and drag racing (MX + DR) or combined drag racing and multi-use track racing, such as circuit racing (DR + MUT), events are held.

Table 9-6: Predicted day  $L_{A10}$  noise levels

Event	SR01	SR02	SR03
Motocross (MX)	38	37	33
Multi use track (MUT)	37	29	28
Drag racing (DR)	38	27	25
4WD training (4WD)	15	16	13
MX + MUT *	40	37	34
MX + DR *	41	37	34
DR + MUT *	40	31	30

\* includes 4WD training, however, 4WD training has no influence on received noise levels, as significantly quieter than other motorsport events.

Predicted evening noise levels from various motorsport events are presented in Table 9-7. These results show that 35 dBA is predicted to be complied with at two of the closest residences (SR02 and SR03) for all event types. Noise levels are predicted to exceed by up to 6 dBA the evening criterion at SR01 when either a drag racing or multi use track racing, or combination event, are held.

Table 9-7: Predicted evening  $L_{A10}$  noise levels

Event	SR01	SR02	SR03
Multi use track (MUT)	37	29	28
Drag racing (DR)	38	27	25
MUT + DR	41	31	30

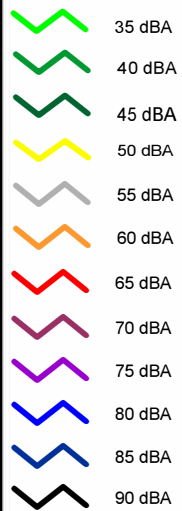
The results presented in Table 9-6 and Table 9-7 demonstrate that for some event combinations, there may be occasions when the predicted noise levels from Albany Motorsport Park may exceed the assigned noise levels.

As such, it is recommended that Albany Motorsport Park prepare and submit a Noise Management Plan, in line with the requirements outlined in *Guide to Management of Noise from Motor Sport Venues* (DER, 2014).

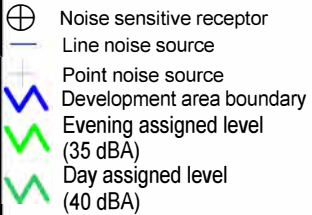
As part of the proposed Albany Local Planning Scheme No.1 amendment for the Project Site (refer section 4.1), the City of Albany should also consider extending the existing industrial noise buffer IA4BA (refer section 2.3) to incorporate the cumulative noise impacts of the Mirambeena TPP and AMP. Whilst this would not be a requirement under the *Environmental Protection (Noise) Regulations 1997*, it would provide the City with the ability to restrict incompatible land uses and residential development in proximity to the AMP.



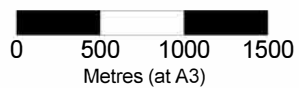
**PREDICTED NOISE LEVELS**



**LEGEND**



**SCALE**

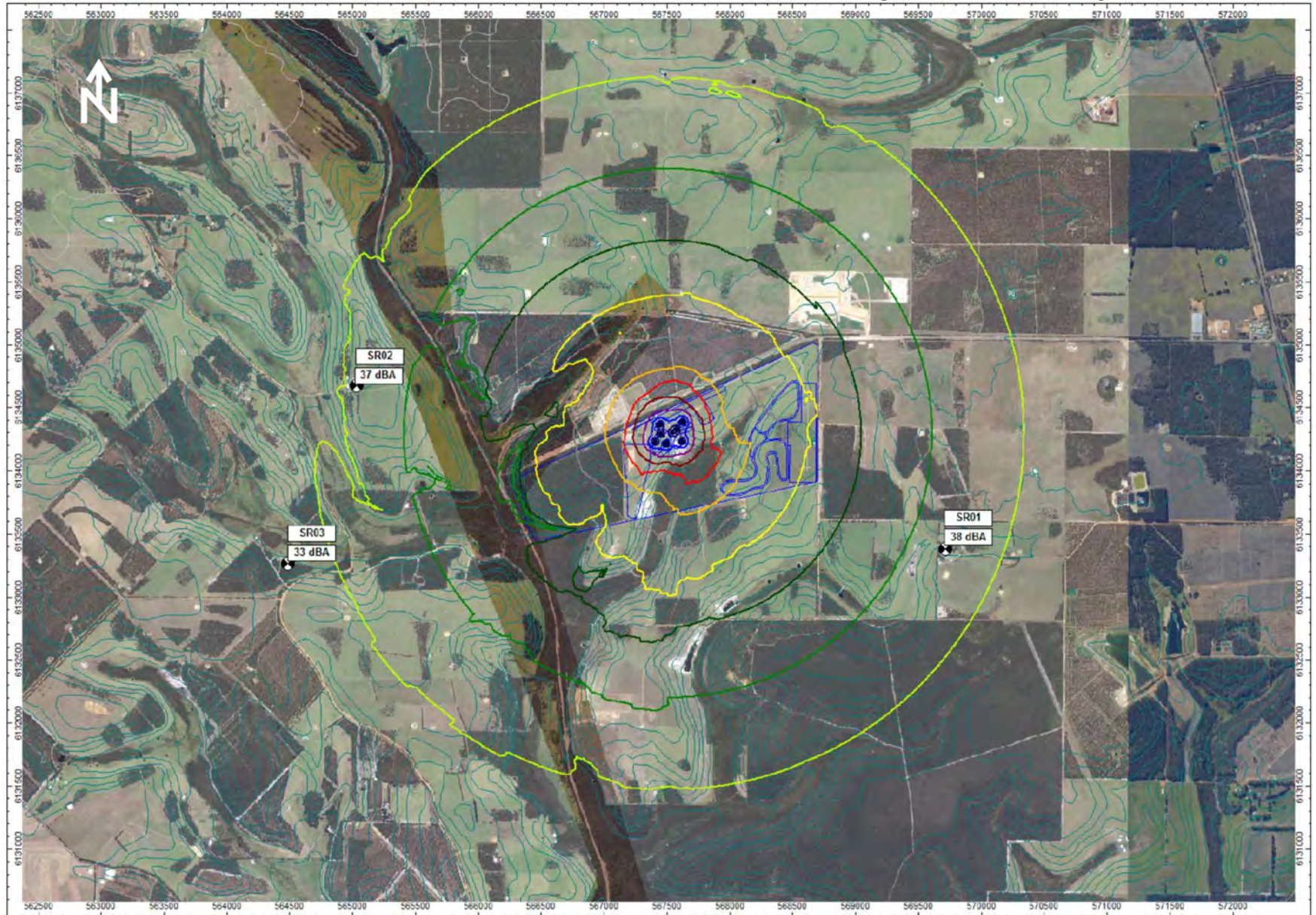


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HORIZONTAL DATUM: Geocentric Datum of Australia (GDA)	
GRID: Map Grid of Australia 1994, Zone 50	
DATE	FILE LOCATION
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REVISION	DRAWING NO.
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**ALBANY MOTORSPORT PARK**

**PREDICTED NOISE LEVELS  
MOTOCROSS EVENT**

**Noise Assessment**

Noise contours: LA10  
Grid height: 1.5 m  
ISO 9613 conditions

**FIGURE 9-2**

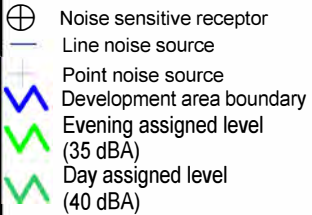


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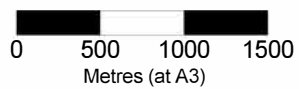
**PREDICTED NOISE LEVELS**



**LEGEND**



**SCALE**

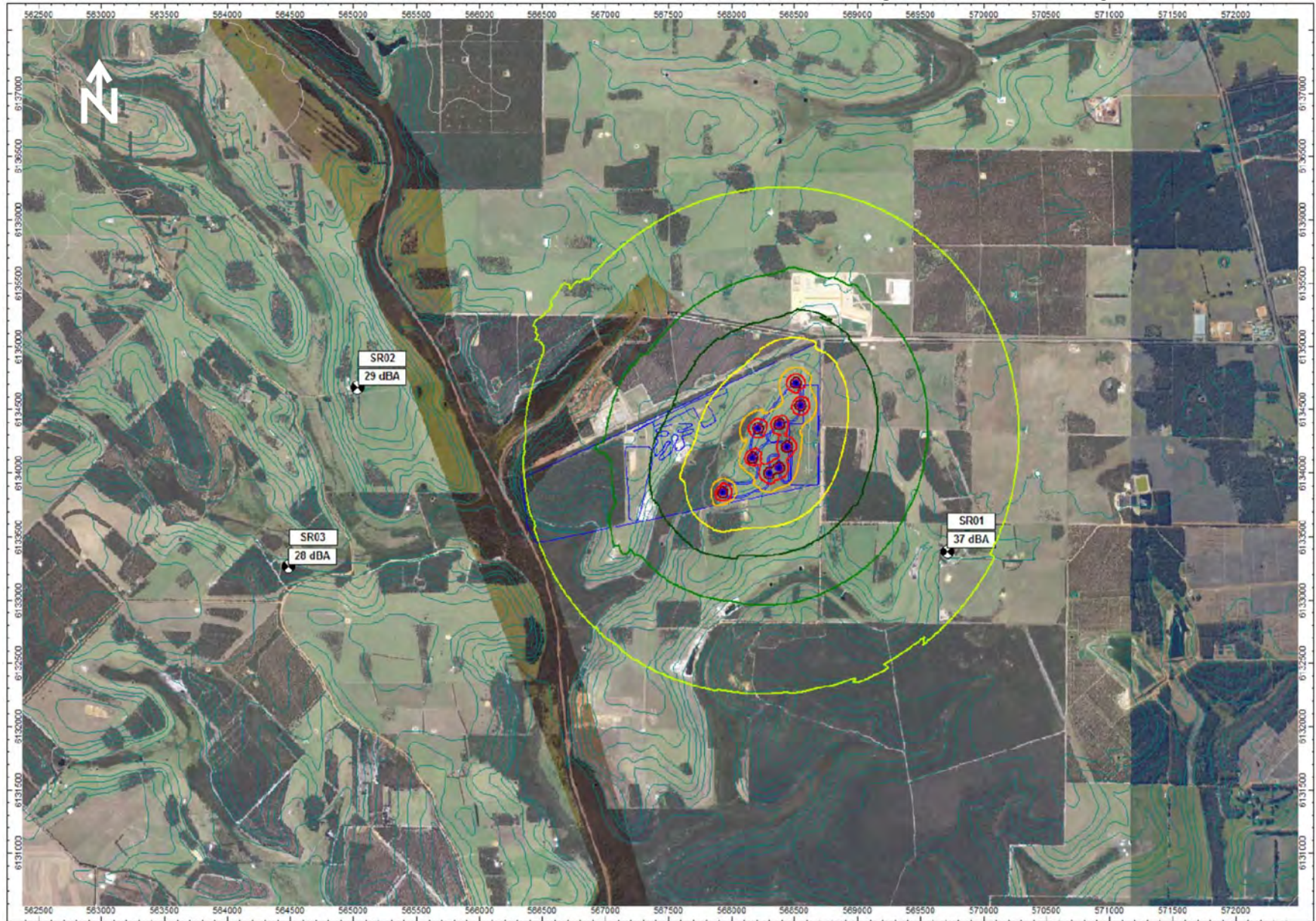


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**ALBANY MOTORSPORT PARK**

**Noise Assessment**

**PREDICTED NOISE LEVELS  
MULTI USE TRACK EVENT**

Noise contours: LA10  
Grid height: 1.5 m  
ISO 9613 conditions

**FIGURE 9-3**

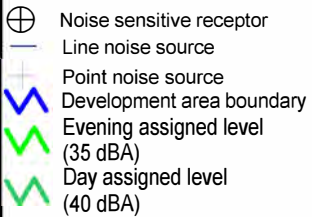


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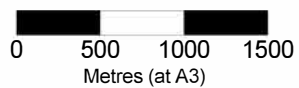
**PREDICTED NOISE LEVELS**



**LEGEND**



**SCALE**



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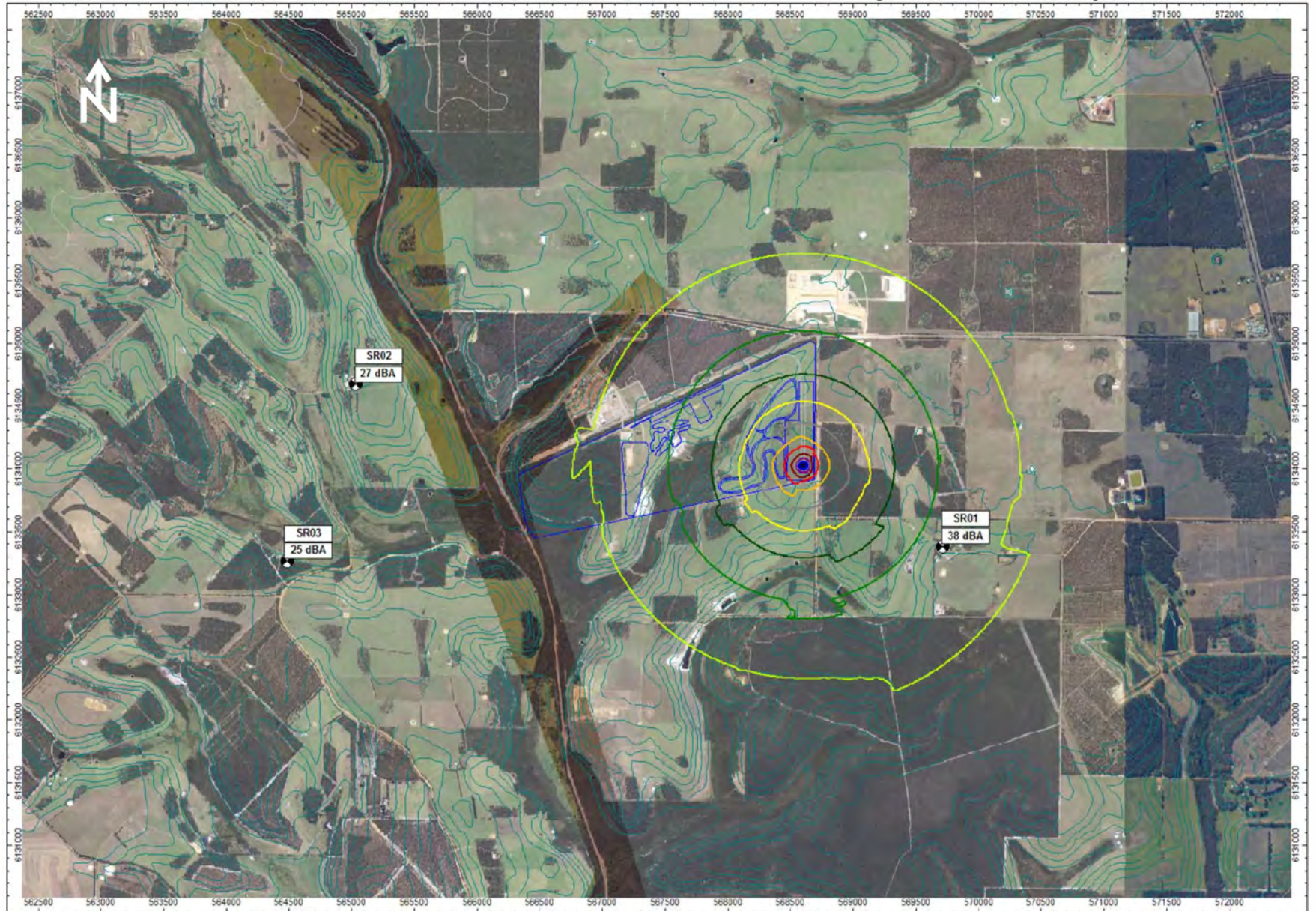
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**ALBANY MOTORSPORT PARK**

**Noise Assessment**

**PREDICTED NOISE LEVELS  
DRAG RACE EVENT**

Noise contours: LA10  
Grid height: 1.5 m  
ISO 9613 conditions

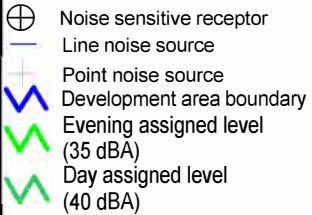
**FIGURE 9-4**



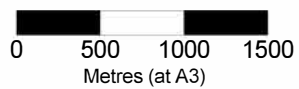
**PREDICTED NOISE LEVELS**



**LEGEND**



**SCALE**

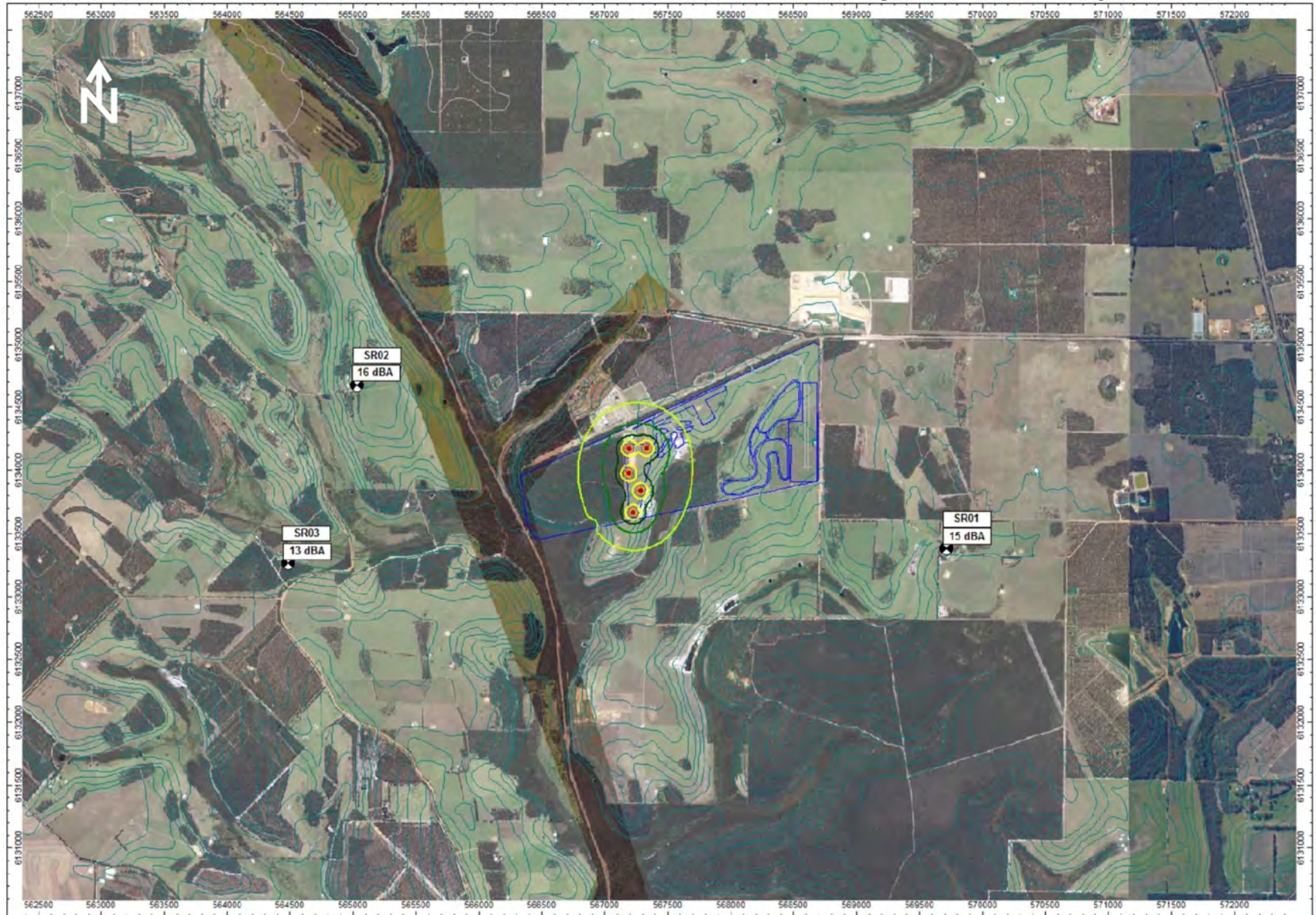


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**ALBANY MOTORSPORT PARK**

**Noise Assessment**

**PREDICTED NOISE LEVELS  
4WD TRAINING**

Noise contours: LA10  
Grid height: 1.5 m  
ISO 9613 conditions

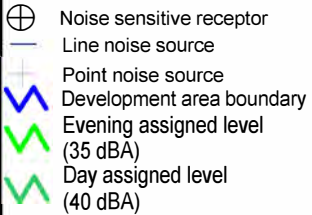
**FIGURE 9-5**



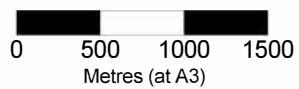
**PREDICTED NOISE LEVELS**



**LEGEND**



**SCALE**

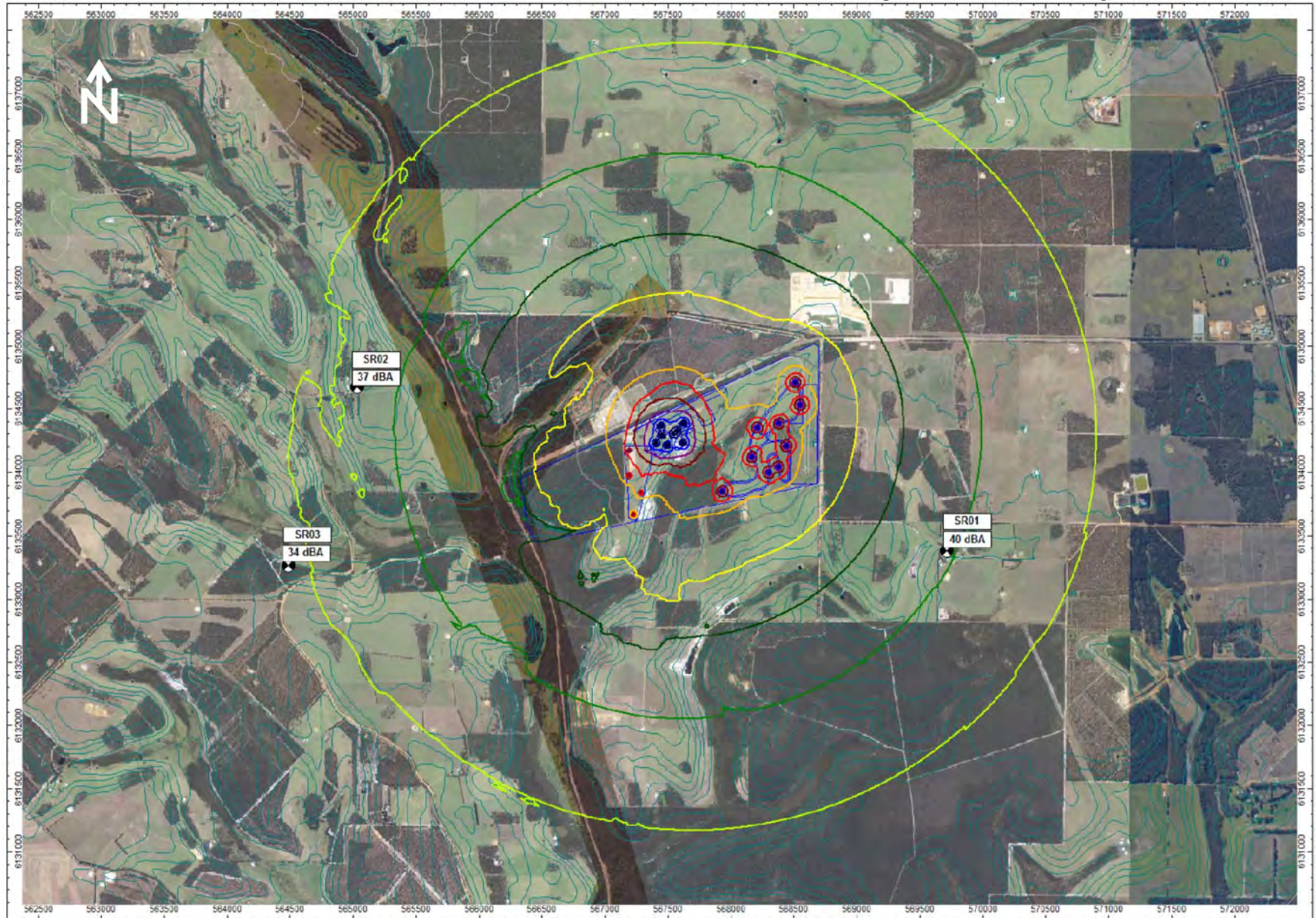


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**ALBANY MOTORSPORT PARK**

**PREDICTED NOISE LEVELS  
MOTOCROSS AND MULTI USE TRACK EVENTS**

**Noise Assessment**

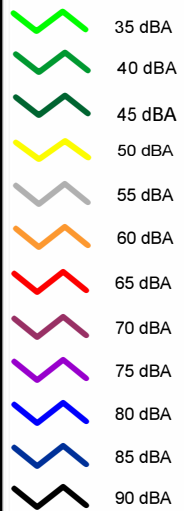
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Grid height: 1.5 m  
ISO 9613 conditions

**FIGURE 9-6**

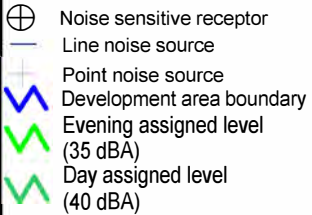


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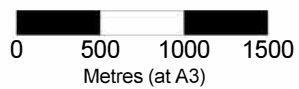
**PREDICTED NOISE LEVELS**



**LEGEND**



**SCALE**



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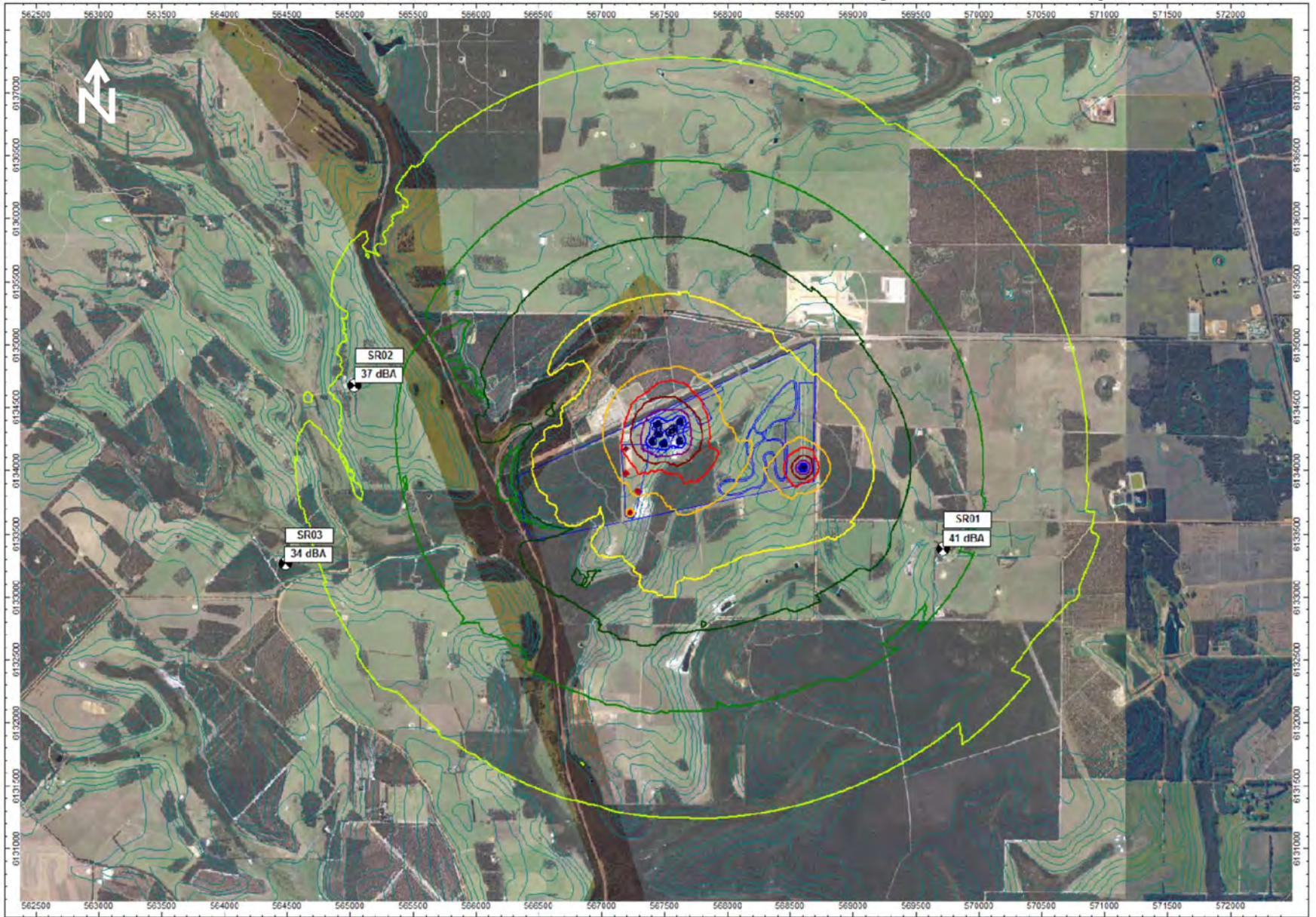
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**ALBANY MOTORSPORT PARK**

**Noise Assessment**

**PREDICTED NOISE LEVELS  
MOTOCROSS AND DRAG RACE EVENTS**

Noise contours: LA10  
Grid height: 1.5 m  
ISO 9613 conditions

**FIGURE 9-7**

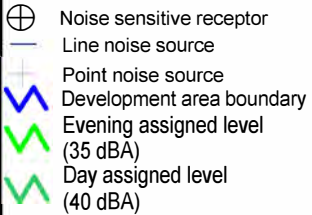


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**PREDICTED NOISE LEVELS**



**LEGEND**



**SCALE**

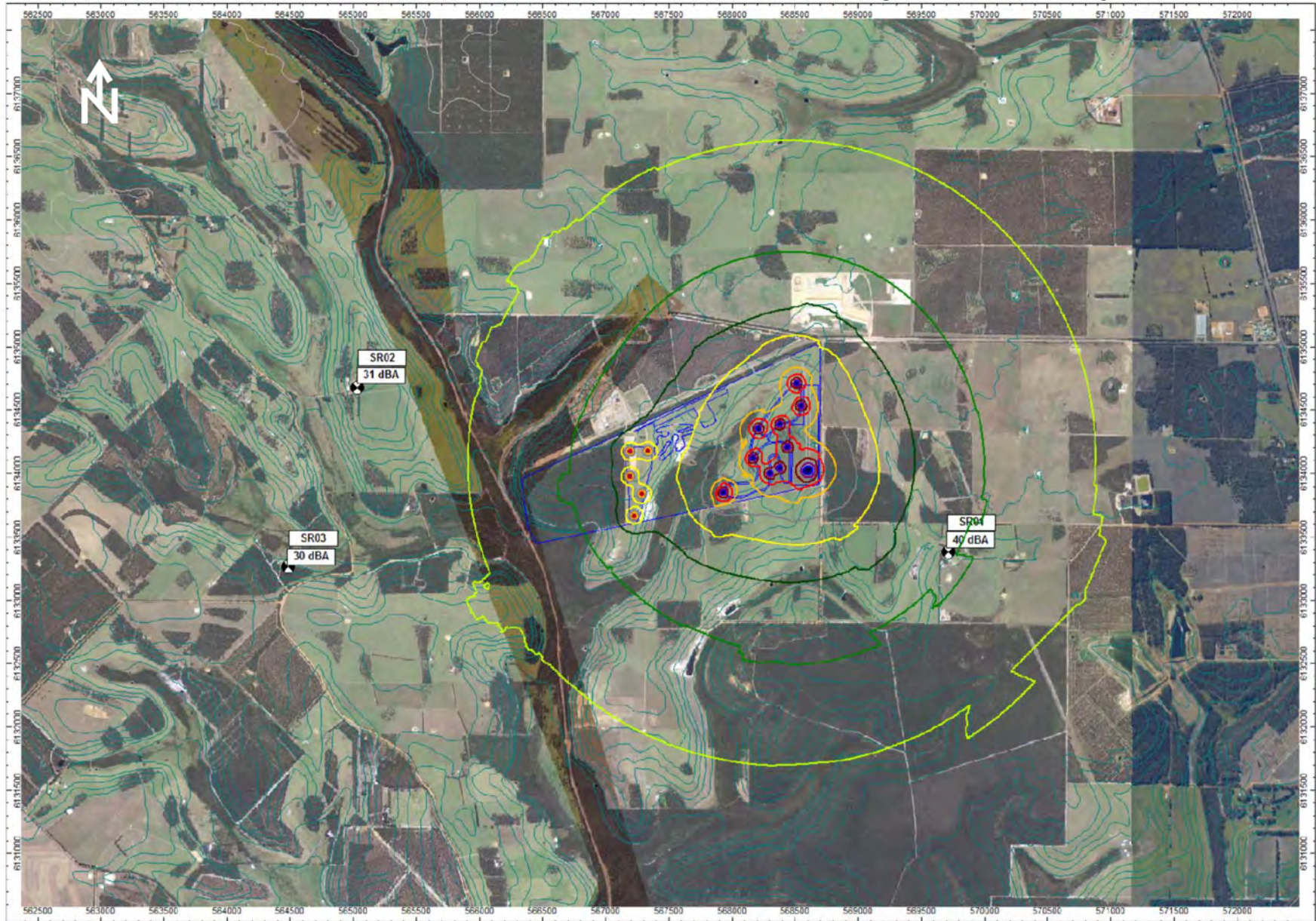


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**ALBANY MOTORSPORT PARK**

**Noise Assessment**

**PREDICTED NOISE LEVELS  
DRAG RACE AND MULTI USE TRACK EVENTS**

Noise contours: LA10  
Grid height: 1.5 m  
ISO 9613 conditions

**FIGURE 9-8**



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### 9.5 Preliminary noise management plan

The *Environmental Protection (Noise) Regulations 1997* set assigned (allowable) noise levels for various types of premises that receive noise from other premises. There are many activities that occur in the community that cannot, however, reasonably and practicably meet those assigned levels, but retain a degree of acceptance, either because of the temporary nature of the activity or the perceived community benefit.

In the case of a motorsport venue, good land use planning may be able to avoid noise problems in the first place – this may involve selection of a site for a new venue that is well away from sensitive receivers, or preventing encroachment by new residences into the noise-affected area around the venue.

Where a motorsport venue cannot practicably comply with the assigned noise levels, Division 3 of the Regulations allows the venue occupier to apply for a special approval. Under this approval the noise emissions from the venue are permitted to exceed the assigned levels in the Regulations provided the venue operates in accordance with an approved noise management plan (NMP) for the venue.

The NMP is usually prepared by the motorsport venue for approval by the Local Government Chief Executive Officer (CEO), as delegated under the Regulations, in order that the decision be made at the local level.

The requirements of an NMP for a motorsport venue are outlined in Table 9-8, with examples of a previously developed NMP provided as guidance for the Albany Motorsport Park.

Table 9-8: Requirements of a motorsport venue NMP

Requirement	Example of information required
Venue details	Name of venue Location of venue Occupier of venue Affiliations Venue maps
Types of racing activities covered by the NMP	Club race meetings State Title race meetings Practice sessions Vehicle tests Exhibitions / Blue Ribbon events Special events
Classes of vehicles	Motorcycles Late model sedans Sprint cars Super sedans Special exhibition vehicles Various other vehicles of smaller engine capacity
Scheduled race meetings and practice sessions	The following limits apply to scheduled race meetings and practice sessions at the speedway: 1. A race meeting or practice session can only take place between DATE and DATE ('season'). 2. Racing can only take place at a race meeting or practice session.



## REPORT ITEM DIS245 REFERS

Requirement	Example of information required
	<ol style="list-style-type: none"> <li>3. Racing vehicles are not to be operated at the venue at any time other than a race meeting or practice session.</li> <li>4. No more than XX race meetings are to be held during a season.</li> <li>5. Race meetings are to be held only on Friday or Saturday, except that a race meeting may be held on a Sunday preceding a public holiday.</li> <li>6. In addition to the XX race meetings per season, a preliminary meeting may be held to conduct tests on racing vehicles to establish their compliance with this Noise Management Plan.</li> <li>7. A race meeting can only be held on two consecutive days twice per season, that being either a Friday race meeting followed by a Saturday race meeting or a Saturday race meeting followed by a Sunday race meeting.</li> <li>8. A race meeting can only be held on three consecutive days once per season, for the purpose of the 'State Titles' race meeting held over a long weekend during the season.</li> <li>9. Races at a race meeting can only take place within a ten hour period on any one day.</li> <li>10. The ten hour period must be between 9:00 am and 10.00 pm on any one day.</li> <li>11. A practice session may be held in the six hour period immediately preceding the start of a race meeting, but is not to commence before 10.00 am.</li> <li>12. In addition, a practice session may be held on Thursday once per season, for the purpose of the 'State Titles' race meeting held over a long weekend during the season.</li> </ol>
Special events	<p>Where a special event that is to be open to the public is proposed to be held at the venue, but the event cannot be conducted within the limits for scheduled race meetings and practice sessions, the occupier is to apply to the CEO for approval of the event under Regulation 18.</p>
Access to race track	<p>In order to prevent noise emissions due to unauthorised use of the race track by racing vehicles, the gates to the race track are to remain locked at all times other than:</p> <ol style="list-style-type: none"> <li>1. In preparation for and during race meetings, practice sessions and special events approved by the CEO.</li> <li>2. During maintenance or improvement of venue facilities.</li> </ol>
Certification of racing vehicles	<p>Each VEHICLE TYPE that is to race at a race meeting at the venue must have a current certificate indicating that its noise level does not exceed a noise limit ('noise limit') when tested in accordance with the noise test procedure.</p> <p>The noise level for a racing vehicle is to be obtained at or before the first meeting of the season at which that racing vehicle is entered to race.</p> <p>Vehicles that have been measured in accordance with accepted measurement procedures at another racing venue are deemed to have complied with the requirement for certification and testing for noise emissions providing the measurements have been conducted by a competent person.</p> <p>If the exhaust system or engine of a racing vehicle is modified or replaced after the level of noise emitted by the car had been measured, VENUE is to ensure that the level of noise emitted by the car is measured again and the vehicle complies before the car is raced at an event.</p> <p>Certification is valid for 12 months only.</p>

## REPORT ITEM DIS245 REFERS

Requirement	Example of information required
	<p>Information provided in the certificate shall include:</p> <ol style="list-style-type: none"> <li>1. Engine and chassis identification number</li> <li>2. Exhaust type</li> <li>3. Owner of vehicle</li> <li>4. Date and location of testing</li> <li>5. Individual and average measured sound pressure level.</li> </ol>
Measuring individual noise level of racing vehicles	<p>The level of noise emitted by a racing vehicle (the tested vehicle) is to be measured while the tested vehicle completes three consecutive laps of VENUE within a period that is not greater than four times the average lap time record.</p> <p>Average lap times are to be calculated during the previous racing season for races at the VENUE in the class of racing vehicle to which the vehicle belongs.</p> <ol style="list-style-type: none"> <li>1. The measurements shall be made at a point that is: <ul style="list-style-type: none"> <li>– Inside the inner boundary of the speedway track in use by the vehicle racing</li> <li>– Not less than 29 metres and not more than 31 metres from the inner boundary</li> <li>– On, or as close as practicable to, the shorter axis of the speedway track</li> </ul> </li> <li>2. With the measuring microphone not less than 1.2 metres or more than 1.4 metres above the ground plane.</li> </ol>
Calculation of average noise level	<p>The level of noise emitted by a racing vehicle is taken to be the level obtained by:</p> <ol style="list-style-type: none"> <li>1. Adding together the maximum level of noise measured for the vehicle on each of the laps</li> <li>2. Dividing the total resulting from that addition by three</li> </ol>
Instruments	<p>Instruments used to measure noise emissions shall:</p> <ol style="list-style-type: none"> <li>1. Be calibrated in accordance with and otherwise comply with Schedule 4 of the Environmental Protection (Noise) Regulations 1997</li> <li>2. Be operated by a person who is approved by the CEO</li> <li>3. Preferably be a Type 1, although Type 2 instruments are acceptable provided allowance is made for their measurement tolerances.</li> <li>4. Copies of the calibration certificates must be provided to the CEO on request.</li> </ol>
Responsibility for noise measurement and certification	<p>The Manager VENUE will ensure that only competent persons utilising equipment conforming to the requirements of Section 5.3.3 are engaged as required to assess compliance. Also, that all noise measurements, calculation, certification and testing requirements are met for speedway events under the control of VENUE to the requirements of the CEO.</p>
Record of tests	<p>The operator is to record all results from tests carried and retain those results in a form that shows (for each test):</p> <ol style="list-style-type: none"> <li>1. Details of the racing vehicle tested, including engine and chassis identification number and exhaust type</li> <li>2. The racing vehicle's owner</li> <li>3. The date and location of the test</li> <li>4. The calculated lap time</li> <li>5. The actual time for the three laps of the test</li> </ol>

## REPORT ITEM DIS245 REFERS

Requirement	Example of information required
Scrutiny of racing vehicles	<ol style="list-style-type: none"> <li>1. A Chief Steward shall be designated for the duration of a race meeting and practice session to verify noise certificates and to evaluate noise emissions from race vehicles.</li> <li>2. The Chief Steward may reject a certificate and require a new test if not satisfied with the noise test on which the certificate is based or if he considers that a racing vehicle has been modified to the extent that the certificate is no longer representative of noise emission from the vehicle.</li> <li>3. If a racing vehicle at the VENUE emits a level of noise that is conspicuously louder than that of the other racing vehicles in the same class at the meeting, the Chief Steward may require that vehicle to immediately cease racing and may prevent that vehicle from further racing at the VENUE until that vehicle's noise level has been shown to comply with the noise limit.</li> </ol>
Public address system noise	<p>The public address (PA) system consists of loudspeaker towers placed around the track, facing towards the track and angled down towards the track.</p> <p>The loudspeakers are not to be moved or adjusted by any person without the approval of the Chief Steward.</p> <p>Noise emissions from the public address system at the speedway are to be under the control of the Chief Steward, who is to designate persons who are authorised to use the system.</p> <p>The public address system controls are to be set to provide a suitable audience sound level during the preliminary meeting each year, with the assistance of such persons as the Chief Steward requires, ensuring the minimum practicable 'spill' of sound into nearby noise sensitive areas.</p> <p>The public address cabinet is to be locked for access only by the Chief Steward and his authorised assistants at all other times.</p> <p>The public address system will only be used during race meetings; it is not to be used during practice sessions or at any other time except in the case of an emergency.</p>
Review of racing activities in response to noise complaint	<p>If complaints are made during a racing activity the occupier will review racing activities to reduce noise where practicable for the remainder of that event.</p>
Written instruction to members	<p>The club management committee shall provide all club members with a written instruction explaining the noise issues and the members' responsibility to maintain the noise limitation requirements.</p>
Notice of racing activities	<p>Notice of the program for racing activities for a season is to be published and distributed to members of the public as follows:</p> <ol style="list-style-type: none"> <li>1. The notice is to be published in the LOCAL NEWSPAPER, showing proposed dates of racing activities (where known) for the coming season and the telephone number for noise complaints.</li> <li>2. In addition to (1), the notice is to be delivered to the address of each noise sensitive premises at locations within 1 km of the venue.</li> <li>3. The notice is to be published and delivered during MONTH of the year in which the season starts.</li> <li>4. A change to the racing program is to be published in the LOCAL NEWSPAPER and a notice provided in accordance with (2) above within four weeks before the changed meeting is to occur.</li> <li>5. Notice of a special event approved by the CEO is to be given in accordance with the conditions of the approval.</li> </ol>

## REPORT ITEM DIS245 REFERS

Requirement	Example of information required
Complaint procedure	<p>A designated telephone line will be manned during racing activities for the receipt of noise complaints.</p> <ol style="list-style-type: none"> <li>1. A complaint received will be recorded on the noise complaint form (Attachment 3).</li> <li>2. All complaints will be treated with due consideration and investigated and responded to as appropriate.</li> <li>3. The occupier will as far as practicable provide advice to the complainant within 48 hours as to the outcomes of the investigation and where appropriate, any proposed modifications to operations.</li> <li>4. The results of complaint investigations, details of measures taken or considered to reduce noise emissions and an outline of the responses given to the complainant shall be recorded on the noise complaint form.</li> <li>5. Completed noise complaint forms will be retained at the speedway for the period of the approval and made available to the CEO on request.</li> <li>6. Noise complaint details are to be provided to the LOCAL GOVT on the next business day following receipt of the complaint.</li> </ol>
Record of vehicle tests	<p>The occupier is to retain records of all tests of race vehicles for a period of two years.</p>
Record of loud racing vehicles	<p>The occupier is to make a record of all racing vehicles that have been required to cease racing by the steward and retain that record for two years in a form that shows:</p> <ol style="list-style-type: none"> <li>1. Details of the racing vehicle required to cease racing.</li> <li>2. The racing vehicle's owner.</li> <li>3. The date and time at which the request to cease racing occurred.</li> <li>4. The action taken by the driver of the racing vehicle following the request.</li> <li>5. The action taken by the owner of the racing vehicle to remedy the excessive noise emissions.</li> </ol>
Records to be forwarded on request	<p>If requested to do so in writing by the CEO, the occupier is to forward a copy of all or any of the records within 21 days of the request.</p>
Responsibilities	<p>Club Committee: Appointment of Chief Steward            Development of program for scheduled race meetings            Chief Steward: Implementation of this Noise Management Plan            Designation and training of stewards            Control of public address system            Head Scrutineer: Scrutiny of racing vehicles</p>

## 10. Traffic investigation

### 10.1 Road network

As described in section 2.1, the Project Site is bounded by Down Road West to the north and Down Road South to the east.

#### 10.1.1 Down Road

Down Road connects with Albany Highway to the east. It is a single carriageway road approximately nine metres (m) wide with one lane in each direction.

It is designated as an Access Road under the Main Roads WA Road Information Mapping system and is under the control of the City of Albany. A speed limit of 110 kilometres per hour (km/h) applies.

The western end of the AMP site is located opposite the exit from the Plantation Energy site and the APEC woodchip facility.

#### 10.1.2 Albany Highway

Albany Highway is under the control of Main Roads WA and is designated a Primary Distributor. A speed limit of 110 km/h applies.

The intersection of Down Road / Albany Highway has been upgraded to accommodate traffic associated with CBH, Plantation Energy and APEC and includes a right and left turn lane in Albany Highway, a continuous left turn lane from Down Road into Albany Highway, and a right turn acceleration lane from Down Road onto Albany Highway.

#### 10.1.3 Restricted Access Vehicle network

Down Road forms part of the Restricted Access Vehicle (RAV) network 7 and accommodates multi combination vehicles up to 36.5 m in length. Down Road accommodates RAVs serving the CBH grain storage facility, Plantation Energy and the APEC wood chipping facility.

Albany Highway also forms part of the RAV network 7 and accommodates multi combination vehicles up to 36.5 m in length.

### 10.2 Traffic data

#### 10.2.1 Existing traffic

Traffic data has been sourced from the Main Roads WA web site and the City of Albany.

Table 10-1: Average weekday and weekend traffic volumes (2017) – existing vehicles per day (vpd)

Location	Average weekday (vpd)	Trucks	Average weekend (vpd)	Trucks
Down Road	844	34%	419	40%
Albany Highway	4,950	20%	3,520	16%

Source: Main Roads WA Traffic Map.

The existing high percentage of trucks on Down Road reflects the activity associated with Plantation Energy, APEC and CBH facility.

## 10.2.2 Site generated traffic

The assessment assumes **500** spectators/competitors in total. Events with larger numbers will be subject to specific traffic management measures. The indicative use of the venue, based on the business plan for AMP, is shown in section 3.2.

Based on an overall attendance of 500 people, it is assumed two people per vehicle so 250 vehicles in and 250 vehicles out, of which, 5% (13) are heavy vehicles transporting competition vehicles.

Table 10-2: Site generates traffic (typical)

Vehicle type	In (vph)	Out (vph)
Light vehicle	237	237
Heavy vehicle	13	13
Total	250	250

A capacity assessment of Down Road using Highway Capacity software (HCS7) indicates a level of service B, assuming AMP and peak hour traffic movement occur at the same time. No capacity issues are therefore anticipated.

The intersection of Albany Highway / Down Road has been upgraded to accommodate CBH traffic and no further upgrade is anticipated to be required for general use of the AMP. Analysis has been undertaken assuming the AMP exit traffic occurs at the same time as the pm peak hour of the intersection and confirms no forecast delay or congestion.

Further analysis has been undertaken assuming a 1% growth rate on Albany Highway for ten years and the results indicate all levels of service remain the same for both the am and pm peak period. Refer to Appendix C for detailed calculations.

## 10.3 Crash data (1 January 2013 – 31 December 2017)

### *Albany Highway / Down Road*

A review of the Main Roads WA crash analysis reporting system (CARS) indicates one reported crash in 2013. The intersection has been upgraded recently.

### *Down Road (Albany Highway to end SLK 5.05)*

There have been no reported crashes along Down Road in the five-year period. The crash assessment indicates there are no current reported safety issues at the Albany Highway / Down Road intersection or along Down Road.

## 10.4 Site access

Two access points are proposed to serve the Project Site from Down Road West. Entry to the AMP would be via the eastern entry point only. The western entry point is for separate controlled access (by Plantation Energy sub-Lessee) to the small dam in the north-west corner of the site.

Traffic volumes on Down Road are approximately 840 vpd, of which, approximately 34% are trucks (large multi combination vehicles). In order to minimise the impacts on large trucks using Down Road during weekday use, a left turn lane in Down Road West should be provided at the access location. Austroads Guide to Road Design indicates the length of the turn lane should be 180 m at 110 km/h or 120 m if a posted speed of 80 km/h is adopted (Table 10-3).

The current speed limit on Down Road is 110 km/h. It is considered this is too high in view of the likely activity associated with the proposed AMP and should be reduced to a maximum of 80 km/h. Main Roads WA will need to be consulted regarding this matter.

Site access should be constructed to accommodate construction traffic prior to the site construction phase.

Table 10-3: Deceleration lane lengths (Austroads)

Design speed of approach	Length of deceleration D – including diverge taper T									
	Stop condition1		Design speed of exit curve (km/h)2							
	0	0	20	30	40	50	60	70	80	90
Road (km/h)	0	0	20	30	40	50	60	70	80	90
	Comf. 2.5 m/s <sup>2</sup>	Max. 3.5 m/s <sup>2</sup>	Comfortable average rate of deceleration 2.5m/s <sup>2</sup>							
50	40	30	30	25	15					
60	55	40	50	40	30	15				
70	75	55	70	60	50	40	20			
80	100	70	95	85	75	60	45	25		
90	125	90	120	110	100	85	70	50	25	
100	155	110	150	140	130	115	100	80	55	30
110	185	135	180	175	160	150	130	110	90	60

Assuming a posted speed of 80 km/h on Down Road, the sight distance at the access location will require 5 m × 214 m. Adequate clearing will need to be undertaken if required (Figure 10-1 and Table 10-4).

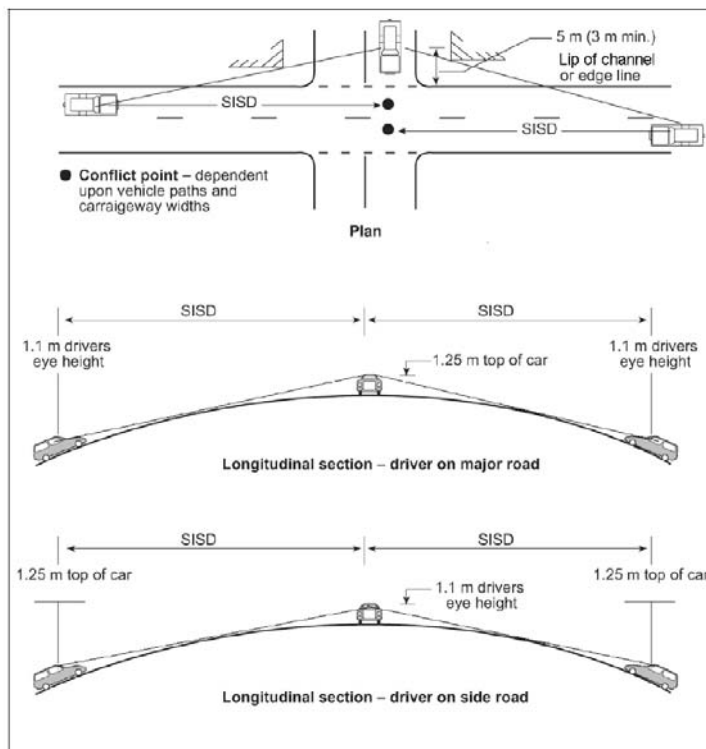


Figure 10-1: Safe intersection sight distance

Table 10-4: Safe intersection sight distance based on design speed

Design speed (km/h)	Based on safe intersection sight distance for cars <sup>1</sup> h <sub>1</sub> = 1.1; h <sub>2</sub> = 1.25, d = 0.362; Observation time = 3 s					
	R <sub>T</sub> = 1.5s <sup>3</sup>		R <sub>T</sub> = 2.0s		R <sub>T</sub> = 2.5s	
	SISD (m)	K	SISD (m)	K	SISD (m)	K
40	67	4.9	73	6	-	-
50	90	8.6	97	10	-	-
60	114	14	123	16	-	-
70	141	22	151	25	-	-
80	170	31	181	35	-	-
90	201	43	214	49	226	55
100	234	59	248	66	262	74
110	-	-	285	87	300	97
120	-	-	324	112	341	124
130	-	-	365	143	383	157

If a speed limit of 110 km/h is maintained, a review of aerial photography would indicate a suitable location for the eastern access is approximately 240 m west of Down Road North, or 150-200 m if the speed limit is reduced to 80 km/h.

## 10.5 Parking

Two car parking areas are proposed to accommodate general event demand. Based on 500 spectators/competitors, an overall provision of 250-300 bays is forecast to be required. For larger events, overspill parking areas are provided which will be controlled and managed by event staff. All parking demand will be contained within the site.

## 10.6 Traffic management for larger events

For larger events, careful planning will be required to accommodate the safe and orderly entry, exit and parking for competitors and spectators. This report does not cover detailed traffic management planning however, the planning will need to include:

- Consultation with Main Roads WA regarding requirements for the Albany Highway / Down Road intersection.
- Consultation with the City of Albany.
- Consultation with the Department of Fire and Emergency Services and WA Police.
- Consultation with adjacent businesses in Down Road.
- Variable Message Sign (VMS) requirements on Albany Highway.
- Directional signage to parking areas.
- Illumination of access and parking areas.
- Community notices, radio, newspaper, social media, etc.
- Speed limits and traffic control in Down Road.
- Emergency access requirements.
- Requirements for satellite parking and bus transfers.

*Note: There are likely to be other considerations in addition to the above list.*



## 10.7 Consultation

Preliminary consultation was undertaken with Main Roads WA (MRWA) and the City of Albany regarding the proposed traffic control measures. Responses to these queries are summarised in Table 10-5

Table 10-5: MRWA and City of Albany consultation

Query / issue	MRWA	City of Albany
In view of the access point to the AMP being in close proximity to CBH, APEC and Plantation Energy, would you consider reducing the speed limit on Down Road from 110 km/h to 80 km/h?	Yes, MRWA Great Southern Region would support a reduction in speed limit to 80 km/h, from say west of the entry to the CBH site. The change in speed limit would also need to be accompanied by some other directional signage for the AMP to assist in causing drivers to slow down. Final decision of speed limit changes are made by the MRWA Perth office, not the Regional office.	Yes, CoA is supportive. Again, from a point west of the CBH site entry.
Does Main Roads have any issue or concern with the existing Down Road/Albany Highway intersection noting it has recently been upgraded?	No, the existing Down Road/Albany Highway intersection does not require additional treatments.	-
Specific traffic management will be required for large events. Does Main Roads WA have any concerns?	MRWA has no concerns about specific traffic management for large events at the Down Road/Albany Highway intersection.	-
A left turn lane is likely to be required in Down Road West at the access point, is the City supportive?	-	Yes.

## 10.8 Summary

The reported crash history does not indicate a safety issue on Down Road or its intersection with Albany Highway.

Assuming competitor/spectator numbers of 500, the site is anticipated to generate 250 vph in and 250 vph out at the start and finish of events. No adverse impacts are anticipated for Down Road or its intersection with Albany Highway.

It is considered that the speed limit on Down Road near the site should be reduced from 110 km/h to a maximum of 80 km/h (west of the CBH entry) and should be progressed with Main Roads WA and the City of Albany. Complementary directional signage on Down Road should be installed for the AMP to assist in causing drivers to slow down.

If a speed limit of 110 km/h is maintained, a review of aerial photography would indicate a suitable location for the eastern access is approximately 240 m west of Down Road North, or 150-200 m if an 80 km/h speed limit is adopted.

## REPORT ITEM DIS245 REFERS

Site access should include a deceleration lane suitable for the posted speed limit.

Traffic management as required will need to be planned and undertaken for events with competitor/ spectator numbers in excess of 500 in consultation with the City of Albany and Main Roads WA. Regular consultation should be undertaken with CBH, Plantation Energy, APEC and other businesses on Down Road to advise when large events are planned.

All parking should be contained on site and should be clearly signed for users.

# 11. Power and communications servicing

## 11.1 Existing services (DBYD information)

The following summarises the information received from the Western Power and Telstra in response to 'dial before you dig' (DBYD) enquiries. Plans that have been received are attached in Appendix H.

### 11.1.1 Power infrastructure

Adjacent to the Project Site is an existing 22 kV, three phase overhead power line, which includes an underslung overhead earth wire. This 22 kV power line is the ALB 518.0 Mt Barker line and emanates from Albany Zone Substation, which is located some 10 km from the site. Refer to Figure 11-1.



Figure 11-1: Existing 22 kV overhead power lines on Project Site (parallel to Down Road South)

On the Project Site, the 22 kV power line is located within the property boundary and therefore will need to be considered when working and operating within the vicinity of this network. Typical safety clearance from this network is 10 metres either side of the power pole. Any works near this power line should be done in consultation with Western Power.

On Down Road West, there is an existing 200 kVA PTTx (Pole Top Transformer) currently servicing the property on the northern side of the road, opposite to the Project Site and is located some 400 metres west from the Down Road intersection. On preliminary investigations, it would appear this existing 200 kVA transformer is located too far from the motocross part of the project to be of use. In saying this, it also appears the power supply to the two areas of the AMP needs to be from two separate Western Power supplies.

It is expected that a new padmount transformer with high voltage switchgear will be required in order to provide a large enough supply for both AMP areas. Western Power will provide the design documentation for the power connection and the Customer's supply point will be the transformer low voltage (LV) frame.

## 11.1.2 Communications

In reviewing the DBYD plans, there are Telstra communication cables with P6 and P8 pits along Down Road West, which could be the service connection point for the subject site. It also appears there is existing fibre within the Telstra network. An application into Telstra via their Smart Communities web portal will need to be made, to allow Telstra to provide a cost for this service, and again it would appear two separate connections will be required.

The Project Site is reasonably well serviced by 3G and 4G mobile phone coverage, as shown below in Figure 11-2 (Telstra, 2018). Some loss of service seems to occur in the valleys of the Project Site.

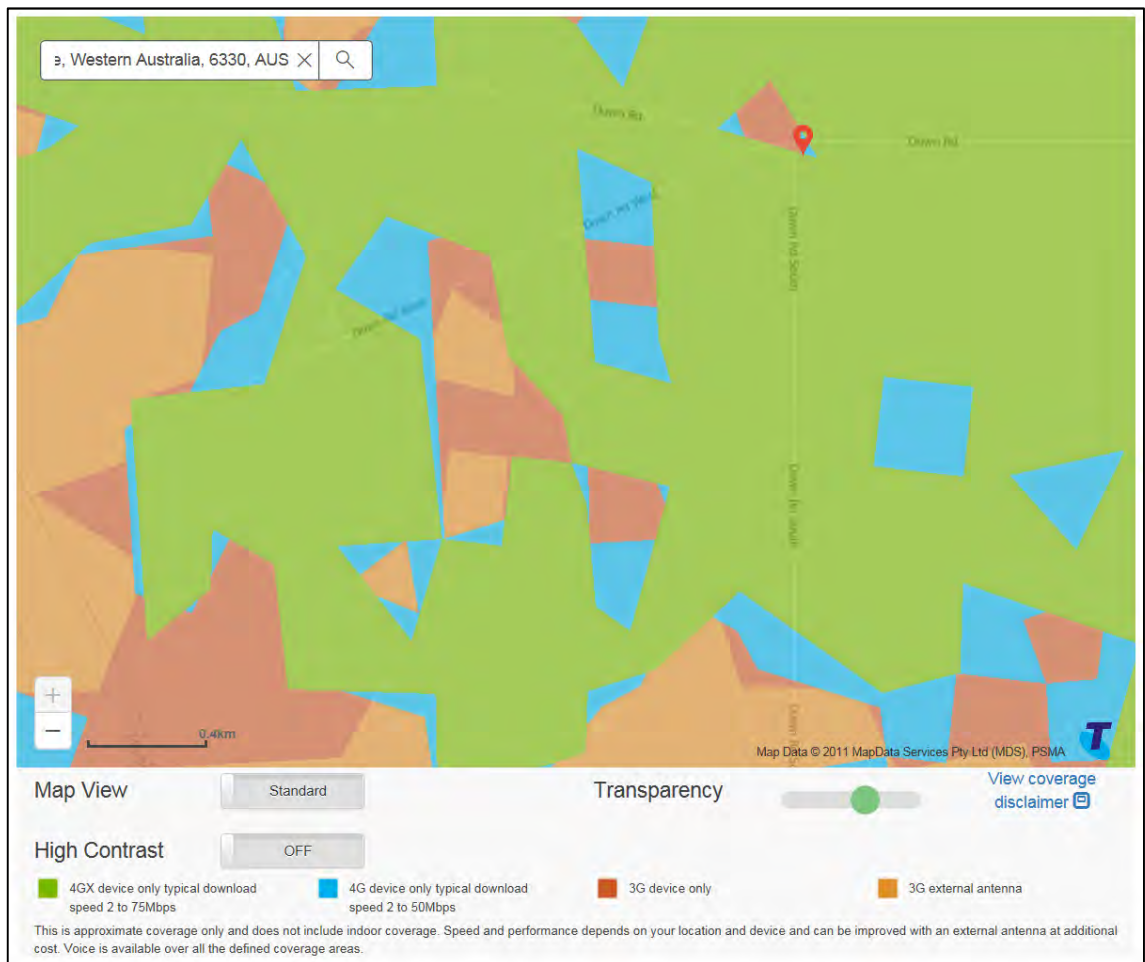


Figure 11-2: Telstra mobile network coverage

## 11.2 Preliminary estimate of power and communications requirements

It is understood that available facilities at the proposed AMP will include:

- Toilets,
- Medical / first aid station,
- Manager's office,
- Meeting / briefing room,
- Kitchen to prepare and sell food,
- Grounds maintenance workshop,
- Vehicle scrutineers' workshop,
- Control tower,
- Spectator viewing area,
- Grassed area with BBQs,
- Parking areas, and
- Tyre warmers and lighting.

It is also understood that temporary power will be provided by way of generators for larger events.

Initial maximum demand for the Project Site, calculated using PowerCAD and based upon the above preliminary power demands, is estimated to be 480 Amps per phase for the Multi-use Track area and some 200 Amps for the Motocross Track area. More definitive information on the loads will need to be provided to calculate the final maximum demand, including diversity factors within this calculation.

### 11.2.1 Communications

Telstra is likely to levy a fee to upgrade the existing network in order to create any new services. Sometime in the future, this network will eventually become owned by NBN Co and therefore future discussions will require a submission into Telstra and NBN Co to ensure timely delivery of advice and services.

## 11.3 Timeframes and cost

### 11.3.1 Timing

Table 11-1 summarises the timeline for design, approval and construction of required power infrastructure by Western Power.

Table 11-1: Western Power timeframes

	Item description	Estimated timeframe
0.	Authorisation to submit application to Western Power	
1.	Supply application submission. Requires: Single Line Diagram Load profile AS 6100 compliance (i.e. motors)	2 weeks
2.	Western Power to provide design (once all information has been provided)	6 weeks
3.	Quote to be reviewed and paid by Client	1 week
4.	Client to engage electrician (for CT metering etc.)	2 weeks
5.	Western Power works (subject to scheduling by Western Power) and Client to survey site.	8 weeks
		<b>19 weeks</b>

Telstra's timeline to provide their quotation from the time the Smart Communities application is made, is approximately 8 weeks and then 12 weeks for construction. Costs for Telstra communication services connection is difficult to ascertain, especially in the Country areas. GHD has managed to source a Telstra contact and an email has been sent, requesting an order of costs for the Telstra connection either copper or fibre to the premise (FTTP) and we are awaiting their response.

### 11.3.2 Cost

The below order of magnitude cost is provided pre-design and as such requires verification through the detailed design process.

- Western Power Application fee: \$6,000 (this will be part of the quote that Western Power issue).
- Western Power Quote Motocross Track: \$232,500 (based on full cost recoverable)\*\*.
- Western Power Quote Multi-use Track: \$258,000 (based on full cost recoverable)\*\*.

\*\* Western Power provides a revenue offset calculation, which could potentially reduce the above costs. This revenue offset calculation is difficult to ascertain until the maximum demands have been finalised; however it will be part of the SP (South Country Project) application process.

Some notes and exclusions:

- The existing 200 kVA pole top transformer (PTTx) on Down Road West is located too far from the motocross track area to be of use, so a new transformer is required for this area too.
- Based on sole use transformers and that all final electrical submains will be more than 400 metres from each motor track site area, in order to comply with zoning policies.
- The costs are based on the existing 22 kV powerline remaining inside the Project Site property (i.e. no relocation required).
- There are revenue offsets that could potentially lower the upfront costs, however this can only be calculated once the final maximum demands are determined.
- The SMSB (site main switchboard) costs are roughly estimated from GHD's experience, and these boards will be part of the private electrician's scope of works.
- Once the maximum demand has been determined, then the Western Power supply arrangement including the size of the transformers can be confirmed.
- Western Power will typically install a high voltage (HV) Switch when connecting a transformer to the power lines, being the worse cost scenario.
- The existing power supply to the Plantation Energy dam needs to be confirmed, as there is a risk that if private mains are crossing the road, then this would not comply with WAER (Western Australian Electrical Requirements).
- Subject to Western Power design and network information that is not currently known.

## 12. Summary of site feasibility assessment

### 12.1 Risk assessment

To summarise, assess and prioritise the site feasibility issues investigated in the preceding chapters, GHD has undertaken a preliminary risk assessment, using the City of Albany's *Risk & Opportunity Management Framework* (2018), as illustrated below.

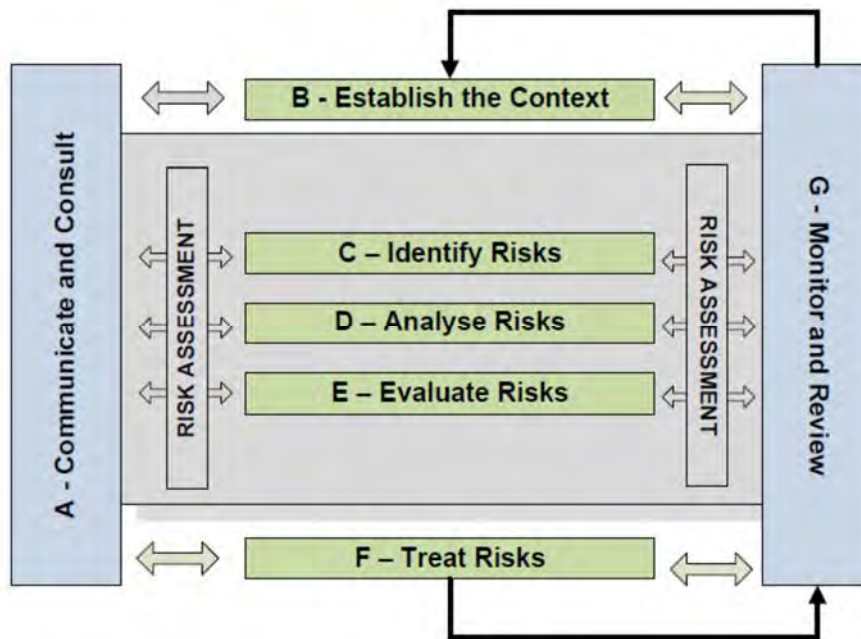


Figure 12-1: CoA risk and opportunity management process (CoA, 2018)

The risk assessment captures the risk issues identified in the preceding chapters and categorises them according to the following *Consequence* categories:

- Business interruption,
- Community,
- Environment,
- Financial,
- Legal and compliance,
- Organisation's operations,
- People health and safety,
- Property, and
- Reputation.

Each (unmitigated) risk is assessed within its category for consequences ranging from 'Insignificant' to 'Severe', and a likelihood ranging from 'Rare' to 'Almost certain'. Descriptors for each likelihood level and each consequence level within each category as documented in the *Risk & Opportunity Management Framework* (CoA, 2018). Where they exist, current risk controls are also documented.

The intersection of the likelihood and consequence ratings then determine the initial risk rating, as per the matrix shown in Figure 12-2.

LIKELIHOOD		CONSEQUENCES				
		1	2	3	4	5
		INSIGNIFICANT	MINOR	MODERATE	MAJOR	SEVERE
5	ALMOST CERTAIN	Medium (5)	High (10)	High b	Extreme (20)	Extreme (25)
4	LIKELY	Low (4)	Medium (8)	High (12)	High (16)	Extreme (20)
3	POSSIBLE	Low (3)	Medium (6)	Medium (9)	High (12)	High (15)
2	UNLIKELY	Low (2)	Low (4)	Medium (6)	Medium (8)	High (10)
1	RARE	Low (1)	Low (2)	Low (3)	Low (4)	Medium (5)

Figure 12-2: Risk rating matrix (CoA, 2018)

The risk assessment then captures the recommended remedial actions, controls and responsibility, with attention paid to the preferred hierarchy of controls (i.e. elimination > substitution > engineering control > administrative control > personal protective equipment). The residual risk is then assessed using the same risk rating matrix as Figure 12-2.

The residual risk level for each risk issue should then be considered according to the City’s *risk acceptance criteria*, as shown below. The target is to reduce each risk issue to ‘as low as reasonably practicable’ (ALARP). For the purposes of this site feasibility assessment, this is interpreted to mean that all treated risks should have a residual risk level of ‘Low / acceptable’, or ‘Medium / monitor’. In the latter case, the proposed remedial actions will require on-going monitoring to assure their effectiveness.

RISK ACCEPTANCE CRITERIA				
* From the risk’s rating, is the Management/Executive/Council willing to accept this risk?				
* Who will be responsible for accepting the level of risk?				
Level of Risk	Description	When is the risk acceptable?	Who is responsible*	Timeframe for Action
Low (1-4)	Acceptable	Risk acceptable with adequate controls, managed by routine procedures.	Responsible Officer (as per risk register)	Review controls every 6 months or As per risk register
Medium (5-9)	Monitor	Risk acceptable by observing, assessing and improving current controls and Council procedures.	Responsible Officer (as per risk register)	Review controls every 3 months or As per risk register
High (10-16)	Urgent Attention Required	Risk acceptable by establishing and implementing new controls.	Executive Directors and CEO	Controls implemented within two weeks of reporting Review controls every month
Extreme (17-25)	Unacceptable	Risk only acceptable with excellent controls and all treatment plans to be explored and implemented where possible, managed by highest level of authority.	Audit & Risk Committee and Council	Controls implemented within 1 week of reporting Review of controls every 2 weeks

Figure 12-3: Risk acceptance criteria (CoA, 2018)



This preliminary risk assessment captured 20 material risk issues, based on the feasibility investigations of the preceding chapters. A summary of the initial and residual risk ratings is shown in Table 12-1, with the full risk assessment outlined in Table 12-2.

Table 12-1: Summary of risk assessment

Risk issue	Initial risk rating	Residual risk rating
Zoning of Project Site	High	Low
Bushfire Prone Area	High	Medium
Security of Project Site	High	Medium
Visual amenity impacts	High	Low
Loss of fauna habitat (Black Cockatoos)	High	Medium
Heritage impacts	Medium	Medium
Adverse geotechnical conditions	High	Medium
Waste materials dumped on site	Medium	Low
General construction phase impacts	Medium	Low
Erosion and sediment pollution to Wetland (construction and operation phases)	Extreme	Medium
Hydrocarbon / chemical pollution to Wetland	Extreme	Medium
Drinking water availability	High	Medium
On-site wastewater management	High	Low
Noise impacts	High	Medium
Traffic impacts from special events	High	Medium
Crash risk with heavy vehicles on Down Rd	High	Medium
Power availability	High	Low
Telecommunications availability	Medium	Low

**Based on this assessment, it can be concluded that the Albany Motorsport Park proposal at Lot 5780, Down Road South does not have any technical obstructions to its feasibility, pending regulatory approvals and implementation of the recommended remedial and control actions.**

Table 12-2: Albany Motorsport Park risk assessment

Guidewords	Risks (New & Existing)				Initial Risk Rating			Remedial Actions / Controls			Residual Risk Rating		
	Consequence Category	Risk Issue (Hazards or events that may have an impact on the project's objectives)	Asset Life Stage (when could the risk event occur?)	Current Controls	Consequence Rating	Likelihood	Risk Level	Actions or Improvements Recommended	Type of Control Measure	Responsible Party	Consequence Rating	Likelihood	Risk Level
Position / Location	Legal & Compliance	Project Site is currently zoned 'Priority agriculture' under the Albany Local Planning Scheme 1. A motor sports park is not a compatible land use, and could not proceed.	Planning & Design	None.	3 - Moderate	A - Almost Certain	15 <b>Urgent attention req'd</b>	1. City of Albany to prepare a Scheme Amendment (standard or complex) to change zoning to 'Special Use'; for approval by WAPC and Minister. Also includes automatic referral to the EPA for assessment under the EP Act. 2. Include reference to the AMP in the Albany Local Planning Strategy, and particularly within Investigation Area 4 - Mirambeena SIA.	1 - Elimination	City of Albany	3 - Moderate	E - Rare	3 <b>Acceptable</b>
Fire / Explosion	Property	Project Site is located in a mapped Bushfire Prone Area, and will be classified as a "vulnerable land use" under SPP 3.7 Planning in Bushfire Prone Areas. Bushfire on the site, or adjacent properties, could damage site infrastructure, and/or cause injuries to people on the site.	Operation	Project Site is largely cleared, with multiple entry points and sealed road access (Down Rd).	4 - Major	C - Possible	12 <b>Urgent attention req'd</b>	1. Bushfire Management Plan to be developed for the Project Site. 2. Secondary road access to be provided from Down Rd, north to Redmond-Hay River Road. Will require easements through Lot 22 Down Road and Lot 5774 Redmond-Hay River Road. 3. Incorporate 'place of refuge' within the Project Site.	3 - Engineering Control	City of Albany, GSMG	4 - Major	D - Unlikely	8 <b>Monitor</b>
Security / Fencing	Property	Unauthorised / uncontrolled access to GSMSP, leading to theft, vandalism, loss of revenue, and public safety concerns.	Operation	Standard farm fencing (approx. 900 mm high), with limited security treatments.	3 - Moderate	B - Likely	12 <b>Urgent attention req'd</b>	Security fencing (1800 mm high + 3 strands barbed wire) & gates around each separate area - i.e. 1) Motocross, 2) Multi-use track & drag strip, 3) 4WD/ATV area.	3 - Engineering Control	GSMG	3 - Moderate	D - Unlikely	6 <b>Monitor</b>
Visual Impacts	Environment	The GSMSP will permanently alter the visual amenity of the Project Site.	Operation	The Project Site is located adjacent to existing an Strategic Industrial Area with visual impacts. Limited nearby residents.	2 - Minor	A - Almost Certain	10 <b>Urgent attention req'd</b>	1. Construction Environmental Management Plan (CEMP) to mitigate construction phase impacts. 2. Site re-vegetation and beautification.	3 - Engineering Control	GSMG	2 - Minor	D - Unlikely	4 <b>Acceptable</b>
Flora / Fauna	Environment	The GSMSP will result in permanent loss of native vegetation (approx. 2 ha) that provides fauna habitat, potentially including habitat for the conservation significant Black Cockatoos and other species.	Construction	None.	4 - Major	B - Likely	16 <b>Urgent attention req'd</b>	1. Conduct a baseline flora and fauna survey (inc. targeted Black Cockatoo assessment) and undertake environmental offset calculations. 2. Negotiate need for and type of environmental offsets with DWER during Clearing Permit application - e.g. purchase offsets, nesting boxes, site re-vegetation to be negotiated as environmental offset. 3. Potentially conduct on-going vegetation monitoring (unlikely to be required).	4 - Administrative Control	GSMG	4 - Major	D - Unlikely	8 <b>Monitor</b>
Heritage	Legal & Compliance	Construction works on the site could reveal artefacts and/or sites of Aboriginal heritage significance. Would lead to suspension of works, additional costs for recovery and preservation of artefacts, or potentially re-design of site layout.	Construction	Search of Aboriginal Heritage Inquiry System completed.	3 - Moderate	D - Unlikely	6 <b>Monitor</b>	Project proposal has been referred to Wagyl Kaip by City of Albany, inviting comment.	4 - Administrative Control	City of Albany	3 - Moderate	D - Unlikely	6 <b>Monitor</b>
Excavation	Property	1. The site contains reactive clay soils. 2. The clayey soils will become difficult to handle and compact if water is allowed to enter them. 3. A perched water table may briefly develop in the upper layer of granular soils on this site following heavy rainfall.	Construction	Geotechnical data available from adjacent site (i.e. CBH).	3 - Moderate	B - Likely	12 <b>Urgent attention req'd</b>	1. Undertake further geotechnical and ASS investigations on site. 2. Appropriate drainage of excavations during construction. 3. Excavations in perched water table may require dewatering. 4. Avoid excavations following periods of high rainfall. 5. Footings and pavements designed to accommodate lower bearing capacity/CBR and higher shrink/swell movements.	3 - Engineering Control	City of Albany / GSMG, Constructor, Designer	3 - Moderate	D - Unlikely	6 <b>Monitor</b>

Table 12-2: Albany Motorsport Park risk assessment

Guidewords	Risks (New & Existing)				Initial Risk Rating			Remedial Actions / Controls			Residual Risk Rating		
	Consequence Category	Risk Issue (Hazards or events that may have an impact on the project's objectives)	Asset Life Stage (when could the risk event occur?)	Current Controls	Consequence Rating	Likelihood	Risk Level	Actions or Improvements Recommended	Type of Control Measure	Responsible Party	Consequence Rating	Likelihood	Risk Level
Contamination	Environment	Waste materials (e.g. used chemical drums, equipment, electrical cable, building rubble, etc.) currently stockpiled in north-western corner of site. May be a risk of asbestos-containing material, or other hazardous materials, causing environmental harm and/or injury/illness to people on site.	Construction	Private property, with secure access.	3 - Moderate	C - Possible	9 <b>Monitor</b>	All waste materials to be sampled (as per Landfill Waste Classification and Waste Definitions) and removed by sub-Lessees, and site 'made good'.	1 - Elimination	Lessees (Lindsay Black, Plantation Energy)	3 - Moderate	E - Rare	3 <b>Acceptable</b>
Dust / Fumes	Environment	General construction phase impacts (e.g. — dust, noise and vibration, visual amenity, fire, and pollution through the use of fuels, chemicals or from general construction litter) cause nuisance to nearby sensitive receptors.	Construction	None.	2 - Minor	B - Likely	8 <b>Monitor</b>	Construction Environmental Management Plan (CEMP) and operational phase Environmental Management Plan (EMP).	4 - Administrative Control	Constructor, GSMG	2 - Minor	D - Unlikely	4 <b>Acceptable</b>
Erosion	Environment	Runoff and sediment from excavations and track areas (esp. unsealed tracks) pollute surface water and Significant Wetland.	Construction	None.	4 - Major	A - Almost Certain	20 <b>Unacceptable</b>	1. Baseline water quality monitoring program. 2. Erosion and sediment control plan, inc. for construction activities.	3 - Engineering Control	GSMG, Constructor	4 - Major	D - Unlikely	8 <b>Monitor</b>
Erosion	Environment	Runoff and sediment from track areas (esp. unsealed tracks) pollute surface water and Significant Wetland.	Operation	None.	4 - Major	A - Almost Certain	20 <b>Unacceptable</b>	1. Baseline water quality monitoring program + on-going monitoring program with annual reporting to DWER and Water Corporation. 2. Minimum 50 m setback from boundary of Significant Wetland and water course. 3. Develop and implement a site Water Management Plan for on-going operational controls (inc. erosion and sediment control). 4. Vegetated swale drains and detention basins to attenuate flows and treatment of gross pollutants. 5. Diversion drains to take external catchment flow through the site to the water course.	3 - Engineering Control	GSMG	4 - Major	D - Unlikely	8 <b>Monitor</b>
Contamination	Environment	Hydrocarbons and other contaminants from pits and vehicle maintenance areas pollute Significant Wetland, surface water and groundwater.	Operation	None.	4 - Major	A - Almost Certain	20 <b>Unacceptable</b>	1. All pits and vehicle maintenance areas to be located > 200 m from boundary of 'Significant Wetland'. 2. Zero on-site fuel storage (i.e. all fuels must be brought in by participants for events only). 3. All pits and vehicle maintenance areas to be impervious and bunded to drain directly to internal sumps for treatment (i.e. oil-water separators). 4. Develop and implement a site Water Management Plan for on-going operational controls. 5. Facilities to have 2 m clearance to max. groundwater level.	3 - Engineering Control	GSMG	4 - Major	D - Unlikely	8 <b>Monitor</b>
Utilities & Services	Community	Project Site currently has no safe potable water services for people / events on site.	Planning & Design	None.	3 - Moderate	A - Almost Certain	15 <b>Urgent attention req'd</b>	1. Install rainwater collection tanks + simple treatment units (i.e. filtration + UV disinfection) to meet demands associated with regular / typical events (i.e. < 500 people). 2. Cart in additional drinking water to fill tanks, if rainfall is insufficient. 3. Use water tankers for special events (i.e. >> 500 people).	1 - Elimination	GSMG	3 - Moderate	D - Unlikely	6 <b>Monitor</b>
Utilities & Services	Community	Project Site currently has no toilets or wastewater management, for people / events on site. Untreated wastewater would cause environmental damage to site water resources and PDWSA.	Planning & Design	None.	3 - Moderate	A - Almost Certain	15 <b>Urgent attention req'd</b>	1. Install ablutions and on-site secondary WWTP to meet demands associated with regular / typical events (i.e. < 500 people). 2. Use port-a-loos for special events (i.e. >> 500 people).	1 - Elimination	GSMG	3 - Moderate	E - Rare	3 <b>Acceptable</b>

Table 12-2: Albany Motorsport Park risk assessment

Guidewords	Risks (New & Existing)				Initial Risk Rating			Remedial Actions / Controls			Residual Risk Rating		
	Consequence Category	Risk Issue (Hazards or events that may have an impact on the project's objectives)	Asset Life Stage (when could the risk event occur?)	Current Controls	Consequence Rating	Likelihood	Risk Level	Actions or Improvements Recommended	Type of Control Measure	Responsible Party	Consequence Rating	Likelihood	Risk Level
Noise	Community	1. Excessive noise from typical / regular motorsports events adversely impacts surrounding residents and community, leading to Council complaints. 2. Noise associated with GSMSP deters other development(s) in the surrounding area.	Operation	Existing noise buffer (IA4BA) associated with Mirambeena Timber Processing Precinct includes Lots 5780 (Project Site), 6026 (to east), 5781 (to south), 4117 (to west). Planning controls prevent incompatible uses within noise buffer.	3 - Moderate	B - Likely	12 <b>Urgent attention req'd</b>	1. Undertake detailed noise modelling, once site concept plan is finalised. 2. Develop and implement Noise Management Plan. 3. All events to cease by 10:00 pm. 4. Expand noise buffer IA4BA to incorporate cumulative noise impacts of Mirambeena TPP and AMP.	4 - Administrative Control	GSMG, City of Albany / DPLH	3 - Moderate	C - Possible	9 <b>Monitor</b>
Traffic	Community	Traffic associated with special events at GSMSP (i.e. >> 500 people) creates congestion and delays at Albany Highway / Down Road intersection. Delays to trucks to/from CBH, APEC and PE.	Operation	1. Northbound and southbound acceleration lanes for exit onto Albany Highway. 2. Left turn and right turn lanes from Albany Highway into Down Road.	3 - Moderate	A - Almost Certain	15 <b>Urgent attention req'd</b>	1. Community advertising for special events. Liaison with CBH, APEC, PE, etc. 2. Traffic management controls at Albany Highway / Down Road.	3 - Engineering Control	GSMG, City of Albany	3 - Moderate	C - Possible	9 <b>Monitor</b>
Traffic	People Health & Safety	Large trucks travelling along Down Road at high speed (110 km/h) could collide with vehicles entering and exiting the GSMSP, due to: 1. Insufficient sight distances. 2. Insufficient road space for vehicles to slow down for GSMSP site entry. Leads to injuries / fatalities, and road closure.	Operation	None.	5 - Severe	C - Possible	15 <b>Urgent attention req'd</b>	1. Reduce speed limit to 80 km/h, west of CBH site. 2. Install westbound left turn lane on Down Road (min. 120 m). 3. Install other signage for AMP. 4. AMP site access to be min. 200 m west of Down Rd North intersection.	3 - Engineering Control	City of Albany, MRWA	5 - Severe	E - Rare	5 <b>Monitor</b>
Energy / Electrical	Community	Project Site currently has no power supply. Any site activities would require portable generators, or similar.	Planning & Design	None.	2 - Minor	A - Almost Certain	10 <b>Urgent attention req'd</b>	1. Liaise with Western Power for power servicing to the Project Site, to meet demands associated with regular / typical events (i.e. < 500 people). 2. Hire additional portable generator(s) to meet demand for special events (i.e. >> 500 people)	1 - Elimination	GSMG	1 - Insignificant	C - Possible	3 <b>Acceptable</b>
Energy / Electrical	People Health & Safety	Electrocution and equipment damage caused by accidental contact with 22 kV overhead power lines. Disruption to power supply to APEC and PE.	Construction	None.	5 - Severe	C - Possible	15 <b>Urgent attention req'd</b>	1. Consultation with Western Power prior to any site works. 2. Safety clearance zone = 10 m from power lines. 3. Construction Management Plan. 4. Special event management plan - safety clearance zone in overflow parking area.	4 - Administrative Control	Constructor, GSMG	5 - Severe	E - Rare	5 <b>Monitor</b>
Communications	Community	Project Site currently has no telephone and internet services (apart from mobile phone coverage).	Planning & Design	Mobile phone coverage.	2 - Minor	B - Likely	8 <b>Monitor</b>	1. Liaise with Telstra / NBN Co. for telecomms servicing to the Project Site, to meet demands associated with regular / typical events (i.e. < 500 people).	1 - Elimination	GSMG	1 - Insignificant	D - Unlikely	2 <b>Acceptable</b>

## 12.2 Recommended remedial and control actions

Drawing on the risk assessment in section 12.1, the recommended remedial and control actions for the AMP proposal are outlined below according to the phase of development – i.e. planning, design development, construction and operation.

### 12.2.1 Planning phase (2018 to 2020)

The following planning phase actions are recommended:

1. City of Albany to include reference to the AMP in the *Albany Local Planning Strategy*, and particularly within Investigation Area 4 - Mirambeena SIA.
2. City of Albany and GSMG to continue the baseline water quality monitoring program.
3. GSMG and City of Albany to conduct a baseline flora and fauna survey (inc. targeted Black Cockatoo assessment) and undertake environmental offset calculations.
4. City of Albany to seek comment from Wagyl Kaip on the AMP proposal.
5. GSMG to arrange for all waste materials on site to be sampled (as per Landfill Waste Classification and Waste Definitions) and removed by sub-Lessees, and site 'made good'.
6. GSMG and City of Albany to prepare a Bushfire Management Plan for the Project Site, including:
  - Secondary road access from Down Road, north to Redmond-Hay River Road (requiring easements through Lot 22 Down Road and Lot 5774 Redmond-Hay River Road), and
  - 'Place of refuge' within the Project Site.
7. GSMG and City of Albany to seek MRWA approval for reduction of speed limit on Down Road to 80 km/h, west of CBH site. Also, install a westbound left turn lane on Down Road (min. 120 m length), together with directional signage for the AMP.
8. City of Albany to prepare a Scheme Amendment (standard or complex) to change zoning to 'Special Use'; for approval by WAPC and Minister. Also includes automatic referral to the EPA for assessment under the EP Act. The Scheme Amendment should consider expansion of noise buffer IA4BA to incorporate the cumulative noise impacts of the Mirambeena TPP and AMP.

### 12.2.2 Design development phase (2019 to 2021)

The following design development actions are recommended:

9. GSMG and City of Albany to undertake further geotechnical and ASS investigations on site. If necessary, the Designer is to accommodate footings and pavements with lower bearing capacity/CBR and higher shrink/swell movements.
10. Designer to incorporate all design elements of the Water Management Plan – i.e.:
  - Minimum 50 m setback from boundary of Significant Wetland and water course.
  - Vegetated swale drains and detention basins to attenuate flows and treatment of gross pollutants.
  - Diversion drains to take external catchment flow through/around the Project Site to the water course.
  - All pits and vehicle maintenance areas to be located > 200 m from boundary of Significant Wetland.
  - All pits and vehicle maintenance areas to be impervious and bunded to drain directly to internal sumps for treatment (i.e. oil-water separators).

- Facilities to have 2 m clearance to maximum groundwater level.
  - Install rainwater collection tanks + simple treatment units (i.e. filtration + UV disinfection) to meet demands associated with regular / typical events (i.e. < 500 people). Cart in additional drinking water to fill tanks, if rainfall is insufficient. Use water tankers for special events (i.e. >> 500 people).
  - Install ablutions and on-site secondary WWTPs to meet demands associated with regular / typical events (i.e. < 500 people). Use port-a-loos for special events (i.e. >> 500 people).
11. GSMG and Designer to liaise with Western Power and Telstra / NBN Co. for power and communications servicing to the Project Site, to meet demands associated with regular / typical events (i.e. < 500 people).
  12. GSMG and Designer to undertake detailed noise modelling.
  13. Designer and GSMG to incorporate security fencing (1800 mm high + 3 strands barbed wire) and gates around each separate area – i.e. 1) Motocross, 2) Multi-use track & drag strip, 3) 4WD/ATV area.

### 12.2.3 Construction phase (summer / autumn 2021)

The following construction actions are recommended:

14. GSMG and Constructor to prepare a Construction Environmental Management Plan (CEMP) to mitigate construction phase impacts, including:
  - Erosion and sediment control.
  - Appropriate drainage and dewatering of excavations during construction.
  - Avoid excavations following periods of high rainfall.
  - Consultation with Western Power prior to any site works and maintain safety clearance zone = 10 m from high voltage (HV) power lines.
15. GSMG and Constructor to undertake site re-vegetation and beautification.

### 12.2.4 Operational phase (post 2021)

The following operational actions are recommended:

16. GSMG to prepare an operational phase Environmental Management Plan (EMP), including:
  - On-going water monitoring program with annual reporting to DWER and Water Corporation.
  - On-going erosion and sediment controls.
  - Zero on-site fuel storage (i.e. all fuels must be brought in by participants for events only).
  - On-going vegetation monitoring (unlikely to be required).
17. GSMG to implement a Noise Management Plan, which includes cessation of all activities by 10:00 pm.
18. For special events (i.e. >> 500 people), GSMG to undertake:
  - Community advertising and liaison with CBH, APEC, Plantation Energy and other Down Road businesses.
  - Additional traffic management controls at Albany Highway / Down Road for special events, in liaison with Main Roads WA.
  - Hire additional portable generator(s) to meet power demand.

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- Contaminated Sites Database (DWER-059)
- DBCA Legislated Lands and Waters (DBCA-011)
- Groundwater Salinity Statewide (DWER-026)
- Hydrographic Catchments – Catchments (DWER-028)
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- Pre-European Vegetation (DPIRD-006)
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- Ramsar Sites (DBCA-010)
- RIWI Act, Groundwater Areas (DWER-019)
- RIWI Act, Rivers (DWER-036)
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- Soil Landscape Mapping – Best Available (DPIRD-027)
- South Coast Significant Wetlands (DBCA-018)
- Surface Water Allocation Areas (DWAID) (DWER-039)
- Surface Water Allocation Subareas (DWAID) (DWER-040)
- Threatened Ecological Communities (DBCA-038)


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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft A	J. Foley V. Davies A. Jennings D. Lamb J. Forrest S. McDermott L. Houghton M. Collins	J. Foley M. Toner S. Cleary				18.09.18
0	J. Foley	J. Cramer		J. Cramer		22.10.18

## Appendix F – Flora and Fauna Survey (Feb. 2019)

Proposed  
Motorsport Park  
Lot 5780 Down  
Road, Drome WA  
6330

## Reconnaissance Flora and Level 1 Fauna Survey Report



Bio Diverse Solutions

FINAL V1

07/02/2019

## DOCUMENT CONTROL

Title: Reconnaissance Flora & Level 1 Fauna Survey, Lot 5780 Down Road, Drome WA

Author (s): Bianca Theyer

Reviewer (s): K. Kinnear, K. Bain, E. Hickman, C. Cramer

Job No.: MSC0137-002

Client: City of Albany

### REVISION RECORD

Revision	Summary	Revised By	Date
DRAFT ID V1 - 4/12/2018	Internal Technical Review	K. Bain & E. Hickman	7/12/2018
DRAFT ID V2 - 11/12/2018	Internal QA	K. Kinnear	12/12/2018
DRAFT ID V3 – 13/12/2018	Updates as per Internal reviews	B. Theyer	13/12/2018
DRAFT ID V3 – 14/12/2018	Submitted to Client for review	B. Theyer	14/12/2018
DRAFT ID V4 – 06/02/2019	Updates as per client review	B. Theyer	06/02/2019
DRAFT ID V4 – 06/02/2019	Internal QA	C. Cramer	07/02/2019
FINAL ID V1 07/02/2019	Updates as per internal QA and submitted to Client as final.	K. Kinnear	07/02/2019



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## 1. Introduction, scope and background information

The City of Albany (“the client”) commissioned Bio Diverse Solutions as Environmental Consultants to undertake a Reconnaissance Flora and Level 1 Fauna Survey within Lot 5780 Down Road, Drome WA. The scope of works included:

- Desktop assessment including all publicly available database searches and Parks and Wildlife database searches (provided by CoA);
- A Reconnaissance Flora Survey across the survey area through relevé sampling in vegetation types present, and mapping the boundaries of vegetation types;
- A Level 1 Fauna Survey across the survey area through low intensity sampling, reconnaissance surveys, and the identification, mapping and description of habitat types;
- Individual tree surveys throughout the survey area to identify breeding / nesting hollows and potential habitat trees, particularly for threatened fauna dependent on hollows, such as: the western ringtail possum, three species of threatened black cockatoos and two species of priority listed owls. GPS mark and measure every tree >500mm DBH (Significant trees) and compile excel data spreadsheet. Survey will be undertaken of every significant tree within 100m of the development footprint and within the proposed survey area;
- GIS mapping of: vegetation communities (including relevé locations), vegetation condition mapping according to the Keighery condition rating scale (Keighery 1994, Table 2), fauna habitat types and condition within the survey area;
- Preparation of Reconnaissance Flora and Level 1 Fauna and Vegetation Report, which will be aligned with the appropriate government agency legislation and guidelines.

Flora assessment was undertaken by Botanist Ellen Hickman on the 31<sup>st</sup> October and 1<sup>st</sup> November 2018. Fauna assessment was undertaken by Wildlife Ecologist Dr. Karlene Bain and Conservation and Wildlife Biologist Bianca Theyer (Bio Diverse Solutions) between the 29<sup>th</sup> of October and the 2<sup>nd</sup> November 2018.

### 1.1. Site location and Development Proposal

The “survey area” is defined as Lot 5780 Down Road and the adjacent roadside reserves situated along the northern and eastern cadastral boundaries of the lot. This site is the location of the proposed Motorsport Park, refer to current “Concept Plan’ Appendix A. Refer to Figure 1 and Appendix A – Survey Area.



Figure 1: Survey Area Locality



The survey area is based upon the likelihood of disturbance through the Motorsport Park development process. These areas included the western precinct (remnant vegetation to the west) that is unlikely to be developed, the southern central precinct (creek / drainage line and surrounding vegetation), road reserves (located along the northern and eastern boundaries of the lot), and cleared / grazed paddock areas (internal to the subject site including stands of native trees).

## 1.2. Geology and soils

Database searches using the NRInfo Portal (Department of Primary Industries and Regional Development, 2018) shows the subject site lies within the King (242Kg) and Redmond (242Re) Systems and the Albany Sandplain Zone(242). The King System is described as *“Dissected siltstone and sandstone terrain, on the southern edge of the Albany Sandplain Zone, with shallow gravel, sandy gravel, grey sandy duplex and pale deep sand. Jarrah-marri-Sheoak woodland and Mallee-heath”* (DPIRD, 2018). The Redmond System is described as *“Undulating plateau with scattered depressions, in the east of the Albany Sandplain Zone. Sandy gravel, pale deep sand, non-saline wet soils and grey sandy duplex. Marri-jarrah forest, swamp yate-paperbark-sheoak woodland and heath”* (DPIRD, 2018). The Albany Sandplain Zone is described as having *“Gently undulating plain dissected by a number of short rivers flowing south. Eocene marine sediments overlying Proterozoic granitic and metamorphic rocks. Soils are sandy duplex soils, often alkaline and sodic, with some sands and gravels.”* (DPIRD, 2018).

## 1.3. Climate

The Albany area is characterised by a Mediterranean climate with mild wet winters and mild to hot dry summers. The average annual temperature in Albany ranges from 11.8 – 19.5°C. The average summer temperature range between 14-22.9°C, whilst average winter temperatures range between 8.2-15.8°C. The annual mean rainfall for Albany is 927.1mm (BOM, 2019).

## 1.4. Water

The survey area lies within a Priority Two (P2) Public Drinking Water Source Area (WALGA, 2018a) and also partially contains the Marbellup Flats along the southern boundary which is a South Coast Significant Wetland (WALGA 2018b).

## 1.5. Existing Land use

The “survey area” is currently used for grazing cattle and for sand extraction purposes. There is also a stockpile area located in the north western corner of the property with wood chips and other materials stored here. Refer to Figure 2.



Figure 2: Photographic representation of the land uses present within the survey area.

## 2. Desktop Flora and Vegetation Values

### 2.1. Remnant Vegetation

The Survey area lies within the Jarrah Forest IBRA bioregion. Hearn *et al* (2002) describes the bioregion as; ‘Duricrusted plateau of Yilgarn Craton characterised by Jarrah-Marri forest on laterite gravels and, in the eastern part, by Wandoo - Marri woodlands on clayey soils. Eluvial and alluvial deposits support *Agonis* shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands.’

The vegetation has been mapped on a broad scale by J.S. Beard (Shepherd *et al.* 2002) in the 1970’s, where a system was devised for state-wide mapping and vegetation classification based on geographic, geological, soil, climate structure, life form and vegetation characteristics (Sandiford and Barrett, 2010). Vegetation units were regarded as associations and were grouped into Vegetation Systems representing a particular pattern of association distribution within a given area. A GIS search of J.S. Beards (DEC, 2005) vegetation classification places the survey area within two System and Vegetation Associations (Source DEC Pre-European Vegetation GIS dataset, 2005):

- System Association Name: Albany
- Vegetation Association Number: 51
- Vegetation Description: Cyperaceae, Restionaceae, Juncaceae (mainly in the South-West).
- System Association Name: Albany
- Vegetation Association Number: 978
- Vegetation Description: Jarrah, Banksia or Casuarina *Eucalyptus marginata*, *Banksia* spp., *Allocasuarina* spp.

### 2.2. Albany Regional Vegetation Survey (ARVS)

The Albany Regional Vegetation Survey (ARVS) undertaken by Sandiford and Barret in 2010 identified the vegetation within the survey area as belonging to the Jarrah/Marri/Sheoak Laterite Forest (12), Jarrah/Sheoak/*E. staeri* Sandy Woodland (13), and *Homalospermum firmum* / *Callistemon glaucus* Peat Thicket (47) unit.

### 2.3. Survey Methods

Desktop inventory of potential threatened flora species likely to occur within 15km of the survey area was undertaken using the following databases:

- Database results provided by the City of Albany;
- Nature Map Database Search (combined data from DBCA, WA Museum and WA Herbarium);
- Protected matters search tool (DoE 2017a); and
- WA Herbarium records accessed through Flora Base (Western Australian Herbarium, DPaW).

The full species list compiled from all available data (Appendix B) is based on observations from a broader area than the survey area and is likely to include species that would not occur in the actual survey area due to a lack of suitable habitat. The data also includes very old records and in some cases the species in question may have become locally or regionally extinct.

The conservation significance of flora species has been assessed using data from the following sources:

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. Administered by the Australian Government Department of the Environment (DoE);
- *Wildlife Conservation Act 1950 (WC Act)*. Administered by the Western Australian Department of Parks and Wildlife (DPaW); and
- DBCA Priority Flora list. A non-legislative list maintained by DBCA’s Parks and Wildlife Service for management purposes.

Bio Diverse Solutions undertook the reconnaissance flora and vegetation survey between the 31<sup>st</sup> October and 1<sup>st</sup> November 2018 EPA Guidance Statement 51: *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2016). The area was surveyed using transects and traversed on foot. Along each transect, relevés were systematically surveyed within representative vegetation types to enable analysis and categorisation across the wider area. The flora was systematically recorded within the relevés and collections of plant specimens were made where further identification was required. For species that were not flowering and

where foliage or nuts / fruit couldn't be used for identification, potential habitat was used as an indication of the likelihood of species occurrence. The vegetation communities occurring within the survey area were mapped and described in detail using opportunistic mapping and relevé based surveys. Vegetation units were described based on structure, dominant taxa and cover characteristics as defined by relevé data and field observations.

A reconnaissance survey was deemed appropriate as the aim of this survey was to provide context and gather broader knowledge of the survey area. This type of survey aims to verify the desktop information obtained, and to characterise the flora / vegetation units present within the survey area. The targeted component of the flora survey aimed at identifying any potential threatened or priority species and communities within the survey area.

#### 2.4. Threatened Flora

As a result of the above-mentioned database searches 17 DRF, 41 Priority and 1 Presumed Extinct species were identified as potentially being present within the survey area.

#### 2.5. Threatened Ecological Communities

Database results also indicate that two Threatened Ecological Communities may be present within the survey area these being: *Subtropical and Temperate Coastal Saltmarsh* and *Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia*.

##### 2.5.1. Subtropical and Temperate Coastal Saltmarsh

Consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of sub-tropical and temperate Australia (south of 23°S latitude). The habitat is located in coastal areas under tidal influence. In southern latitudes saltmarsh are the dominant habitat in the intertidal zone and often occur in association with estuaries. It is typically restricted to the upper intertidal environment, generally between the elevation of the mean high tide, and the mean spring tide. The community consists mainly of salt-tolerant vegetation (halophytes) including: grasses, herbs, reeds, sedges and shrubs. Succulent herbs and grasses generally dominate and vegetation is generally <0.5m tall with the exception of some reeds and sedges. Many species of non-vascular plants are also found in saltmarsh, including epiphytic algae, diatoms and cyanobacterial mats. Saltmarsh consists of many vascular plant species but is dominated by relatively few families. There is also typically a high degree of endemism at the species level. The two most widely represented coastal saltmarsh plant families are the Chenopodiaceae and Poaceae. Four structural saltmarsh forms are currently recognised based on dominance of a particular vegetation type:

- dominance by succulent shrubs (e.g. *Tecticornia*)
- dominance by grasses (e.g. *Sporobolus virginicus*)
- dominance by sedges and grasses (e.g. *Juncus kraussii*, *Gahnia trifida*)
- dominance by herbs (e.g. low-growing creeping plants such as *Wilsonia backhousei*, *Samolus repens*, *Schoenus nitens*) (DBCA, 2017a).

##### 2.5.2. The Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia

The Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia is generally kwongkan / kwongan shrubland, ranging from sparse to dense, thicket-forming, where Proteaceae species form a significant component. It is confined to the southeast botanical province of Western Australia (*sensu* Hopper and Gioia, 2004) and primarily occurs on sandplains and marine plains and lower to upper slopes and ridges, as well as uplands across this region (Department of the Environment, 2014).

## 2.6. Survey Limitations and constraints

### Experience of personnel

Dr Ellen Hickman has over 18 years' experience as a botanist, of particular note is her work as the Rare Flora Officer in the South Coast for the then named Department of Environment and Conservation (DEC).

### Availability of local / regional contextual information

Vegetation types present within the local and regional area are well documented through the Albany Regional Vegetation Survey (ARVS). Detailed site-specific information is limited as it is privately owned land this is not considered a limiting factor for this survey.

### Proportion of flora recorded and/or collected, and identification issues

The single season vegetation and flora survey was undertaken in November 2018 (Spring) with the targeted flora survey completed at the same time. Spring is considered the optimal time for undertake vegetation and flora surveys within the South-west region. The proportion of flora identified is considered high.

### Survey effort and extent

Vegetation throughout the survey area was traversed by foot with opportunistic sampling and relevés utilised to classify the flora and vegetation present. The survey intensity was deemed appropriate for this stage of development.

### Disturbances (e.g. fire or flood)

A section of the western vegetation block had been recently burnt, however vegetation types were still able to be established based on regenerating and existing flora present. This is not deemed to have affected the completeness of the survey.

### Survey timing / season and, rainfall

As per the EPA Guidelines the survey was undertaken in Spring. The Albany area has seen a lower than average rainfall year, however this is not deemed to be a limiting factor for this survey.

### Remoteness or access issues

No restrictions were encountered. All areas were accessible by vehicle and on foot.

### 3. Flora and vegetation survey outcomes

During the field survey 141 species, consisting of 41 families and 105 genera were found. The most common families were Fabaceae, Proteaceae, Myrtaceae, Poaceae and Cyperaceae. This list includes 123 native species (Table 1) and 18 introduced species (denoted with an \*). No priority species were identified. The broadscale vegetation units are described in Section 3.1. with species identified within them outlined in Table 1 below (indicated by an X). Refer to Figure 9 for vegetation unit mapping. Relevé datasheets are presented in Appendix C.

Table 1: Flora species recorded within survey area.

Family	Genus	Species	Common Name	Vegetation Type					
				1	2	3	4	5	6
Anarthriaceae	<i>Anarthria</i>	<i>prolifera</i>		X	X				
Anarthriaceae	<i>Anarthria</i>	<i>scabra</i>			X				
Anarthriaceae	<i>Lyginia</i>	<i>barbata</i>			X				
Apiaceae	<i>Actinotus</i>	<i>glomeratus</i>			X				
Apiaceae	<i>Platysace</i>	<i>pendula</i>			X				
Apiaceae	<i>Xanthosia</i>	<i>rotundifolia</i>	Southern Cross	X	X				
Asparagaceae	<i>Laxmannia</i>	<i>jamesii</i>	James's Paperlily		X				
Asparagaceae	<i>Lomandra</i>	<i>sonderi</i>		X					
Asparagaceae	<i>Thysanotus</i>	<i>tenellus</i>		X					
Asteraceae	<i>Hypochaeris</i>	<i>radicata</i>	Flat Weed*		X				X
Campanulaceae	<i>Lobelia</i>	<i>tenuior</i>	Slender Lobelia		X				
Casuarinaceae	<i>Allocasuarina</i>	<i>fraseriana</i>	Sheoak	X	X				
Centrolepidaceae	<i>Centrolepis</i>	<i>strigosa</i>	Hairy Centrolepis		X				
Colchicaceae	<i>Burchardia</i>	<i>congesta</i>		X	X				
Cyatheaceae	<i>Cyathea</i>	<i>cooperi</i>	Tree Fern*				X		
Cyperaceae	<i>Baumea</i>	<i>preissii</i>						X	
Cyperaceae	<i>Cyathochaeta</i>	<i>avenacea</i>		X					
Cyperaceae	<i>Cyathochaeta</i>	<i>equitans</i>			X				
Cyperaceae	<i>Gahnia</i>	<i>decomposita</i>						X	
Cyperaceae	<i>Gymnoschoenus</i>	<i>anceps</i>				X			
Cyperaceae	<i>Lepidosperma</i>	<i>squamatum</i>		X					
Cyperaceae	<i>Mesomelaena</i>	<i>tetragona</i>	Semaphore Sedge	X					
Cyperaceae	<i>Tetragonia</i>	<i>octandra</i>		X					
Dasypogonaceae	<i>Dasypogon</i>	<i>bromeliifolius</i>	Pineapple Bush	X	X				
Dasypogonaceae	<i>Kingia</i>	<i>australis</i>	Kingia	X					
Dennstaedtiaceae	<i>Histiopteris</i>	<i>incisa</i>	Bat's wing Fern					X	
Dennstaedtiaceae	<i>Pteridium</i>	<i>esculentum</i>	Bracken	X	X				
Dilleniaceae	<i>Hibbertia</i>	<i>cunninghamii</i>		X					
Dilleniaceae	<i>Hibbertia</i>	<i>pilosa</i>	Hairy Guinea Flower		X				
Droseraceae	<i>Drosera</i>	<i>macrantha</i>	Bridal Rainbow	X					
Droseraceae	<i>Drosera</i>	<i>menziesii</i>	Pink Rainbow			X	X		
Elaeocarpaceae	<i>Tetratheca</i>	<i>affinis</i>			X				
Ericaceae	<i>Brachyloma</i>	<i>baxteri</i>			X				

Table 1 continued.

Family	Genus	Species	Common Name	Vegetation Type						
				1	2	3	4	5	6	
Ericaceae	<i>Leucopogon</i>	<i>distans</i>			X					
Ericaceae	<i>Leucopogon</i>	<i>verticillata</i>	Tassel Flower	X						
Fabaceae	<i>Acacia</i>	<i>baileyana</i>	Cootamundra Wattle*	X						
Fabaceae	<i>Acacia</i>	<i>hastulata</i>				X				
Fabaceae	<i>Acacia</i>	<i>longifolia</i>	Sydney Wattle*	X						
Fabaceae	<i>Acacia</i>	<i>myrtifolia</i>		X						
Fabaceae	<i>Bossiaea</i>	<i>linophylla</i>		X						
Fabaceae	<i>Bossiaea</i>	<i>ornata</i>	Broad Leaved Brown Pea		X					
Fabaceae	<i>Bossiaea</i>	<i>rufa</i>			X					
Fabaceae	<i>Daviesia</i>	<i>aphylla</i>			X					
Fabaceae	<i>Daviesia</i>	<i>flexuosa</i>		X						
Fabaceae	<i>Gompholobium</i>	<i>knightianum</i>			X					
Fabaceae	<i>Gompholobium</i>	<i>ovatum</i>		X						
Fabaceae	<i>Gompholobium</i>	<i>polymorphum</i>		X						
Fabaceae	<i>Gompholobium</i>	<i>scabrum</i>			X					
Fabaceae	<i>Hovea</i>	<i>chorizemifolia</i>	Holly-leaved Hovea	X						
Fabaceae	<i>Jacksonia</i>	<i>spinosa</i>			X					
Fabaceae	<i>Kennedia</i>	<i>coccinea</i>	Coral Vine		X					
Fabaceae	<i>Latrobea</i>	<i>genistoides</i>			X					
Fabaceae	<i>Ornithopus</i>	<i>compressus</i>	Yellow Serradella*					X		
Fabaceae	<i>Psoralea</i>	<i>pinnata</i>	African Scurfpea*		X	X	X			
Fabaceae	<i>Pultenaea</i>	<i>reticulata</i>			X					
Fabaceae	<i>Sphaerolobium</i>	<i>hygrophilum</i>				X		X		
Fabaceae	<i>Sphaerolobium</i>	<i>fornicatum</i>				X		X		
Fabaceae	<i>Sphaerolobium</i>	<i>rostratum</i> (albino form)				X		X		
Fabaceae	<i>Trifolium</i>	<i>glomeratum</i>	Cluster Clover*					X	X	
Goodeniaceae	<i>Dampiera</i>	<i>leptoclada</i>	Slender-shooted Dampiera			X				
Goodeniaceae	<i>Dampiera</i>	<i>pedunculata</i>		X	X					
Goodeniaceae	<i>Scaevola</i>	<i>striata</i>	Royal Robe	X						
Haemodoraceae	<i>Anigozanthos</i>	<i>preissii</i>	Albany Catspaw		X					
Haemodoraceae	<i>Conostylis</i>	<i>setigera</i>	Bristle Cottonhead	X						
Haemodoraceae	<i>Haemodorum</i>	<i>spicatum</i>	Mardja		X					
Haemodoraceae	<i>Phlebocarya</i>	<i>ciliata</i>			X					
Hemerocallidaceae	<i>Agrostocrinum</i>	<i>scabrum</i>	Blue Grass Lily		X					
Hemerocallidaceae	<i>Johnsonia</i>	<i>lupulina</i>	Hooded Lily	X						
Iridaceae	<i>Patersonia</i>	<i>babianoides</i>		X						
Iridaceae	<i>Patersonia</i>	<i>occidentalis</i>	Purple Flag	X						
Iridaceae	<i>Watsonia</i>	<i>meriana</i> var. <i>bulbillifera</i>	Bugle Lily*		X					

Table 1 continued.

Family	Genus	Species	Common Name	Vegetation Type					
				1	2	3	4	5	6
Lentibulariaceae	<i>Utricularia</i>	<i>multifida</i>	Pink Petticoats			X			
Lentibulariaceae	<i>Utricularia</i>	<i>volubilis</i>	Twining Bladderwort			X			
Lindsaeaceae	<i>Lindsaea</i>	<i>linearis</i>	Screw Fern	X					
Loganiaceae	<i>Orianthera</i>	<i>serpyllifolia</i>		X					
Loganiaceae	<i>Phyllangium</i>	<i>paradoxum</i>			X				
Loranthaceae	<i>Nuytsia</i>	<i>floribunda</i>	Christmas Tree		X				
Myrtaceae	<i>Agonis</i>	<i>theiformis</i>		X					
Myrtaceae	<i>Beaufortia</i>	<i>decussata</i>	Gravel Bottlebrush	X					
Myrtaceae	<i>Callistemon</i>	<i>glaucus</i>	Albany Bottlebrush			X	X	X	
Myrtaceae	<i>Corymbia</i>	<i>calophylla</i>	Marri	X					
Myrtaceae	<i>Eucalyptus</i>	<i>marginata</i>	Jarrah	X	X				
Myrtaceae	<i>Eucalyptus</i>	<i>staeri</i>	Albany Blackbutt		X				
Myrtaceae	<i>Homalospermum</i>	<i>firmum</i>				X	X	X	
Myrtaceae	<i>Hypocalymma</i>	<i>robustum</i>	Swan River Myrtle		X				
Myrtaceae	<i>Kunzea</i>	<i>sulphurea</i>		X					
Myrtaceae	<i>Melaleuca</i>	<i>preissiana</i>	Moonah				X		
Myrtaceae	<i>Melaleuca</i>	<i>thymoides</i>		X	X				
Myrtaceae	<i>Taxandria</i>	<i>linearifolia</i>				X			
Myrtaceae	<i>Taxandria</i>	<i>parviceps</i>		X	X				
Orchidaceae	<i>Caladenia</i>	<i>flava</i>	Cowslip Orchid		X				
Orchidaceae	<i>Gastrodia</i>	<i>lacista</i>	Potato Orchid			X			
Orchidaceae	<i>Paracaleana</i>	<i>disjuncta</i>			X				
Orchidaceae	<i>Thelymitra</i>	<i>crinita</i>	Blue Lady Orchid	X					
Orchidaceae	<i>Thelymitra</i>	<i>mucida</i>	Plum Orchid	X					
Phyllanthaceae	<i>Poranthera</i>	<i>microphylla</i>	Small Poranthera		X				
Phytolaccaceae	<i>Phytolacca</i>	<i>octandra</i>	Red Ink Plant*		X	X		X	
Poaceae	<i>Anthoxanthum</i>	<i>odoratum</i>	Sweet Vernal Grass	X					
Poaceae	<i>Avena</i>	<i>barbata</i>	Bearded Oats*	X					
Poaceae	<i>Briza</i>	<i>maxima</i>	Blowfly Grass*	X					
Poaceae	<i>Bromus</i>	<i>diandrus</i>	Great Brome*	X	X				
Poaceae	<i>Eragrostis</i>	<i>curvula</i>	African Lovegrass*		X				
Poaceae	<i>Holcus</i>	<i>lanatus</i>	Yorkshire Fog*	X			X	X	
Poaceae	<i>Lagurus</i>	<i>ovatus</i>	Hare's Tail Grass*		X				
Poaceae	<i>Lolium</i>	<i>rigidum</i>	Wimmera Ryegrass*		X				X
Poaceae	<i>Cenchrus</i>	<i>clandestinus</i>	Kikuyu*	X	X				X
Polygalaceae	<i>Comesperma</i>	<i>virgatum</i>				X		X	
Polygalaceae	<i>Rumex</i>	<i>pulcher</i>	Fiddle Dock*		X				X
Proteaceae	<i>Adenanthos</i>	<i>cuneatus</i>	Coastal Jugflower	X	X				
Proteaceae	<i>Adenanthos</i>	<i>obovatus</i>	Basket Flower		X				



Table 1 continued.

Family	Genus	Species	Common Name	Vegetation Type					
				1	2	3	4	5	6
Proteaceae	<i>Banksia</i>	<i>attenuata</i>	Slender Banksia	X	X				
Proteaceae	<i>Banksia</i>	<i>formosa</i>	Showy Dryandra	X					
Proteaceae	<i>Banksia</i>	<i>grandis</i>	Bull Banksia	X					
Proteaceae	<i>Banksia</i>	<i>ilicifolia</i>	Holly-leaved Banksia		X				
Proteaceae	<i>Banksia</i>	<i>littoralis</i>	Swamp Banksia				X	X	
Proteaceae	<i>Banksia</i>	<i>quercifolia</i>	Oak-leaved Banksia		X				
Proteaceae	<i>Conospermum</i>	<i>caeruleum</i>	Blue Brother	X					
Proteaceae	<i>Hakea</i>	<i>amplexicaulis</i>	Prickly Hakea	X					
Proteaceae	<i>Hakea</i>	<i>ruscifolia</i>	Candle Hakea	X					
Proteaceae	<i>Hakea</i>	<i>varia</i>			X				
Proteaceae	<i>Isopogon</i>	<i>longifolius</i>		X					
Proteaceae	<i>Persoonia</i>	<i>longifolia</i>	Snottygobble	X					
Proteaceae	<i>Petrophile</i>	<i>diversifolia</i>		X					
Restionaceae	<i>Desmocladus</i>	<i>fasciculatus</i>		X					
Restionaceae	<i>Empodisma</i>	<i>gracillimum</i>				X	X	X	
Restionaceae	<i>Hypolaena</i>	<i>exsulca</i>			X				
Restionaceae	<i>Leptocarpus</i>	<i>tenax</i>	Slender Twine Rush			X		X	
Restionaceae	<i>Tremulina</i>	<i>tremula</i>			X				
Rhamnaceae	<i>Spyridium</i>	<i>globulosum</i>	Basket Bush	X					
Rubiaceae	<i>Opercularia</i>	<i>hispidula</i>	Hispid Stinkweed	X					
Rutaceae	<i>Boronia</i>	<i>crenulata</i>	Aniseed Boronia	X					
Rutaceae	<i>Boronia</i>	<i>molloyae</i>	Tall Boronia					X	
Rutaceae	<i>Boronia</i>	<i>spathulata</i>	Boronia	X					
Solanaceae	<i>Solanum</i>	<i>laciniatum</i>	Kangaroo Apple*	X				X	
Stylidiaceae	<i>Stylidium</i>	<i>diversifolium</i>	Touch-me-not		X				
Stylidiaceae	<i>Stylidium</i>	<i>piliferum</i>	Common Butterfly Triggerplant	X					
Stylidiaceae	<i>Stylidium</i>	<i>schoenoides</i>	Cow Kicks	X					
Stylidiaceae	<i>Stylidium</i>	<i>spinulosum</i>	Topsy-turvy Triggerplant		X				
Thymelaeaceae	<i>Pimelea</i>	<i>imbricata</i>			X				
Xanthorrhoeaceae	<i>Xanthorrhoea</i>	<i>platyphylla</i>		X					
Xyridaceae	<i>Xyris</i>	<i>lanata</i>						X	

## 3.1. Vegetation types

The flora and vegetation survey identified six vegetation types; Jarrah/Marri/Sheoak Laterite Forest (Vegetation Type 1) Jarrah/Sheoak/*Eucalyptus staeri* Sandy Woodland (Vegetation Type 2), *Homalospermum firmum*/*Callistemon glaucus* Peat Thicket (Vegetation Type 3), *Melaleuca preissiana* Low Woodland (Vegetation Type 4), Miscellaneous Drainage Woodland/Shrubland (Vegetation Type 5) and Open paddock / agricultural land (Vegetation Type 6), including bare and sand extraction areas. A full description is provided in the following sections.

### 3.1.1. Vegetation Type 1 - Jarrah/Marri/Sheoak Laterite Forest

Key defining features of this vegetation type are an overstorey of *Eucalyptus marginata* and *Allocasuarina fraseriana*. The relatively open and diverse shrub layer is dominated by *Banksia grandis*, *Agonis theiformis*, *Leucopogon verticillata*, *Xanthosia rotundifolia*, *Bossiaea linophylla*, *Nuytsia floribunda*, *Kingia australis*, *Hovea chorizemifolia*, *Taxandria parviceps* and *Xanthorrhoea platyphylla*. The sedges and herb layers are dominated by *Anarthria prolifera*, *Desmocladius fascicularis*, *Mesomelaena tetragona*, *Cyathochaeta equitans*, *Patersonia occidentalis*, *Haemodorum spicatum* and *Orianthera serpyllifolia*. The grass layer consists of introduced species such as *Briza maxima*\*, *Avena barbata*\*, *Holcus lanatus*\*, *Bromus diandrus*\*.

This vegetation type aligns with ARVS 12 and occurs within the remnant vegetation to the west and along the northern and eastern boundaries in the existing Down Road and Down Road South Road reserves (Figure 9). Please refer to Table 1 above for a full list of species identified during the survey and Figure 3 for images of this vegetation type.



Figure 3: Photographic representation of the vegetation type present within the survey area.

### 3.1.2. Vegetation Type 2 - Jarrah/Sheoak/Eucalyptus staeri Sandy Woodland

Key defining features of this vegetation type are an overstorey of *Eucalyptus marginata*, *Allocasuarina fraseriana*, *Eucalyptus staeri* and *Corymbia calophylla*. The relatively open and diverse shrub layer is dominated by *Banksia grandis*, *Pimelea imbricata*, *Hakea amplexicaulis*, *Leucopogon verticillata*, *Dasyogon bromeliifolius*, *Leucopogon distans*, *Boronia crenulata*, *Xanthosia rotundifolia* and *Gompholobium ovatum*. The sedges and herb layers are dominated by *Anarthria prolifera*, *Cyathochaeta equitans*, *Desmocladius fascicularis*, *Patersonia occidentalis*, *Lindsaea linearis*, *Dampiera pedunculata* and *Lepidosperma squamatum*. The grass layer consists of introduced species *Holcus lanatus*\*, *Bromus diandrus*\*, *Cenchrus clandestinus*\*, *Anthoxanthum odoratum*\*, *Lolium rigidum*\* and *Lagurus ovatus*\*.

This vegetation type aligns with ARVS 13 and occurs within the western remnant vegetation (western precinct), along the northern and eastern boundaries in the existing Down Road and Down Road South Road reserves, within remnant vegetation located to the north and south of the creek / drainage line (southern precinct) and in small isolated pockets throughout the paddocks (Figure 9). Please refer to Table 1 for a full list of species identified during the survey and Figure 4 for images of this vegetation type.



Figure 4: Photographic representation of the vegetation type present within the survey area.

### 3.1.3. Vegetation Type 3 - Homalospermum firmum/Callistemon glaucus Peat Thicket

The vegetation type is dominated by a shrub layer consisting of *Melaleuca preissiana*, *Callistemon glaucus*, *Homalospermum firmum* and *Banksia littoralis* over *Taxandria parviceps*, *Taxandria linearis* and *Acacia hastulata*. The sedges and herbs layers are dominated by *Empodisma gracillimum*, *Gymnoschoenus anceps* and *Dampiera leptoclada*. This vegetation unit aligns with ARVS 47 and occurs along the south-western boundary (recently burnt) and within the creek / drainage system located along the southern boundary (southern precinct) (Figure 9). Please refer to Table 1 for a list of species identified during the survey within this vegetation type and Figure 5 for images of this vegetation type.



Figure 5: Photographic representation of the vegetation type present within the survey area.

### 3.1.4. Vegetation Type 4 - *Melaleuca preissiana* Low Woodland

This vegetation type was dominated by a shrub layer of *Melaleuca preissiana* and *Psoralea pinnata*\* and occasional *Banksia littoralis* over *Taxandria linearis*, *Taxandria parviceps*, *Callistemon glaucus*, *Homalospermum firmum*, *Empodisma gracillimum* and *Holcus lanatus*\*. This vegetation type aligns with ARVS 49 and was found within the creek / drainage area (Figure 9). Please refer to Table 1 for a full list of species identified during the survey and Figure 6 for images of this vegetation type.



Figure 6: Photographic representation of the vegetation type present within the survey area.

### 3.1.5. Vegetation Type 5 - Miscellaneous Drainage Woodland/Shrubland

This vegetation type is dominated by *Taxandria linearis* and *Acacia hastulata* over *Homalospermum firmum*, *Callistemon glaucus* and *Boronia molloyae*. Dominant species in the sedge, herb and grass layer were *Drosera menziesii*, *Gahnia decomposita*, *Phytolacca octandra*\* and *Holcus lanatus*\*. This unit aligns with ARVS 50 and is located along the creek / drainage line situated between *Homalospermum firmum* / *Callistemon glaucus* Peat Thicket and *Melaleuca preissiana* Low Woodland vegetation types (Figure 9). Please refer to Table 1 for a full list of species identified during the survey and Figure 7 for images of this vegetation type.



Figure 7: Photographic representation of the vegetation type present within the survey area.

### 3.1.6. Vegetation Type 6 - Open paddock / agricultural land

This vegetation unit is situated internally throughout the survey area (Figure 9). It consists of grazed paddock areas / agricultural land. Species composition includes introduced paddock species such as *Cenchrus clandestinus* (Kikuyu), *Trifolium glomeratu* (Cluster Clover) *Hypochaeris radicata* (Flat Weed), *Lagurus ovatus* (Hare's Tail Grass), *Lolium rigidum* (Wimmera Ryegrass), *Rumex pulcher* (Fiddle Dock) and *Solanum laciniatum* (Kangaroo Apple). This unit also includes the bare areas associated with existing sand extraction operations. Please refer to Table 1 above for a full list of species identified during the survey and Figure 8 for images of this vegetation type.



Figure 8: Photographic representation of the vegetation type present within the survey area.

### 3.2. Extent and Conservation Significance of Vegetation Types

The vegetation types described above align with vegetation units described in the Albany Regional Vegetation Survey (ARVS) report by Sandiford and Barret (2010). This report outlines that the total remnant vegetation within the ARVS area (made up of IUCN I-IV, other Crown reserves and non-reserve areas) was 44093ha (Sandiford and Barret 2010). The local and regional extent and significance of the vegetation units is discussed below (taken from Tables 3.2 and 3.3 in Sandiford and Barret 2010).

#### ARVS Vegetation Unit 12

This ARVS unit aligns with Vegetation Type 1. The vegetation unit is the most common vegetation unit throughout the ARVS area with the total current extent at 13144ha (representing 29.8% of the total remnant vegetation in the ARVS survey area). Approximately 7879ha are found within non-reserve areas followed by Crown Reserves (3991.6ha) and IUCN I-IV Reserves (1273ha). Although this unit is the most widespread it may be restricted to the ARVS context / survey area, with its eastern range limit occurring +/- within 10km of the ARVS survey area boundary (Sandiford and Barret 2010). Other regional and local representation criteria are that the vegetation type contains Priority flora species. The vegetation unit does not contain specific habitats of significance such as wetland / riparian vegetation, wetlands of national significance etc. (Sandiford and Barret 2010).

### ARVS Vegetation Unit 13

This ARVS unit aligns with Vegetation Type 2. This vegetation unit is the second most common unit throughout the ARVS area with the total extent being 5148ha (representing 29.8% of the total remnant vegetation in the ARVS survey area). 1936ha is found in Non-Reserve areas, 1878ha in Other Crown Reserves and 1334 in IUCN Reserves. This unit is also potentially restricted to the ARVS context / survey area with its eastern range limit occurring +/- within 10km of the ARVS survey area boundary (Sandiford and Barret 2010). Other regional and local representation criteria are that the vegetation type contains Priority and Declared Rare Flora (DRF) species. The vegetation unit does not contain specific habitats of significance such as wetland / riparian vegetation, wetlands of national significance etc. (Sandiford and Barret 2010).

### ARVS Vegetation Unit 47

This ARVS unit aligns with Vegetation Type 3. The total current extent within the ARVS unit as described by Sandiford and Barret (2010) is 2083ha, consisting of 1606ha in Non-Reserves, 263ha in IUCN Reserves and 214ha in Other Crown Reserves. This unit is not restricted nor is it near its range limit. It does contain habitats of significance such including wetland/dampland/riparian habitats and wetlands of national significance (Sandiford and Barret 2010). This vegetation unit is associated with the Marbellup flats that extends from the southern boundary of the Down Road survey area and into surrounding areas.

### ARVS Vegetation Unit 49

This ARVS unit aligns with Vegetation Type 4. The total current extent within the ARVS unit as described by Sandiford and Barret (2010) is 679ha, consisting of 476ha in Non-Reserves, 150ha in Other Crown Reserves and 53ha in IUCN Reserves. This vegetation unit has been classified as rare (<1500ha) as well being at its eastern range limit (+/- within 10km) of the ARVS survey area boundary (Sandiford and Barret 2010). Priority flora species are found within this vegetation unit as well as significant habitat (wetland/dampland/riparian habitats). At a site-specific scale (i.e Down Road survey area) the vegetation unit is associated with the Marbellup flats that extends from within the southern boundary and into surrounding areas.

### ARVS Vegetation Unit 50

This ARVS unit aligns with Vegetation Type 5. The total current extent within the ARVS unit as described by Sandiford and Barret (2010) is 259ha, consisting of 161ha in Non-Reserves, 77ha in Other Crown Reserves and 21ha in IUCN Reserves. This unit is not included in Sandiford and Barret's conservation assessment (Table 3.3), however the vegetation unit is associated with the Marbellup flats that extends from within the southern boundary and into surrounding areas.





Figure 9: Vegetation Complexes Mapping



29 Hercules Crescent  
Albany, WA 6330  
Australia  
Tel: 08 9842 1575  
Fax: 08 9842 1575



Overview Map Scale 1:100,000

**Legend**

- Subject Site
- Cadastre
- 5m Contours
- ▲ Vegetation Relieves
- Vegetation Complexes**
- Jarrah/Sheoak/Eucalyptus staeri Sandy Woodland
- Jarrah/Marri/Sheoak Laterite Forest
- Homalospermum firmum/Callistemon glaucus Peat Thicket
- Melaleuca preissiana Low Woodland
- Open paddock / agricultural land
- Miscellaneous Drainage Woodland/Shrubland



Scale  
1:8,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**

Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

**CLIENT**

City of Albany  
PO Box 484  
Albany, WA 6331

**Vegetation Complexes Mapping**

Assessor	QA Check	Drawn by
EH	KK	BT
STATUS	FILE	DATE
FINAL	MSC0137-002	06/02/2019

### 3.3. Vegetation Condition

The vegetation condition for the survey area has been mapped using the Keighery condition rating scale (Keighery 1994, Table 2). Vegetation in the survey area has variable condition ranging from Pristine to Completely Degraded. The majority of the western remnant vegetation block has been classified as Pristine, with two small sections classified as Excellent along its north and south eastern boundaries. The vegetation situated immediately along the creek / drainage line has been classified as both Pristine and Very Good. Roadside vegetation has been classified as both Very Good and Excellent. The paddock areas and vegetation surrounding dams and remnant vegetation have been classified as Completely Degraded due to significant structural changes such as multiple disturbances be that either through fire, clearing, weed invasion and impacts from cattle. Stands of paddock trees have also been classified as Completely Degraded due to the complete loss of structure and solely consisting of a native overstorey. Overall 121.52ha were classified as Completely Degraded, 12.06ha as Very Good, 59.76ha as Pristine and 6.78ha as Excellent. Refer to Figure 10 for vegetation condition mapping.

Table 2: Condition Rating Scale (Keighery 1994).

Vegetation Condition Rating	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very good	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires; the presence of some more aggressive weeds; dieback; logging; & grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate to it. For example, disturbance to vegetation structure caused by very frequent fires; the presence of some very aggressive weeds at high density; partial clearing; dieback; & grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires; the presence of very aggressive weeds; partial clearing; dieback; & grazing.
Completely Degraded	Vegetation structure not intact; the area completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

### 3.4. Weeds and disturbance

Of the 141 species recorded within the survey area, 19 (12.7%) are introduced (Table 1). Of the 19-weed species identified across the survey area, none are a declared pest species under the *Biosecurity and Agriculture Management Act 2007*. Under the Environmental Weeds Strategy for Western Australia (CALM 1999) there are two weed species rated as Low, four species are rated as Mild, seven species are rated as Moderate, four species are rated as High and the remaining two species have no rating (Table 3). The strategy classifies weeds according to their relative level of threat to conservation (high medium or low) and this rating is based on their distribution, relative level of invasiveness and environmental impact.

Table 3: Weed species recorded from the survey area.

Family	Genus	Species	Vernacular	WA Weed Strategy rating (CALM 1999) / BAM Act
Asteraceae	<i>Hypochaeris</i>	<i>radicata</i>	Flat Weed	Moderate / Permitted - s11
Cyatheaceae	<i>Cyathea</i>	<i>cooperi</i>	Tree Fern	Low / Permitted - s11
Fabaceae	<i>Acacia</i>	<i>baileyana</i>	Cootamundra Wattle	Low / Permitted - s11
Fabaceae	<i>Acacia</i>	<i>longifolia</i>	Sydney Wattle	Permitted - s11
Fabaceae	<i>Ornithopus</i>	<i>compressus</i>	Yellow Serradella	Mild / Permitted - s11
Fabaceae	<i>Psoralea</i>	<i>pinnata</i>	African Scurfpea	Mild / Permitted - s11
Fabaceae	<i>Trifolium</i>	<i>glomeratum</i>	Cluster Clover	Moderate / Permitted - s11

Table 3 Continued

Family	Genus	Species	Vernacular	WA Weed Strategy rating (CALM 1999) / BAM Act
Iridaceae	<i>Watsonia</i>	<i>meriana</i> var. <i>bulbillifera</i>	Bugle Lily	High / Permitted - s11
Poaceae	<i>Avena</i>	<i>barbata</i>	Bearded Oats	Moderate / Permitted - s11
Poaceae	<i>Briza</i>	<i>maxima</i>	Blowfly Grass	Moderate / Permitted - s11
Poaceae	<i>Bromus</i>	<i>diandrus</i>	Great Brome	High / Permitted - s11
Poaceae	<i>Eragrostis</i>	<i>curvula</i>	African Lovegrass	High / Permitted - s11
Poaceae	<i>Holcus</i>	<i>lanatus</i>	Yorkshire Fog	Moderate / Permitted - s11
Poaceae	<i>Lagurus</i>	<i>ovatus</i>	Hare's Tail Grass	High / Permitted - s11
Poaceae	<i>Lolium</i>	<i>rigidum</i>	Wimmera Ryegrass	Moderate / Permitted - s11
Poaceae	<i>Cenchrus</i>	<i>clandestinus</i>	Kikuyu	Moderate / Permitted - s11
Polygalaceae	<i>Rumex</i>	<i>pulcher</i>	Fiddle Dock	Mild / Permitted - s11
Phytolaccaceae	<i>Phytolacca</i>	<i>octandra</i>	Red Ink Plant	Mild / Permitted - s11
Solanaceae	<i>Solanum</i>	<i>laciniatum</i>	Kangaroo Apple	Permitted - s11



Figure 10: Vegetation Condition Mapping

REPORT ITEM DIS245 REFERS



29 Hercules Crescent  
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Australia  
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Overview Map Scale 1:100,000

Legend

- Subject Site
  - Cadastre
  - 5m Contours
- Vegetation Condition**
- Completely Degraded
  - Very Good
  - Excellent
  - Pristine



Scale  
1:8,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

CLIENT

City of Albany  
PO Box 484  
Albany, WA 6331

**Vegetation Condition Mapping**

Assessor <b>EH</b>	QA Check <b>KK</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>MSC0137-002</b>	DATE <b>13/12/2018</b>

### 3.5. Priority and Threatened Ecological Communities

While two threatened ecological communities were identified as potentially occurring within the survey area during the desktop assessment, neither of these were found to be present within the survey area (Table 4).

Table 4 Potential Priority and Threatened Ecological Communities within 15km of the survey area.

Community Name	Status	Description	Survey Outcome
Subtropical and Temperate Coastal Saltmarsh	Priority 3 (WA) VU (EPBC Act)	<p>Consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of sub-tropical and temperate Australia (south of 23oS latitude). The habitat is coastal areas under tidal influence. In southern latitudes saltmarsh are the dominant habitat in the intertidal zone and often occur in association with estuaries. It is typically restricted to the upper intertidal environment, generally between the elevation of the mean high tide, and the mean spring tide. The community consists mainly of salt-tolerant vegetation (halophytes) including: grasses, herbs, reeds, sedges and shrubs. Succulent herbs and grasses generally dominate and vegetation is generally &lt;0.5m tall with the exception of some reeds and sedges. Many species of non-vascular plants are also found in saltmarsh, including epiphytic algae, diatoms and cyanobacterial mats. Saltmarsh consists of many vascular plant species but is dominated by relatively few families. There is also typically a high degree of endemism at the species level. The two most widely represented coastal saltmarsh plant families are the Chenopodiaceae and Poaceae. Four structural saltmarsh forms are currently recognised based on dominance of a particular vegetation type:</p> <ul style="list-style-type: none"> <li>• dominance by succulent shrubs (e.g. <i>Tecticornia</i>)</li> <li>• dominance by grasses (e.g. <i>Sporobolus virginicus</i>)</li> <li>• dominance by sedges and grasses (e.g. <i>Juncus kraussii</i>, <i>Gahnia trifida</i>)</li> <li>• dominance by herbs (e.g. low-growing creeping plants such as <i>Wilsonia backhousei</i>, <i>Samolus repens</i>, <i>Schoenus nitens</i>) (DBCA, 2017a).</li> </ul>	Not present within the survey area. The habitat described is not present in the creek line / drainage area. The structural composition on site does not meet any of the four described as being consists with this TEC.
Proteaceae Dominated Kwongan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Priority 3 (WA) EN (EPBC Act)	<p>Consists of predominantly obligate seeding proteaceous shrubland and heath (kwongan) and mallee heath on sandplain, duplex sand/clay and gravels overlying Eocene sediments, quartzite, schist, Yilgarn and Albany Fraser granite and greenstone ranges. Its flora is characterised by high species diversity and a high degree of endemism, particularly in the Stirling Range, Fitzgerald River National Park, Ravensthorpe Range and Russell Ranges. Due to the high levels of endemism, there are few species that exist across the entire range of the dense, obligate seeding Proteaceae dominated shrublands and kwongan of the Esperance Sandplains, however particular species have been identified as common dominant species in each of its ecodistricts (DBCA, 2017a).</p>	Not present within the survey area. Species composition does not meet the diagnostic features of the TEC.

### 1.1. Threatened Flora

The scope for this survey was to provide the client with information on any threatened flora species that are potentially present within the survey area. For species that were not flowering and that require flowers for accurate identification, a risk assessment was undertaken of habitat suitability (Table 5). Species were deemed either likely or unlikely to occur in the area based on habitat suitability (e.g. soil type, vegetation type, density etc). None of the 17 DRF and 41 Priority species potentially occurring in the area were found to be present.

Table 5 Potential threatened flora located within 15km of the survey area.

Family	Species	Status (WA)	Habitat	Flowering period	Potentially Suitable Habitat Present	Survey Outcome / Comment
Asparagaceae	<i>Laxmannia jamesii</i>	P4	Grey sand. Winter-wet locations.	May-Jul	Y	Species detection within remnant vegetation to the west. Noted during the report writing process the species has been delisted.
Asparagaceae	<i>Thysanotus isantherus</i>	P4	Granite.	Nov - Dec	N	Survey timing suitable. No suitable habitat present. Species not found.
Brassicaceae	<i>Lepidium pseudotasmanicum</i>	P4	Loam, sand.	Feb or Dec	Y	Survey timing suitable. Species not found.
Centrolepidaceae	<i>Centrolepis caespitosa</i>	P4	White sand, clay. Salt flats, wet areas.	Oct-Dec	N	Survey timing suitable. No suitable habitat present. Species not found.
Dasypogonaceae	<i>Calectasia cyanea</i>	T	White, grey or yellow sand, gravel. Occurs in heathland on gentle slopes with <i>Allocasuarina humilis</i> , <i>Banksia grandis</i> , <i>Adenanthos cuneatus</i> , <i>Hakea ruscifolia</i> and <i>Melaleuca thymoides</i> .	Jun-Oct	Y	Survey outside of flowering period. Species not found.
Droseraceae	<i>Drosera fimbriata</i>	P4	White sand, clay. Salt flats, wet areas.	Oct-Dec	N	Survey timing suitable. No suitable habitat present. Species not found.
Ericaceae	<i>Andersonia auriculata</i>	P3	Grey or peaty sand, often over laterite. Swampy areas, granite outcrops.	Apr-Oct	Y	Survey outside of flowering period. Genus not found within the survey area. Species not found.
Ericaceae	<i>Andersonia sp. Jamesii</i> (J. Liddelow 84)	P3	Very limited publicly available information on this species			Genus not found within the survey area. Species not found.
Ericaceae	<i>Andersonia sp. Mitchell River</i> (B.G. Hammersley 925)	P3	Grey sand over laterite or granite.	Jun-Sept	Y	Survey outside of flowering period. Genus not found within the survey area. Species not found.
Ericaceae	<i>Leucopogon alternifolius</i>	P3	Grey/white sand. Swampy areas, seasonally wet areas	Aug-Dec	Y	Survey timing suitable. Species not found.

Table 5 Continued.

Family	Species	Status (WA)	Habitat	Flowering period	Potentially Suitable Habitat Present	Survey Outcome / Comment
Ericaceae	<i>Leucopogon cymbiformis</i>	P2	White/grey or yellow sand, lateritic gravelly soils. Sandplains, wet flats, foothills	Jul-Nov or Feb-Mar	Y	Survey timing suitable. Species not found.
Ericaceae	<i>Lysinema lasianthum</i>	P4	Swamps, seasonally wet areas	Jul-Nov	Y	Survey timing suitable. Species not found.
Ericaceae	<i>Sphenotoma drummondii</i>	T	Stony or shallow soils over granite or quartzite. Steep rocky slopes, crevices of rocks	Sept-Dec	N	Survey timing suitable. No suitable habitat present. Species not found.
Fabaceae	<i>Acacia prismifolia</i>	X				Presumed extinct, Species not found.
Fabaceae	<i>Chorizema carinatum</i>	P3	Sand, sandy clay	Oct - Dec	Y	Survey timing suitable. Species not found.
Fabaceae	<i>Kennedia glabrata</i>	T	Soil pockets, sandy soils. Granite outcrops.	Aug-Nov	Y	Survey timing suitable. Species not found.
Haemodoraceae	<i>Conostylis misera</i>	T	White or grey sand, sandy loam. Winter-wet flats.	Oct-Nov	Y	Survey timing suitable. Species not found.
Haloragaceae	<i>Gonocarpus pusillus</i>	P4	Grey sandy clay. Winter-wet swamps	Nov-Dec	N	Survey timing suitable. No suitable habitat present. Species not found.
Haloragaceae	<i>Gonocarpus simplex</i>	P4	Peaty sand. Swamps, seasonally inundated areas	Nov-Dec	Y	Survey timing suitable. Species not found.
Juncaceae	<i>Juncus meianthus</i>	P3	Black sand, sandy clay. Creeks, seepage areas	Nov-Dec or Jan	N	Survey timing suitable. No suitable habitat present. Species not found.
Malvaceae	<i>Thomasia quercifolia</i>	P4	Alluvium, sand over limestone, rocky loam. Coastal areas.	Sept-Dec	N	Survey timing suitable. No suitable habitat present. Species not found.
Malvaceae	<i>Thomasia solanacea</i>	P4	Alluvium, sand over limestone, rocky loam. Coastal areas.	Sept-Dec	N	Survey timing suitable. No suitable habitat present. Species not found.
Myrtaceae	<i>Astartea transversa</i>	P2	Grey sand or peaty black sandy clay on winter-wet flats in heath	Jan and Apr-Jun	Y	Survey outside of flowering period. Genus not found within the survey area. Species not found.

Table 5 Continued.

Family	Species	Status (WA)	Habitat	Flowering period	Potentially Suitable Habitat Present	Survey Outcome / Comment
Myrtaceae	<i>Melaleuca ringens</i>	P3	Sand. Limestone ridges & clifftops.	Sept-Oct	N	Survey timing suitable. No suitable habitat present. Species not found.
Myrtaceae	<i>Verticordia apecta</i>	T	Sandy clay with loam & broken granite. Slopes	Nov	N	Survey timing suitable. No suitable habitat present. Species not found.
Myrtaceae	<i>Verticordia fimbriilepis</i> subsp. <i>australis</i>	T	Shallow sand, clay loam. Granite outcrops	Oct-Dec	N	Survey timing suitable. No suitable habitat present. Species not found.
Orchidaceae	<i>Caladenia evanescens</i>	P1	Sand. Consolidated sand dunes.	Nov	N	Survey timing suitable. No suitable habitat present. Species not found.
Orchidaceae	<i>Caladenia granitora</i>	T	Shallow soil crevices on granite. Coastal areas	Oct-Nov	N	Survey timing suitable. No suitable habitat present. Species not found.
Orchidaceae	<i>Caladenia harringtoniae</i>	T	Sandy loam. Winter-wet flats, margins of lakes, creeklines, granite outcrops.	Oct-Nov	Y	Survey timing suitable. Species not found.
Orchidaceae	<i>Corybas abditus</i>	P3	Black peaty soils. Winter-wet swamps	Oct-Nov	Y	Survey timing suitable. Species not found.
Orchidaceae	<i>Corybas limpidus</i>	P4	Sand. Coastal dunes.	Aug-Sept	N	Survey outside of flowering period. No suitable habitat present. Species not found.
Orchidaceae	<i>Diuris drummondii</i>	T	Low-lying depressions, swamps.	Nov-Dec or Jan	Y	Survey timing suitable. Species not found.
Orchidaceae	<i>Drakaea micrantha</i>	T	White-grey sand.	Sept-Oct	Y	Survey outside of flowering period. Species not found.
Orchidaceae	<i>Microtis globula</i>	T	Peaty soils. Winter-wet swamps	Dec or Jan	Y	Survey outside of flowering period. Species not found.
Orchidaceae	<i>Microtis pulchella</i>	P4	Peaty sand. Winter-wet swamps	Nov-Dec or Jan	Y	Survey timing suitable. Species not found.
Orchidaceae	<i>Microtis quadrata</i>	P4	Poorly known taxa with unresolved distribution	Sept-Jan	Y	Survey timing suitable. Species not found.
Orchidaceae	<i>Prasophyllum paulinae</i>	P1	Low winter wet shrublands, in grasses and sedges in swamps	Sept-Nov	Y	Survey timing suitable. Species not found.



Table 5 Continued.

Family	Species	Status (WA)	Habitat	Flowering period	Potentially Suitable Habitat Present	Survey Outcome / Comment
Orchidaceae	<i>Pterostylis heberlei</i>	P2	Recently described (2017) very limited publicly available information			Genus not found on site. Species not found.
Orchidaceae	<i>Thelymitra variegata</i>	P2	Sandy clay, sand, laterite	Jun-Sept	Y	Survey outside of flowering period. Species not found.
Proteaceae	<i>Adenanthos x cunninghamii</i>	P4	Grey sand. Coastal dunes & sandplains	Sept-Oct	N	Survey outside of flowering period. No suitable habitat present. Species not found.
Proteaceae	<i>Banksia brownii</i>	T	Sand over laterite, gravel, loam over granite. In gullies	Mar-Jul	Y	Survey outside of flowering period. Species distinguishable outside of flowering period. Species not found.
Proteaceae	<i>Banksia goodii</i>	T	Shallow white to grey sand over laterite, in low open forest or low woodland of Jarrah and Sheoak.	May, Nov	Y	Survey timing suitable. Species not found.
Proteaceae	<i>Banksia seneciifolia</i>	P4	Sandy loam, sand. Rocky hillslopes.	Jun or Aug	N	Survey outside of flowering period. No suitable habitat present. Species not found.
Proteaceae	<i>Banksia serra</i>	P4	Gravel, sand or clay loam over laterite. Hillslopes.	Jul-Sept	Y	Survey outside of flowering period. Species not found.
Proteaceae	<i>Banksia verticillata</i>	T	Sandy loam. On or beside granite outcrops.	Jan-Apr	N	Survey outside of flowering period. No suitable habitat present. Species not found.
Proteaceae	<i>Isopogon buxifolius</i> var. <i>buxifolius</i>	P2	Grey sand. Swampy areas.	Jul-Dec	Y	Survey timing suitable. Species not found.
Proteaceae	<i>Isopogon uncinatus</i>	T	Loam or sand on granite, peaty sand. Swampy depressions, hillslopes.	Oct-Nov	Y	Survey timing suitable. Species not found.
Proteaceae	<i>Lambertia orbifolia</i> subsp. <i>orbifolia</i>	T	Shallow grey or light brown sand, grey sandy loams over laterite, gravel. Gently undulating plains, low slopes, low ridges, along roadsides	May, Aug, Nov-Dec or Jan-Feb	Y	Survey timing suitable. Species not found.
Proteaceae	<i>Synaphea incurva</i>	P1	Gravelly loam, sandy soils. Slopes.	Sept-Nov	Y	Survey timing suitable. Species not found.
Proteaceae	<i>Synaphea intricata</i>	P3	Sand, peaty sand. Flats, swampy areas	Sept-Oct	Y	Survey outside of flowering period. Species not found.

Table 5 Continued.

Family	Species	Status (WA)	Habitat	Flowering period	Potentially Suitable Habitat Present	Survey Outcome / Comment
Proteaceae	<i>Synaphea preissii</i>	P3	Sand, gravelly loam	Jul-Nov	Y	Survey timing suitable. Species not found.
Restionaceae	<i>Chordifex abortivus</i>	T	Sand. Low rises and undulating areas.	Sep-Oct	N	Survey outside of flowering period. No suitable habitat present. Species not found.
Restionaceae	<i>Leptocarpus crassipes</i>	P3	Swamps	Dec-Feb	Y	Survey outside of flowering period. Species not found.
Rhamnaceae	<i>Spyridium spadiceum</i>	P4	Sand or gravelly loam. Granitic hills	Aug-Dec or Jan-Feb/Apr	N	Survey timing suitable. No suitable habitat present. Species not found.
Rutaceae	<i>Boronia crassipes</i>	P3	Sand, peaty sand. Winter-wet swamps, creeklines.	Aug-Sept	Y	Survey outside of flowering period. Species not found.
Rutaceae	<i>Boronia virgata</i>	P4	Peaty sand or clay. Swampy or waterlogged places.	Aug-Dec	Y	Survey timing suitable. Species not found.
Stylidiaceae	<i>Stylidium falcatum</i>	P1	Sand, gravelly clay loam. Plains, lateritic ridges.	Oct-Nov	N	Survey timing suitable. No suitable habitat present. Species not found.
Stylidiaceae	<i>Stylidium gloeophyllum</i>	P4	Sandy clay loam, granite. Winter wet depressions, or fringing outcrops. Agonis, mallee, or Hakea shrubland with sedges	Oct-Dec	Y	Survey timing suitable. Species not found.
Thymelaeaceae	<i>Pimelea rosea</i> subsp. <i>annelsii</i>	P3	Sandy soils with gravel, laterite. Upper slopes	Sept-Nov	Y	Survey timing suitable. Species not found.

## 4. Fauna

### 4.1. Desktop Assessment

Desktop inventory of potential fauna species likely to occur within 15 km of the survey area was undertaken using the following databases and applicable reports:

- DBCA's Nature Map Database Search (combined data from DBCA, Western Australian Museum and Birds Australia) (DPaW 2007-); and
- Protected matters search tool (DoE 2017a).

The list compiled from this data (Appendix B) is based on observations from a broader area than the survey area and is likely to include species that are vagrants or would not occur in the actual survey area due to a lack of suitable habitat or poor ecological connectivity. The databases also often included very old records and in some cases the species in question may have become locally or regionally extinct.

### 4.2. Habitat Connectivity

The *South Coast Macro Corridor Network* is a bioregional and landscape-scale approach to habitat connectivity that acknowledges that remnant vegetation can play a very important role in developing corridors between protected areas to help achieve long-term biodiversity management outcomes (Wilkins *et al.* 2006; DBCA, 2017b). The subject site lies within one of the major potential vegetation corridors known as the "Marbellup Link" which connects remnant vegetation to the existing protected areas. This particular proposed corridor links remnant vegetation to the north west of the site to the Mount Lindsay, as well as connecting to the "Coastal Corridor" which ultimately connects to Torndirrup National Park (WALGA, 2018c).

At a local level the remnant vegetation within the survey area provides a corridor for wildlife along the eastern and northern property boundaries and internal throughout the site. The remnant vegetation situated within the western and southern extents of the property also provide wildlife corridors / habitat connectivity external to the site to surrounding bushland areas. The riparian vegetation situated along the Marbellup Flats (located along the southern boundary) provides a corridor to the south into the Down Road South Nature Reserve.

The vegetation types / wildlife habitat present within the survey area are well represented locally and in nearby reserves. The Jarrah / Marri dominated woodland and forest present are one of the most abundant habitat types present within the ARVS survey area, providing a significant proportion of wildlife habitat. The *Homalospermum* and *Callistemon* dominated thickets present with the survey area are not as common at a regional level based on ARVS mapping. However, these habitat types are well represented in surrounding remnant vegetation and nearby reserves such as the Down Road Nature Reserve.

### 4.3. Potential Breeding, Foraging and Roosting Black Cockatoo Habitat

Desktop searches of publicly available information indicates that areas of the Jarrah and Marri dominated vegetation throughout the survey area is potential feeding / foraging habitat to Carnaby's Black Cockatoos (WALGA, 2018d). This dataset is based on vegetation containing plant species favoured by Carnaby's Black Cockatoos not point records of feeding (WALGA, 8018d). This dataset shows no confirmed or potential breeding or roosting areas for Carnaby's Black Cockatoos to be present within the survey area. Based on known habitat preferences for Baudin's Black Cockatoos and Forest Red-tailed Black Cockatoos the vegetation present in the survey area also holds potential for foraging, breeding and roosting for the two species (DSEWPaC (2012).

### 4.4. Field Methodology

Field survey work was carried out by Dr. Karlene Bain (Wildlife Ecologist) and Bianca Theyer (Conservation and Wildlife Biologist) from Bio Diverse Solutions between the 29<sup>th</sup> of October and the 2<sup>nd</sup> November 2018 in accordance with Guidance Statement 56: *Terrestrial Fauna Surveys* (EPA 2016a). A total of 44 survey hours over 5 days were dedicated to the fauna survey. Vegetation units observed during the site survey were used to define broad fauna habitat types across the site (See Section 3). The aim of the fauna survey was to gain an understanding of what species and habitat are present in the area and to determine the likelihood of threatened species utilising the area as well as the significance of the habitat to them. As the western remnant vegetation area is not set to be developed, significant trees were not measured and mapped throughout this area. Surveys in all areas consisted of systematic transects along which evidence of fauna activity was documented and potential habitat was identified. In all areas (other than the western remnant vegetation) each individual tree with a DBH

>500mm was measured, mapped and assessed for habitat potential. All evidence of threatened species was GPS'd and all hollows were GPS'd and described, with likely occupants noted.

Targeted assessment was carried out for *Calyptorhynchus baudinii* (Baudin's Cockatoo), *Calyptorhynchus banksii naso* (Forest Red-tailed Black-Cockatoo), *Calyptorhynchus latirostris* (Carnaby's Cockatoo), *Dasyurus geoffreyi* (Chuditch), *Hydromys chrysogaster* (Water Rat), *Falsistrellus mackenziei* (Western False Pipistrelle), *Isoodon obesulus fusciventer* (Quenda), *Notamacropus irma* (Western Brush Wallaby), *Phascogale tapoatafa wambenger* (Brush-tailed Phascogale), *Pseudocheirus occidentalis* (Western Ringtail Possum), *Setonix brachyurus* (Quokka) and *Zephyrarchaea mainae* (Western Arachnid Spider).

Targeted assessment techniques included:

- Survey for hollow-bearing trees and potential breeding trees for *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo), *Calyptorhynchus baudinii* (Baudin's Cockatoo) and *Calyptorhynchus latirostris* (Carnaby's Black-Cockatoo), including identification of all suitable trees species within the survey area with a Diameter at Breast Height (DBH) of over 500mm;
- Surveys for foraging habitat for *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo), *Calyptorhynchus baudinii* (Baudin's Cockatoo) and *Calyptorhynchus latirostris* (Carnaby's Black-Cockatoo), including observation of any actual foraging evidence such as chewed nuts, cones or stripped bark;
- Surveys for potential habitat trees for *Pseudocheirus occidentalis* (Western Ringtail Possum), through identification of dreys, hollows and tree scratchings;
- Surveys for potential habitat and evidence of *Setonix brachyurus* (Quokka), *Isoodon obesulus fusciventer* (Quenda) presence through the identification of diggings, scats and runnels and the use of remote cameras;
- Surveys for potential habitat and evidence of *Dasyurus geoffreyi* (Chuditch) presence through the identification of scats, activity around potential den logs and the use of remote cameras;
- Surveys for potential hollows for *Phascogale tapoatafa wambenger* (Brush-tailed Phascogale);
- Surveys for potential habitat and evidence of *Notamacropus irma* (Western Brush Wallaby) presence through the identification of scats and the use of remote cameras;
- Surveys for potential habitat and evidence of *Hydromys chrysogaster* (Water Rat) through identification of scats, feeding debris and the use of remote cameras;
- Surveys for potential habitat for *Zephyrarchaea mainae* through identifying areas of suspended leaf litter;
- Surveys for potential hollows for *Falsistrellus mackenziei*; and
- General signs of habitat utilisation and evidence for any other species.

In total five cameras were placed where evidence of fauna activity was observed, in order to provide further evidence of species presence within the survey area (Refer to Figure 12). Cameras 04 and 10 were out in the field for 4 consecutive nights, whilst cameras 01, 07 and 23 were out for 3 consecutive nights.

A summary of threatened species survey outcomes are presented in Table 6. Refer to the following sections for survey outcomes.

The assessment was carried out in a manner consistent with the following documents developed by the EPA and Department of Environment and Energy (DoEE) formerly the Department of Sustainability, Water, Population, and Communities (DSEWPaC) and Department of the Environment, Water, Heritage and the Arts (DEWHA):

- EPA (2016a) Technical Guidance: Terrestrial Fauna Surveys;
- EPA (2016b) Technical Guidance: Sampling Methods for Terrestrial Vertebrate Fauna;
- EPA (2016c) Technical Guidance: Sampling of Short-range Endemic Invertebrate Fauna;
- DEWHA (2010) Survey guidelines for Australia's threatened birds;
- DSEWPaC (2011) Survey Guidelines for Australia's Threatened Mammals; and
- DSEWPaC (2012) Referral Guidelines for Three Threatened Black Cockatoo Species.

The results presented are based upon opportunistic field data collected over a limited period of time and are indicative of the environmental condition of the site at the time. Some fauna species are reported as potentially occurring within the study area based on the presence of suitable habitat (quality and extent) within the study area or immediately adjacent. With respect to opportunistic observations, the possibility exists that certain species may not have been detected during field investigations due to seasonal inactivity during the field survey, species present

within micro habitats not surveyed, cryptic species able to avoid detection and transient wide-ranging species not present during the survey period.

#### 4.5. Survey Limitations and Constraints

##### Experience of personnel

Dr Karlene Bain has over 20 years of fauna survey experience, Bianca Theyer has 3 years' experience.

##### Scope (what faunal groups were sampled and were there any constraints affecting this)

The scope was a Level 1 survey and this was completed. Targeted habitat assessments for Black Cockatoos, Western Ringtail Possum, Quokka, Quenda, Chuditch, Brush-tailed Phascogale, Western Brush Wallaby, Water Rat, Western Arachnid Spider and Western False Pipistrelle were also conducted.

##### Proportion of task achieved and completeness of survey

A Level 1 survey of the survey area was completed. Additional targeted survey may be required within the western block of vegetation if development is to occur within it.

##### Disturbances (e.g. fire or flood)

A section of the western vegetation block had been recently burnt, however habitat assessment for Black Cockatoos, Arboreal Mammals, Wallaby's and Water rat were not affected by this. Overall the western block had a lower sampling intensity (due to the lack of proposed development) and therefore it is not deemed to have affected the completeness of the survey.

##### Intensity of survey

A Level 1 (and supplementary targeted assessments) were deemed appropriate given the proposed development is to be restricted to previously disturbed paddock / agricultural areas.

##### Sources of information (recent or historic) and availability of contextual information

Site specific data is limited as it is privately owned land, this is not considered a limiting factor for this survey.

##### Resources (e.g. degree of expertise available)

All resources required for this survey were available.

##### Remoteness or access issues

No restrictions were encountered. All areas were accessible by vehicle and on foot.

#### 4.6. Non-Threatened Fauna survey outcomes

A description of the broadly defined fauna habitats within the study area (based on vegetation units) is given in Section 3. The approximate extent of each identified unit is shown in the Site Vegetation Complexes Map (Figure 9). During the field survey 40 species of fauna were detected, of which three are introduced; *Felis catus* (Cat), *Vulpes Vulpes* (Red Fox) and *Oryctolagus cuniculus* (Rabbit). There were multiple dens (Fox and Rabbit) located within the northern road reserve (Figure 11), as well as the portion of remnant vegetation situated along the southern boundary (east of the creek line; Figure 11). Multiple nests and hollows for non-threatened bird species such as: *Cracticus tibicen* (Australian Magpie), *Grallina cyanoleuca* (Magpie Lark) and *Purpureicephalus spurius* (Red Capped Parrot) were detected throughout the site, as well as multiple hollows likely being utilised by *Trichosurus vulpecula* (Brushtail Possum). Two unoccupied hollows were detected within the remnant vegetation to the west as well as one active *Eolophus roseicapillus* (Galah) hollow. The subject site also provides suitable habitat for *Macropus fuliginosus* (Western Grey Kangaroo) and *Rattus fuscipes* (Bush Rat). Multiple hollows likely being utilised by *Trichosurus vulpecula* were identified across the survey area. Refer to Table 6 for a list of species detected throughout the survey area, Figure 11 for non-threatened species indicator images and Figure 12 for locations of species and / or evidence.



Figure 11: Species indicators throughout the survey area a) remote camera image of Fox near active den; b) remote camera image of a Kangaroo; c) and d) active fox den entrances; e) fox scat; f) Brushtail Possum scat.

Table 6: Fauna species recorded within survey area (presented in alphabetical order of family, then scientific name).

Family	Scientific name	Vernacular
Acanthizidae	<i>Gerygone fusca</i>	Western Gerygone
Accipitridae	<i>Lophoictinia isura</i>	Square-Tailed Kite
Alcedinidae	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
Anatidae	<i>Chenonetta jubata</i>	Australian Wood Duck
Ardeidae	<i>Egretta novaehollandiae</i>	White-Faced Heron
Artamidae	<i>Cracticus tibicen</i>	Australian Magpie
Cacatuidae	<i>Calyptorhynchus baudinii</i> (EN)	Baudin's Cockatoo
Cacatuidae	<i>Calyptorhynchus banksii naso</i> (VU)	Forest Red-tailed Black Cockatoo
Campephagidae	<i>Coracina novaehollandiae</i>	Black-Faced Cuckoo-Shrike
Canidae	<i>Vulpes vulpes</i> *	Red Fox
Columbidae	<i>Phaps elegans</i>	Brush Bronzewing
Corvidae	<i>Corvus coronoides</i>	Australian Raven
Cuculidae	<i>Cacomantis pallidus</i>	Pallid Cuckoo
Elapidae	<i>Notechis scutatus</i>	Tiger Snake
Eolophus	<i>Eolophus roseicapillus</i>	Galah
Estrildidae	<i>Stagonopleura oculata</i>	Red-Eared Firetail
Felidae	<i>Felis catus</i> *	Cat
Hylidae	<i>Litoria adelaidensis</i>	Slender Tree Frog
Leporidae	<i>Oryctolagus cuniculus</i> *	Rabbit
Macropodidae	<i>Macropus fuliginosus</i>	Western Grey Kangaroo
Macropodidae	<i>Notamacropus irma</i> (P4)	Western Brush Wallaby
Maluridae	<i>Malurus elegans</i>	Red-Winged Fairy-Wren
Maluridae	<i>Malurus splendens</i>	Splendid Fairy-Wren
Meliphagidae	<i>Anthochaera lunulata</i>	Western Wattlebird
Meliphagidae	<i>Anthochaera carunculata</i>	Red Wattlebird
Meliphagidae	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-Lark
Muridae	<i>Rattus fuscipes</i>	Bush Rat
Myobatrachidae	<i>Crinia glauerti</i>	Rattling Froglet; Clicking Froglet
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-Thrush
Peramelidae	<i>Isoodon obesulus fusciventer</i> (P4)	Quenda; Southern Brown Bandicoot
Petroicidae	<i>Eopsaltria georgiana</i>	White-breasted Robin
Phalangeridae	<i>Trichosurus vulpecula</i>	Australian Brushtail Possum
Psittacidae	<i>Purpureicephalus spurius</i>	Red capped parrot
Psittacidae	<i>Platycercus icterotis</i>	Western Rosella
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail
Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail
Threskiornithidae	<i>Threskiornis spinicollis</i>	Straw-Necked Ibis



Figure 12: Fauna habitat values

REPORT ITEM DIS245 REFERS



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Overview Map Scale 1:100,000

Legend

- Fauna Indicators**
- ▲ Active Den
  - ▲ Active Fox Den
  - Baudins Cockatoo
  - ✦ Brush Wallaby
  - ▲ Brushtail Possum Scat
  - ▲ Brushtail Possum Scratchings
  - ▲ Cockatoo Hollow
  - ▲ Forest Red-Tailed BC
  - ▲ Fox Den
  - ▲ Fox Scat
  - ▲ Galah Hollow
  - ▲ Hollow
  - ▲ Possum Hollow
  - ▲ Potential Den
  - ▲ Potential den log
  - ★ Quenda
  - ▲ Rabbit
  - ▲ Unoccupied Hollow
- Subject Site  
 Cadastre  
 Camera

Scale  
1:8,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
City of Albany  
PO Box 484  
Albany, WA 6331

**Fauna Habitat Values**

Assessor <b>KB &amp; BT</b>	QA Check <b>KK</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>MSC0137-002</b>	DATE <b>30/01/2019</b>



#### 4.7. Threatened fauna outcomes

Of the 40 species detected during the survey four species; *Calyptorhynchus banksii subsp. naso* (Forest Red-tailed Black Cockatoo), *Calyptorhynchus baudinii* (Baudin's Cockatoo), *Isoodon obesulus fusciventer* (Quenda), and *Notamacropus irma* (Brush Wallaby) were identified on site. Potential habitat was found for *Calyptorhynchus latirostris* (Carnaby's Black-Cockatoo), *Apus pacificus* (Fork-tailed Swift), *Falco peregrinus* (Peregrine Falcon), *Falco peregrinus subsp. macropus* (Australian Peregrine Falcon), *Tringa nebularia* (Common greenshank), *Tyto novaehollandiae subsp. novae-hollandiae* (Masked Owl (southern subsp.)), *Dasyurus geoffroii* (Chuditch), *Falsistrellus mackenziei* (Western False Pipistrelle), *Hydromys chrysogaster* (Water-rat), *Phascogale tapoatafa* (Brush-tailed Phascogale), *Pseudocheirus occidentalis* (Western Ringtail Possum), *Setonix brachyurus* (Quokka), *Galaxiella munda* (Western Mud Minnow), *Galaxiella nigrostriatal* (Black-stripe Minnow) and *Lepidogalaxias salamandroides* (Salamanderfish). A risk assessment of habitat suitability and presence / absence of species is provided in the Table 7. Whilst locations of observed evidence of species presence is presented in Figure 13.

#### Arachnid

The threatened species *Zephyrarchaea mainae* (Western Arachnid Spider) requires suspended leaf litter lodged within Restionaceae species under *Agonis flexuosa*. There were no areas of suitable habitat identified during the survey.

#### Birds

Evidence of *Calyptorhynchus banksii subsp. naso*, and *Calyptorhynchus baudinii* feeding activity was found within the remnant vegetation on the southern boundary (southern precinct) of the survey area (Figure 12). The feeding debris wasn't fresh and occurred in low quantities with the area of feeding restricted to a small number of trees. The vegetation throughout the survey area contained a very high proportion of potential feed species for each of the three Black Cockatoos such as *Eucalyptus marginata*, *Corymbia calophylla*, *Eucalyptus staeri*, *Allocasuarina fraseriana* (DoE; 2017b, 2017c, 2017d). However, the southern area of remnant vegetation southern boundary (southern precinct) had the highest occurrences of *Calyptorhynchus baudinii* and *Calyptorhynchus banksii subsp. naso* feeding signs. No feeding signs for *Calyptorhynchus latirostris* (Carnaby's Black-Cockatoo) were detected during the survey.

The majority of feeding evidence was from *Corymbia calophylla* nuts (Figure 13) and this area of vegetation had the highest amount of significant (>500mm DBH) *Corymbia calophylla* trees present. This indicates that although the site contains potential high-quality foraging habitat (dominated by Jarrah and Marri) for the three Black Cockatoo species, the quality of forage is marginal and the area is not currently a favoured feeding site. One *Calyptorhynchus baudinii* individual was heard calling during the survey as it flew over the western remnant vegetation, but it did not land within the area. There was one potential Black Cockatoo hollow observed in the remnant vegetation to the west, no other signs of habitat utilisation (feeding signs etc.) were detected. 92 hollow-bearing trees and 586 potential habitat trees (>500mm DBH) were documented throughout the survey area. No other threatened bird species were identified on site. In total, based on vegetation types and the fauna habitat within there is approximately 64.15ha of suitable Black Cockatoo Habitat.

Potential habitat was identified in remnant vegetation areas across the site for *Apus pacificus*, *Falco peregrinus*, *Falco peregrinus subsp. Macropus*, *Tringa nebularia* and *Tyto novaehollandiae subsp. novae-hollandiae* yet evidence of species presence was not identified during the survey period.

#### Mammals

Evidence of *Isoodon obesulus fusciventer* through diggings and well-established runnels is present within the western remnant vegetation block as well as in surrounding creek line vegetation (Figure 13). Defined *Notamacropus irma* runnels were identified within the creek line vegetation (Figure 13) and scats were detected within the creek vegetation (Figure 13) as well as in a stand of paddock trees east of the creek line. Potential den logs for *Dasyurus geoffroii* (Chuditch) were detected in the remnant vegetation in the southern precinct (Figure 13), however no other evidence of species presence was detected.

There was no evidence of the presence of *Hydromys chrysogaster*, *Phascogale tapoatafa*, *Pseudocheirus occidentalis* or *Setonix brachyurus*. The high level of *Trichosurus vulpecula* (Brush-tail Possum) activity throughout the survey area may be a limiting factor for these arboreal mammal species. The high level of *Vulpes vulpes* (Fox) activity and the presence of *Felis catus* (Feral Cat) may be a limiting factor for terrestrial mammal species.

Fish

Although no sampling was undertaken, the shallow creek system provides potential habitat for *Galaxiella munda*, *Galaxiella nigrostriatal* and *Lepidogalaxias salamandroides*.



Figure 13: Threatened species indicators throughout the survey area: a) Quenda Runnel; b) Quenda digging; c) potential habitat for *Galaxiella* and *Lepidogalaxias* species; d) Potential Chuditch den log; e) Wallaby runnel; f) Wallaby scat; g) and h) *Corymbia calophylla* nuts chewed by Black Cockatoos.

Table 7: Risk assessment and survey outcomes for potential threatened fauna within 15km of the survey area. Species are presented alphabetised under their relevant class.  
 Note: N = No, Y = Yes, P = Potential, L = Low, M = Medium, H = High

Class	Scientific Name	Vernacular	Cons Code WC / EPBC Acts	Survey Method	Habitat Present	Likelihood of Detection of Species if present	Species Present	Comment
Arachnid	<i>Zephyrarchaea mainae</i>	Western Archaeid Spider	VU / -	Search for suitable habitat including suspended leaf-litter lodged in the crown of Restionaceae species, <i>L. gladiatum</i> and <i>L. effusum</i> , which grow under long-unburnt stands of weeping peppermint ( <i>Agonis flexuosa</i> (Willd.) Sweet; Rix and Harvey, 2009, 2012)	N	M	N	
Aves (Birds)	<i>Actitis hypoleucos</i>	Common sandpiper	IA/ MI	Survey for birds in suitable habitat; almost entirely coastal.	N	H	N	
	<i>Apus pacificus</i>	Fork-tailed Swift	IA / MI	Survey of potential habitat; almost exclusively aerial, flying from less than 1 m to at least 300 m above ground over inland plains but sometimes above foothills or in coastal areas. Mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh (Higgins 1999).	Y	H	N	Species not identified during survey. Suitable habitat present along creekline.
	<i>Ardenna carneipes</i>	Fleshy-footed Shearwater	VU & IA / MI	Assessment of habitat suitability including coastal areas and offshore islands	N	H	N	
	<i>Atrichornis clamosus</i>	Noisy Scrub-bird	EN / EN	Diurnal surveys of suitable habitat and potential foraging areas; dawn and dusk surveys and call back for calling birds. Preferred habitat includes low closed forests 5–15 m in height that are dominated by Eucalyptus or <i>Agonis</i> and <i>Banksia littoralis</i> and occur in the steep and wetter gullies, and drainage lines of hills and granite mountains and on the margins of freshwater lakes.	N	H	N	
	<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN / EN	Dawn survey for calling males. Survey was conducted during the spring-summer breeding season for 1 hour prior to dawn and one hour after sunrise when calls are most often heard (Marchant & Higgins 1990). Weather was calm and clear, allowing for optimal listening conditions. In the south-west of Western Australia, the Australasian Bittern is found in beds of tall rush mixed with, or near, short fine sedge or open pools. The species also occurs around swamps, lakes, pools, rivers and channels fringed with lignum ( <i>Muehlenbeckia</i> sp.), cane grass ( <i>Eragrostis</i> sp.) or other dense vegetation (Marchant & Higgins 1990).	N	H	N	
	<i>Calidris alba</i>	Sanderling	IA / MI	Survey for birds in suitable habitat; almost entirely coastal.	N	H	N	
	<i>Calidris canutus</i>	Red knot	EN & IA / EN & MI	Survey for birds in suitable habitat; almost entirely coastal. Red Knots gather in large flocks on the coast in sandy estuaries with tidal mudflats	N	H	N	
	<i>Calidris ferruginea</i>	Curlew sandpiper	CR & IA / CR & MI	Survey for birds in suitable habitat; almost entirely coastal. Found on intertidal mudflats of estuaries, lagoons, mangroves, as well as beaches, rocky shores and around lakes, dams and floodwaters.	N	H	N	
	<i>Calidris ruficollis</i>	Red-necked stint	IA / MI	Survey of suitable habitat: mostly coastal areas, including sheltered inlets, bays, lagoons and estuaries with intertidal mudflats; ephemeral or permanent shallow wetlands near the coast or inland, and sometimes flooded paddocks or damp grasslands (Higgins & Davies 1996).	N	H	N	
	<i>Calidris tenuirostris</i>	Great knot	CR & IA / CR & MI	Survey for birds in suitable habitat; inhabit intertidal mudflats and sandflats in sheltered coasts, including bays harbours and estuaries.	N	H	N	
	<i>Calyptorhynchus banksii subsp. naso</i>	Forest Red-tailed Black Cockatoo	VU / VU	Dawn survey for roosting and foraging birds. Diurnal survey for nesting females, focusing on the hollows of large, mature trees. Remote cameras and diurnal assessment of the presence and extent of foraging habitat including vegetation containing proteaceous heath/woodland, eucalypt woodlands or forest (particularly Marri and Jarrah forest) and in areas dominated by <i>Pinus</i> spp. (Johnstone and Kirkby 1999).	Y	H	Y	Suitable foraging habitat is present throughout the survey area. Feeding debris and potential hollows and breeding / roosting trees located onsite. Refer to Figure 12.
	<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo	EN / EN	Dawn survey for roosting and foraging birds. Diurnal survey for nesting females, focusing on the hollows of large, mature trees. Remote cameras and diurnal assessment of the presence and extent of foraging habitat including vegetation containing proteaceous heath/woodland, eucalypt woodlands or forest (particularly Marri and Jarrah forest) and in areas dominated by <i>Pinus</i> spp. Overall Marri ( <i>Corymbia calophylla</i> ) is the primary food source with the birds using its seeds, flowers, nectar and buds.	Y	H	Y	Suitable foraging habitat is present throughout the survey area. Feeding debris and potential hollows and breeding / roosting trees located onsite. Refer to Figure 12.

Table 7 Continued.

Class	Scientific Name	Vernacular	Cons Code WC / EPBC Acts	Survey Method	Habitat Present	Likelihood of Detection of Species if present	Species Present	Comment
Aves (Birds)	<i>Calyptorhynchus latirostris</i>	Carnaby's Black-Cockatoo	EN / EN	Dawn sightings and calls to identify potential breeding and roosting trees. Breeding tree survey and identification of suitable tree species within the survey area with a diameter at breast height (DBH) of over 50cm; Survey for presence and extent of foraging habitat (proteaceous heath/woodland, eucalypt woodlands or forest) and search for evidence of foraging such as chewed nuts. Carnaby's Cockatoo has been observed feeding on a wide range of foods including the seeds of Banksias, Dryandras, Corymbia, Eucalyptus, Hakeas, Grevillea, Pinus, Callitris, Jacaranda, Helianthus, Macadamia, Prunus, Carya, Liquidambar, Mesomelaena spp., Citrullus and Erodium; flower buds, flowers and nectar of Banksia, Callistemon, Corymbia, Dryandra, Eucalyptus, Grevillea, Stenocarpus, Protea spp., insect larvae and insects (including weevils) from under bark, from wood of live and dead trees and shrubs, from galls and from flowers and flower stems, of Acacia spp. (including <i>A. saligna</i> and <i>A. pentedenia</i> ) <i>Banksia</i> spp., <i>Eucalyptus</i> spp., <i>Jacksonia</i> , <i>Agonis</i> and <i>Xanthorrhoea</i> ; also the flesh and juice of apples and persimmons.	Y	H	N	Suitable foraging habitat is present throughout the survey area Potential hollows and roosting trees located onsite. No feeding evidence identified. Species not identified during survey.
	<i>Cereopsis novaehollandiae grisea</i>	Cape Barren Goose (south-western),	VU / VU	The Cape Barren Goose (south-western) can be surveyed from land, sea or air. The recommended method for land-based surveys is to conduct area searches for birds or nests. The recommended method for sea-based surveys is to circumnavigate inhabited or potentially-inhabited islands in a boat. This latter method is effective because the geese usually occur in open habitats with low vegetation and tend to walk or fly away when approached. The recommended method for aerial surveys is to employ a helicopter or light plane to search the coastline and then inland areas of inhabited or potentially-inhabited islands. It is recommended that surveys of islands be conducted during late autumn, when few birds occur on the mainland, the weather is usually fine, and the breeding season has not yet begun (reducing the risk of disturbance to breeding pairs) (DEWHA 2010; Halse et al. 1995; Shaughnessy & Haberley 1994)	N	L	N	
	<i>Charadrius leschenaultii</i>	Greater Sand Plover	VU & IA / VU & MI	Survey for birds in suitable habitat; almost entirely coastal, inhabiting littoral and estuarine habitats. Mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons (Stewart et al. 2007). Seldom occur at shallow freshwater wetlands (Storr 1977).	N	H	N	
	<i>Dasyornis longirostris</i>	Western Bristlebird	EN / EN	Diurnal surveys of suitable habitat and potential foraging areas; dawn and dusk surveys and call back for calls. Preferred habitat includes floristically diverse low dense coastal heathland (McNee 1986).	N	H	N	
	<i>Diomedea antipodensis</i>	Antipodean Albatross	EN / VU	At sea, shipboard surveys during the non-breeding season. On land, observation from onshore vantage points using telescope. Detection of flying birds. Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	H	N	
	<i>Diomedea dabbenena</i>	Tristan Albatross	CR & IA / EN & MI	At sea, shipboard surveys in the non-breeding season. On land, observation from onshore vantage points using telescopes. Detection of flying birds. Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	H	N	
	<i>Diomedea epomophora</i>	Southern Royal Albatross	VU & IA / VU & MI	At sea, shipboard surveys. On land, observation from onshore vantage points (using telescopes). Detection of flying birds. Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	H	N	
	<i>Diomedea exulans</i>	Wandering Albatross	VU & IA / VU & MI	At sea, shipboard surveys. On land, area searches or transect surveys and observation from onshore vantage points using telescopes. Detection of flying birds and nests. Colony sites well documented (Department of Primary Industries, Water and Environment, Hobart). Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	H	N	
	<i>Diomedea exulans subsp. exulans</i>	Snowy Albatross	VU & IA / VU & MI	Assessment of habitat suitability including coastal areas and offshore islands	N	H	N	

Table 7 Continued.

Class	Scientific Name	Vernacular	Cons Code WC / EPBC Acts	Survey Method	Habitat Present	Likelihood of Detection of Species if present	Species Present	Comment
Aves (Birds)	<i>Diomedea sanfordi</i>	Northern Royal Albatross	EN & IA / EN & MI	At sea, shipboard surveys. The use of berley during shipboard surveys may help to attract birds and draw them in for closer observation. On land, observation from onshore vantage points using telescopes. Detection of flying birds. Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	H	N	
	<i>Falco peregrinus</i>	Peregrine Falcon	OS / -	Survey of potential habitat; almost exclusively aerial whilst hunting (flying / hovering above vegetation).	Y	H	N	Suitable habitat throughout the majority of the survey area. Species not identified during survey.
	<i>Falco peregrinus subsp. macropus</i>	Australian Peregrine Falcon	OS / -	Survey of potential habitat; almost exclusively aerial whilst hunting (flying / hovering above vegetation).	Y	H	N	Suitable habitat throughout the majority of the survey area Species not identified during survey.
	<i>Halobaena caerulea</i>	Blue Petrel	- / VU	At sea, shipboard surveys. On land, area searches or transect surveys in potential breeding habitat to locate burrows with follow-up spotlighting at night when birds active at colony. Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens, as bodies are usually displaced by currents and winds. Colony sites are well documented (DEWHA 2010).	N	H	N	
	<i>Hydroprogne caspia</i>	Caspian Tern	IA / MI	Assessment of habitat suitability including coastal areas and offshore islands	N	M	N	
	<i>Limosa lapponica</i>	Bar-tailed Godwit	IA / MI	Survey for birds in suitable habitat; inhabit estuarine mudflats, beaches and mangroves.	N	M	N	
	<i>Limosa lapponica baueri</i>	Western Alaskan Bar-tailed Godwit	VU / VU	Observation using telescope from vantage points overlooking suitable foraging or roosting habitat at appropriate periods of the tidal cycle. Occurs mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It has also been recorded in coastal sewage farms and saltworks, salt lakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats (Higgins & Davies 1996).	N	L	N	
	<i>Limosa lapponica menzbieri</i>	Northern Siberian Bar-tailed Godwit	CR / CR	Observation using telescope from vantage points overlooking suitable foraging or roosting habitat at appropriate periods of the tidal cycle. The bar-tailed godwit (northern Siberian) occurs mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It has also been recorded in coastal sewage farms and saltworks, salt lakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats (Higgins & Davies 1996).	N	L	N	
	<i>Macronectes giganteus</i>	Giant Petrel	IA / EN & MI	Assessment of habitat suitability including coastal areas and offshore islands	N	H	N	
	<i>Macronectes halli</i>	Northern Giant Petrel	IA / VU & MI	At sea, shipboard surveys. On land, area searches or transect surveys and observation from onshore vantage points using telescopes. Detection of flying birds and nests. Colony sites well documented (Department of Primary Industries, Water and Environment, Hobart). Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	H	N	
	<i>Numenius madagascariensis</i>	Eastern Curlew	CR & IA / CR & MI	Observation using telescope from vantage points overlooking suitable foraging or roosting habitat at appropriate periods of the tidal cycle. During the non-breeding season in Australia, the eastern curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass (Zosteraceae). Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes within the mangroves. The birds are also found in coastal saltworks and sewage farms (Marchant & Higgins, 1993).	N	L	N	
	<i>Oxyura australis</i>	Blue-billed Duck	P4 / -	Diurnal surveys of suitable habitat. Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover.	N	H	N	
	<i>Pachyptila turtur subantarctica</i>	Fairy Prion	- / VU	At sea, shipboard surveys. On land, area searches or transect surveys and observation from onshore vantage points using telescopes. Detection of flying birds and burrows with follow-up spotlighting at night when birds are active at colony. Colony sites well documented (Department of Primary Industries, Water and Environment, Hobart). Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	M	N	

Table 7 Continued.

Class	Scientific Name	Vernacular	Cons Code WC / EPBC Acts	Survey Method	Habitat Present	Likelihood of Detection of Species if present	Species Present	Comment
Aves (Birds)	<i>Pandion cristatus</i>	Osprey, Eastern Osprey	IA / MI	Assessment of habitat suitability including coastal areas and offshore islands	N	H	N	
	<i>Philomachus pugnax</i>	Ruff	IA / MI	Survey for birds in suitable habitat; generally fresh, brackish or saline wetlands with exposed mudflats at the edges. It is found in terrestrial wetlands including lakes, swamps, pools, lagoons, tidal rivers, swampy fields and flood lands. They are occasionally seen on sheltered coasts, in harbours, estuaries, seashores and are known to visit sewage farms and saltworks	N	M	N	
	<i>Phoebastria fusca</i>	Sooty Albatross	EN & IA / VU & MI	At sea, shipboard surveys in the non-breeding season. On land, observation from onshore vantage points using telescopes. Detection of flying birds. Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	M	N	
	<i>Plegadis falcinellus</i>	Glossy Ibis	IA / MI	Survey for birds in suitable habitat; requires shallow water and mudflats, is found in well-vegetated wetlands, floodplains, mangroves and rice fields	N	M	N	
	<i>Pluvialis fulva</i>	Pacific Golden Plover	IA / MI	Surveys for birds in suitable habitat; coastal habitats, occasionally fresh, brackish or saline wetlands or claypans especially with muddy margins and often with submerged vegetation or short emergent grass. Other terrestrial habitats include short grass in paddocks, or ploughed or recently burnt areas (Marchant & Higgins 1993).	N	H	N	
	<i>Pluvialis squatarola</i>	Grey Plover	IA / MI	Surveys for birds in suitable habitat; sheltered embayments, estuaries and lagoons with mudflats and sandflats; terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes (Marchant & Higgins 1993).	N	H	N	
	<i>Pterodroma mollis</i>	Soft-plumaged Petrel	/ VU	At sea, shipboard surveys in non-breeding season. Detection of flying birds. Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	H	N	
	<i>Sternula nereis nereis</i>	Australian Fairy Tern	VU / VU	The Fairy Tern (Australian) nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. The subspecies has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline (Higgins & Davies 1996; Lindsey 1986a). The bird roosts on beaches at night (Higgins & Davies 1996). The Fairy Tern is similar to the Little Tern but differs in having a shorter tail, a bigger head with a larger bill and shorter, narrower wings. Fairy Tern are distinguishable in breeding plumage by their entirely yellow beaks (Higgins & Davies 1996) and the black patch at the eye which does not extend to a point at the bill (Cox & Close 1977).	N	H	N	
	<i>Thalassarche carteri</i>	Indian Yellow-nosed Albatross	EN & IA / VU & MI	At sea, shipboard surveys. On land, observation from onshore vantage points using telescopes. Detection of flying birds and nests. Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	H	N	
	<i>Thalassarche cauta cauta</i>	Shy Albatross	VU & IA / VU & MI	At sea, shipboard surveys. On land, area searches or transect surveys, and observation from onshore vantage points (using telescopes). Detection of flying birds and nests. Colony sites well documented (Department of Primary Industries, Water and Environment, Hobart). Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	H	N	
	<i>Thalassarche cauta steadi</i>	White-capped Albatross	VU & IA / VU & MI	At sea, shipboard surveys. On land, observation from onshore vantage points using telescopes. Detection of flying birds. Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	H	N	
	<i>Thalassarche chlororhynchos</i>	Atlantic Yellow-nosed Albatross	VU & IA / MI	Assessment of habitat suitability including coastal areas and offshore islands	N	H	N	
	<i>Thalassarche impavida</i>	Campbell Albatross	VU & IA / VU & MI	At sea, shipboard surveys during non-breeding season. On land, observation from onshore vantage points using telescope. Detection of flying birds. Surveys of beach cast birds may provide an opportunity to detect this species, though they provide little information on origins of specimens as bodies are usually displaced by currents and winds (DEWHA 2010).	N	H	N	
	<i>Thalassarche melanophris</i>	Black-browed Albatross	EN & IA / VU & MI	Shipboard surveys. Continuous 300 m wide survey transects while the vessel is in motion (Woehler 1997). Preferred habitat Marine. Rarely fly over land except when breeding. Fly low to moderately high, rising with updraft produced by wave fronts. Accompanies fishing boats.	N	H	N	

Table 7 Continued.

Class	Scientific Name	Vernacular	Cons Code WC / EPBC Acts	Survey Method	Habitat Present	Likelihood of Detection of Species if present	Species Present	Comment
Aves (Birds)	<i>Thalasseus bergii</i>	Crested tern	IA / MI	Assessment of habitat suitability including coastal areas and offshore islands.	N	H	N	No evidence of species presence identified during the survey.
	<i>Thinornis rubricollis</i>	Hooded Plover	P4 / -	Dawn survey for birds within suitable habitat including sheltered sandy beaches and salt lakes	N	H	N	
	<i>Tringa glareola</i>	Wood Sandpiper	IA / MI	Survey for birds in suitable habitat; seen in small flocks or singly on inland shallow freshwater wetlands, often with other waders. They prefer ponds and pools with emergent reeds and grass, surrounded by tall plants or dead trees and fallen timber.	N	H	N	
	<i>Tringa nebularia</i>	Common greenshank	IA / MI	Dawn survey for calling birds and dawn survey of dam and creek line area for birds.	Y	H	N	Suitable habitat around existing dams and creek area. Species not identified during survey.
	<i>Tyto novaehollandiae subsp. novaehollandiae</i>	Masked Owl (southern subsp.)	P3 / -	Surveys for potential breeding hollows in suitable habitat; wide variety of lowland forests and woodlands that provide mature trees with hollows suitable for nesting and roosting, and nearby open areas for foraging (Schodde & Mason 1980, Peake et al. 1993). Nests in large hollows in old eucalypt trees (Kavanagh & Murray 1996). Sedentary and territorial (Schodde & Mason 1980). May occupy exclusive home ranges, and may mate for life (Kavanagh & Murray 1996).	Y	H	N	Suitable hollows throughout remnant vegetation areas. Species not identified during survey.
Fish (Actinopterygii)	<i>Galaxiella munda</i>	Western Mud Minnow	VU / -	Search for suitable habitat including small streams or shallow pools connected to streams (Pen et al. 1991).	Y	L	P	Suitable habitat present within creek; further surveys required to sample species if disturbances are likely to have direct or indirect impacts on the quality of the water and creekline habitat.
	<i>Galaxiella nigrostriata</i>	Black-stripe Minnow	P3 / -	Search for suitable habitat including small streams or shallow pools connected to streams (Pen et al. 1991).	Y	L	P	Suitable habitat present within creek; further surveys required to sample species if disturbances are likely to have direct or indirect impacts on the quality of the water and creekline habitat.
	<i>Lepidogalaxias salamandroides</i>	Salamanderfish	EN / -	Search for suitable habitat including small streams or shallow pools connected to streams	Y	L	P	Suitable habitat present within creek; further surveys required to sample species if disturbances are likely to have direct or indirect impacts on the quality of the water and creekline habitat.
	<i>Nannatherina balstoni</i>	Balston's Pygmy Perch	VU / VU	Search for suitable habitat including acidic, tannin-stained freshwater pools, streams and lakes in peat flats within 30 km of the coast of south-west Western Australia. The species prefers shallow water, and is commonly associated with tall sedge thickets and inundated riparian vegetation (Allen et al. 2002; Morgan et al. 1998).	N	H	N	
Mammalia	<i>Bettongia penicillata subsp. ogilbyi</i>	Woylie, Brush-tailed Bettong	CR / EN	Remote cameras and diurnal assessment of habitat, diggings and nest sites under dense bushes. Preferred habitat ranges from forest to grassland, coastal and inland.	Y	H	N	Suitable habitat present within areas of remnant vegetation. No evidence of species presence identified during the survey.
	<i>Dasyurus geoffroii</i>	Chuditch	VU / VU	Remote cameras and searches for faecal material and den sites in wooded habitat. Logs must have a diameter > 30 cm and a hollow with 7–20 cm diameter and 1 m length (Dunlop and Morris 2012)	Y	H	N	Potential den logs located onsite; high level of fox activity is likely to be a limiting variable. No other evidence of species presence identified.
	<i>Falsistrellus mackenziei</i>	Western False Pipistrelle	P4 / -	Surveys for potential hollows in suitable habitat; Preferred habitat of live mainly in wet sclerophyll forests of Karri, Jarrah and Tuart eucalypts. Roost in hollows in old trees, branches and stumps, in colonies	Y	L	N	This species is directly detectable only by echo meters or observation. Potential hollows have been identified as a part of the tree surveys.
	<i>Hydromys chrysogaster</i>	Water-rat (Rakali)	P4 / -	Remote cameras and diurnal assessment of habitat and evidence of feeding. Wide variety of freshwater habitats, from subalpine streams and other inland waterways to lakes, swamps, and farm dams.	Y	H	N	Some <i>Cherax</i> feeding debris onsite, but this was more consistent with bird feeding than Water Rat.

Table 7 Continued.

Class	Scientific Name	Vernacular	Cons Code WC / EPBC Acts	Survey Method	Habitat Present	Likelihood of Detection of Species if present	Species Present	Comment
Mammalia	<i>Isoodon obesulus fusciventer</i>	Quenda	P4	Remote cameras and diurnal assessment of habitat and diggings. Inhabits a variety of habitats including forests, woodlands, shrublands and heathlands (Van Dyck and Strahan 2008). The main habitat requirement is for dense cover at ground level (Maxwell et al. 1996, Van Dyck and Strahan 2008).	Y	H	Y	Diggings in remnant vegetation and creek line habitat. Present throughout remnant vegetation areas.
	<i>Macrotis lagotis</i>	Bilby	VU / VU	Assessment of habitat and search for scat, burrows and diggings Preferred habitat is open tussock grassland on uplands and hills; mulga woodland/shrubland growing on ridges and rises, and hummock grassland (spinifex) growing on sandplains and dunes, drainage systems, salt lake systems and other alluvial areas.	N	L	N	
	<i>Notamacropus irma</i>	Western Brush Wallaby	P4 / -	Remote cameras and diurnal assessment of habitat suitability, faecal material and runnels/pads. Preferred habitat includes open forest or woodland, particularly open, seasonally-wet flats with low grasses and open scrubby thickets.	Y	H	Y	Scats consistent with Western Brush Wallaby were found in open Jarrah remnant vegetation upslope of the creekline and in the adjoining paddock areas.
	<i>Parantechinus apicalis</i>	Dibbler	EN / EN	Remote cameras and diurnal assessment of habitat suitability and diggings. Dibblers have been recorded over an extensive area and it is likely that they can occupy a diverse range of habitats. Dibblers seem to prefer vegetation with a dense canopy greater than 1 m high which has been unburnt for at least 10 years or more (Baczocha & Start 1996).	Y	M	N	Suitable habitat in remnant vegetation surrounding riparian areas and in the western block. No evidence of species presence identified during the survey.
	<i>Phascogale tapoatafa wambenger</i>	Brush-tailed Phascogale	CD / -	Remote cameras and diurnal assessment of habitat suitability, potential hollows and scratchings.	Y	H	N	Suitable habitat is present throughout the survey area. High level of Brushtail Possum activity likely to be a limiting variable.
	<i>Pseudocheirus occidentalis</i>	Western Ringtail Possum	CR / VU	Remote cameras and diurnal assessment of habitat suitability, hollows, dreys and search for faecal material. Suitable habitat in the southern forests includes Jarrah, Marri or Karri dominated forests. South coast habitat includes coastal heath, Jarrah/Marri woodland and forest, Peppermint Tree woodland, myrtaceous heaths and shrublands, Bullich dominated riparian zones and Karri forest (DBCA 2017).	Y	H	N	Suitable habitat is present throughout the survey area High level of Brushtail Possum activity likely to be a limiting variable. No evidence of species presence identified.
	<i>Setonix brachyurus</i>	Quokka	VU / VU	Remote cameras and diurnal assessment of habitat suitability, faecal pellets and runnels. Preferred habitat includes woodland, forest, coastal heath, thicket and riparian vegetation	Y	H	N	Suitable habitat within the remnant vegetation surrounding creek line. No evidence of species presence identified.
Petromyzontida	<i>Geotria australis</i>	Pouched Lamprey	P1 / -	Search for suitable habitat. Species is anadromous and requires estuaries and coastal waters connected to freshwater rivers and streams with slow flowing, fine sediment microhabitats where spawning and development of ammocoetes occurs.	N	H	N	



#### 4.8. Significant tree outcomes

There were 678 significant trees (>500mm DBH) identified throughout the survey area, 132 *Allocasuarina fraseriana*, 141 *Corymbia calophylla*, 398 *Eucalyptus marginata* and seven *Eucalyptus staeri*. Of these 678 trees 94 contained hollows (three in *Allocasuarina fraseriana*, 12 in *Corymbia calophylla*, 78 in *Eucalyptus marginata* and one in *Eucalyptus staeri*), with a further 21 trees in the stages of developing hollows in trunks and / or branches. The highest number of hollow bearing trees are located within the area of remnant vegetation along the southern boundary (southern precinct), the northern road reserve and the large stand of paddock trees in the eastern portion of the survey area (Refer to Figure 14).

Of the 94 hollow bearing trees no evidence was found to indicate current occupancy by any of the three Black Cockatoo species. Of the existing hollows 11 are either suitable for or have the potential to develop into Black Cockatoo hollows, based on their dimensions (Trees 158, 269, 351, 389, 546, 611, 633, 636, 675, 676 and 677; Table 8). There are an additional 2 trees that have hollows forming that have good Black Cockatoo hollow forming potential (Trees 17 and 26; Table 8). Of the significant trees identified throughout the site (except for the western remnant) 63 had no clear evidence of being occupied, 11 were occupied by *Trichosurus vulpecula*, 14 were occupied by non-threatened birds, and four occupied by feral bees. Assessment of the 94 potential or actual habitat trees (with hollows) are presented in Table 8 (please refer to Appendix D for the full list of trees identified on site). Corresponding photographs of hollows within significant trees are presented in Figure 15.



Figure 14: Significant Tree with Hollows

REPORT ITEM DIS245 REFERS



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Overview Map Scale 1:100,000

Legend

- Subject Site
- Cadastre
- Significant Trees with Hollows**
- Hollow, Occupant**
- N, Hollow forming
- Y, Bird (Non Threatened)
- Y, Feral Bees
- Y, Possum
- Y, Red-capped parrot
- Y, Unclear Evidence of Occupancy
- Y, Welcome swallows



Scale  
1:8,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
RIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
City of Albany  
PO Box 484  
Albany, WA 6331

**Significant Trees with Hollows**

Assessor <b>KB &amp; BT</b>	QA Check <b>KK</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>MSC0137-002</b>	DATE <b>10/12/2018</b>

Table 8: Significant (&gt;500mm DBH) habitat trees with hollows, potential hollows, nests or evidence of fauna activity located within the survey area.

ID	Species	DBH (mm)	Northing	Eastings	Hollow Y/N	Location	Dimensions (cm)	Occupant	Fauna activity	Comments	Photo Id
1	<i>Eucalyptus marginata</i>	537	6133653.76	566393.75	Y	Trunk	15x12	Na		Beginnings of small hollow in upper branch 6x6cm; beginnings of hollow in fork of trunk.	1
2	<i>Eucalyptus marginata</i>	548	6133647.48	566397.94	N	Trunk	15x12	Termites	Termite mound/nest		2
5	<i>Eucalyptus marginata</i>	440	6133629.49	566405.46	Y	Trunk	18x13	Undetermined	Very low levels of bark disturbance around lower edge of hollow	Likely small bird. Too small for Black Cockatoos.	7
6	<i>Eucalyptus marginata</i>	463	6133637.55	566417.07	Y	Trunk	10x12	Undetermined	Very low levels of bark disturbance around lower edge of hollow		8
7	<i>Corymbia calophylla</i>	488	6133637.715	566423.83	N	Na	Na	Na	Large nest in canopy that looks like a raptor nest.	No fresh faecal material or feathers.	9
11	<i>Allocasuarina fraseriana</i>	453	6133607.284	566458.17	Y	Trunk	12x12	Not occupied		Hollow opens all the way thru trunk approx. 70cm deep. Possible <i>Falsistrellis</i> hollow.	10
15	<i>Allocasuarina fraseriana</i>	587	6133604.42	566480.99	Y	Branch	5x7	Not occupied	No scratching or chewing		12
17	<i>Corymbia calophylla</i>	969	6133607.95	566488.08	N	Na	Na	Na	Na	Large branch junction is beginning to form a hollow. Good potential for large hollow.	
23	<i>Allocasuarina fraseriana</i>	803	6133573.15	566562.71	N	Na	Na	Na	Na	Hollow butt.	13
26	<i>Corymbia calophylla</i>	830	6133553	566602.32	N	Na	Na	Na	Na	Large upper trunk and branches have good hollow forming potential.	
49	<i>Eucalyptus marginata</i>	962	6133995.374	567528.14	Y	Branch	15x15	Not occupied	Small amount of scratching	Shallow hollow; small hollow in branch forming as well.	22
55	<i>Eucalyptus marginata</i>	1357	6134059.876	567565.19	Y	Branch	5x4	Bird	Fresh chewing around entrance consistent with nesting activity.	Too small for Black Cockatoo.	24
57	<i>Eucalyptus marginata</i>	714	6134046.425	567538.41	Y	Trunk	3x2	Not currently occupied	No scratching	Tiny hollow.	25
76	<i>Eucalyptus marginata</i>	601	6133984.898	567475.07	N	Na	Na	Na	Stick nest, fresh faecal material and black feather	3 nests all close to each other. Magpies with juveniles calling from nearby area.	29
79	<i>Eucalyptus marginata</i>	680	6133972.03	567494.90	N	Na	Na	Na	Large stick nest high in canopy. Lots of fresh faecal material. Raptor-like		30
85	<i>Eucalyptus marginata</i>	604	6133943.376	567434.87	N	Na	Na	Na	Possum scratching		31
86	<i>Eucalyptus marginata</i>	572	6133940.983	567435.59	N	Na	Na	Na	Possum scratching		32
92	<i>Eucalyptus marginata</i>	854	6133904.848	567423.351	N	Na	Na	Na	Magpie chick in nest; faecal material;		34
95	<i>Eucalyptus marginata</i>	971	6133868.178	567415.472	Y	Branch	12x9	Not currently occupied	Bark disturbance around hollow entrance. No tracks up to hollow.	Small or medium bird.	35
98	<i>Eucalyptus marginata</i>	650	6133829.155	567389.865	N	Na	Na	Na	Magpie chick in nest; faecal material;		37
106	<i>Eucalyptus marginata</i>	933	6134381.77	568474.758	Y	Branch	15x13	Not currently occupied	Possum scratching	3 stick nests. One large and 2 medium. All unused. Hollow was checked for occupancy. Too shallow.	41
111	<i>Eucalyptus marginata</i>	539	6134354.927	568502.487	N	Na	Na	Na	Na	Small areas of bark have been stripped in the canopy. Possibly Black Cockatoos searching for invertebrates.	42
112	<i>Eucalyptus marginata</i>	533	6134341.702	568496.259	Y	Trunk	3x3	Not currently occupied	Na	Tiny hollow associated with dry side fissure.	43
113	<i>Eucalyptus marginata</i>	1098	6134332.801	568507.433	Y	Branch	25x23	Not currently occupied	Disturbed bark leading into hollow	Checked. Has historically been used. Angled branch and hollow. Bottom of branch has split and top portion of hollow has become unstable. Bottom of hollow shallow. Has potential to continue forming down into trunk.	196
122	<i>Eucalyptus marginata</i>	689	6134333.852	568455.075	Y	Branch	17x7	Not currently occupied	Old disturbance around entrance	Too small for Black Cockatoo.	44
126	<i>Eucalyptus marginata</i>	568	6134307.879	568436.677	Y	Branch	16x8	Not currently occupied	No scratching or chewing	Shallow hollow.	45
127	<i>Eucalyptus marginata</i>	602	6134303.73	568451.111	Y	Trunk	9x8	Red-capped parrot	Fresh chewing around hollow entrance	Red-capped parrot.	46

Table 8 Continued.

ID	Species	DBH (mm)	Northing	Eastings	Hollow Y/N	Location	Dimensions	Occupant	Fauna activity	Comments	Photo Id
128	<i>Eucalyptus marginata</i>	669	6134302.155	568450.140	Y	Branch	4x3	Welcome swallows	Birds observed	Mudlark nest. 3 juveniles still being fed.	54, 59
132	<i>Eucalyptus marginata</i>	514	6134272.048	568463.545	Y	Trunk	6x8	Not currently occupied	Na	Good small-medium bird hollow.	60
149	<i>Eucalyptus marginata</i>	669	6134363.58	568418.221	Y	Branch	12x7	Bird	Fresh chewing around entrance consistent with medium bird.	Too small for Black Cockatoo.	65
156	<i>Eucalyptus marginata</i>	652	6134313.678	568374.098	Y	Butt	7x4	Feral Bees	Bees observed		66
158	<i>Eucalyptus marginata</i>	736	6134288.683	568373.734	Y	Trunk	43x46		Old nest remnants this season. Possible Wattlebird feathers	Checked. Shallow. Has potential to develop into Black Cockatoo hollow.	67
161	<i>Eucalyptus marginata</i>	592	6134266.179	568377.378	N	Na	Na	Na	Fresh feeding on jarrah nuts		68
166	<i>Eucalyptus marginata</i>	389	6134266.785	568425.820	Y	Trunk	9x6	Bird	Fresh chewing around entrance	Top and side entry into hollow.	70, 71
177	<i>Eucalyptus marginata</i>	1004	6133957.808	568019.393	Y	Branch	5x6	Not currently occupied	No scratching or chewing	Branch has small diameter. Potentially suitable for small bird or mammal.	72
188	<i>Corymbia calophylla</i>	861	6133929.747	567973.993	Y	Trunk	4x4	Small bird	Fresh chewing around entrance	Small hollow.	73
228	<i>Corymbia calophylla</i>	627	6133759.988	567867.734	N	Na	Na	Na	Red-tailed Black Cockatoo feeding debris		76
230	<i>Corymbia calophylla</i>	609	6133796.336	567872.650	N	Na	Na	Na	Possum scratching		77
236	<i>Corymbia calophylla</i>	613	6133832.199	567868.691	Y	Trunk	12x7	Small bird	Fresh chewing around entrance		78
241	<i>Corymbia calophylla</i>	793	6133867.066	567868.846	N	Na	Na	Na	Red-tailed Black Cockatoo feeding debris		80
256	<i>Corymbia calophylla</i>	572	6133969.756	567875.844	N	Na	Na	Na	Red-tailed Black Cockatoo and Baudin's feeding debris		87
265	<i>Eucalyptus marginata</i>	549	6133972.231	567858.074	Y	Trunk	24x42	Not currently occupied	Down feathers and egg remnants in hollow. Old small carnivore scat	Recently used.	94
268	<i>Eucalyptus marginata</i>	1131	6133941.597	567869.866	Y	Branch	14x14	Feral Bees	Bees observed; termite mound in base	Big old tree; good hollow forming potential.	97
269	<i>Corymbia calophylla</i>	766	6133934.997	567859.045	Y	Trunk	14x15	Possum	Possum scratching	Scratching up to hollow; double entrance. Large hollow potentially suitable for Black Cockatoos.	98
270	<i>Corymbia calophylla</i>	538	6133930.236	567864.508	Y	Trunk	8x7	Not currently occupied	Fresh chewing around entrance	Small birds; shallow hollow.	99
281	<i>Eucalyptus marginata</i>	1159	6133847.058	567854.958	Y	Branch	13x12	Possum	Possum scratching	Scratching up to hollow.	88,94
282	<i>Eucalyptus marginata</i>	615	6133830.877	567857.015	Y	Trunk	13x15	Undetermined	Fresh chewing around entrance	Checked.	102
288	<i>Eucalyptus marginata</i>	661	6133765.308	567858.336	Y	Trunk	28x32	Not currently occupied	No scratching or chewing	Shallow hollow.	103
310	<i>Eucalyptus marginata</i>	804	6133914.002	567819.888	Y	Branch	9x5	Small bird	Fresh chewing around entrance; possum scratching		104
313	<i>Eucalyptus marginata</i>	812	6133933.257	567836.044	Y	Trunk	26x34	Not currently occupied	Possum scratching	Small carnivore scat and active den at base of this tree.	106
314	<i>Eucalyptus marginata</i>	518	6133938.657	567843.150	Y	Trunk	15x15	Not currently occupied	Possum scratching	Scratching up to hollow; shallow hollow.	112
319	<i>Eucalyptus marginata</i>	615	6133961.469	567842.312	Y	Trunk	12x5	Not currently occupied	No scratching or chewing		113
321	<i>Eucalyptus marginata</i>	554	6133973.872	567844.761	Y	Trunk	25x12		Fresh chewing around entrance; possum scratching	Checked. Remnants of old bee hive; 2 well-formed hollows in trunk.	114,115
330	<i>Eucalyptus marginata</i>	632	6133937.601	567797.571	Y	Trunk	16x16	Not currently occupied	Possum scratching	Scratching doesn't go all the way to hollow.	117

Table 8 Continued.

ID	Species	DBH (mm)	Northing	Eastings	Hollow Y/N	Location	Dimensions	Occupant	Fauna activity	Comments	Photo Id
331	<i>Eucalyptus marginata</i>	520	6133928.08	567812.321	Y	Trunk	12x12	Not currently occupied	No scratching or chewing	Shallow hollow.	118
332	<i>Corymbia calophylla</i>	1002	6133929.559	567812.277	Y	Branch	38x16	Possum	Den beneath tree; possum scratching up to and around hollow	Small carnivore scats. Old; den currently inactive.	120
334	<i>Corymbia calophylla</i>	894	6133919.901	567828.499	Y	Branch	20x18	Medium bird	Fresh chewing around entrance	Small diameter branch. Large entrance. Too small for Black Cockatoo.	119
351	<i>Eucalyptus marginata</i>	675	6133889.045	567765.960	Y	Trunk	18x20	Not currently occupied	Fresh chewing around entrance; possum scratching	2 hollows within 2 mod each other. Both potential Black Cockatoo hollows.	122,123
352	<i>Corymbia calophylla</i>	526	6133899.584	567778.094	Y	Trunk	16x11	Not currently occupied	Fresh disturbance around entrance		125
356	<i>Corymbia calophylla</i>	612	6133916.019	567793.109	N	Na	Na	Na	Baudin's feeding debris		126
361	<i>Eucalyptus marginata</i>	544	6133864.187	567805.042	Y	Branch	9x8	Not currently occupied	No scratching or chewing		127,128
366	<i>Eucalyptus marginata</i>	699	6133849.56	567803.293	Y	Branch	11x11	Small bird	Fresh chewing around entrance	Additional branch hollow 8x8 with fine scratching up to and into hollow; small mammal likely. Possibly arboreal Dasyurid.	129
369	<i>Eucalyptus marginata</i>	570	6133800.778	567802.620	Y	Trunk	12x10	Not currently occupied	Possum scratching	Shallow hollow.	130
387	<i>Eucalyptus marginata</i>	612	6133863.741	567713.06	Y	Trunk	20x18	Not currently occupied	Old nest	Small-med birds.	133
389	<i>Eucalyptus marginata</i>	640	6133842.831	567720.150	Y	Branch	26x26	Not currently occupied	Old nest	Potential Black Cockatoo hollow.	134
392	<i>Corymbia calophylla</i>	712	6133822.92	567726.642	Y	Branch	10x12	Small bird	Fresh chewing around entrance		135
393	<i>Eucalyptus marginata</i>	652	6133815.819	567746.070	Y	Branch	8x8	Small bird	Fresh chewing around entrance		136
431	<i>Eucalyptus marginata</i>	773	6133783.968	567642.126	Y	Branch	23x20	Not currently occupied	No scratching or chewing	Chimney	139
445	<i>Eucalyptus marginata</i>	856	6134159.281	568703.316	Y	Branch	32x27	Possum	Possum scratching	Dead. Additional hollows in nearby limbs; fresh scratching all way up to and into hollow.	140
447	<i>Allocasuarina fraseriana</i>	503	6134556.977	568705.232	N	Na	Na	Na	Sheoak nut feeding debris		141
458	<i>Eucalyptus marginata</i>	648	6135040.494	568684.752	Y	Trunk	8x4	Not currently occupied	Fresh chewing around hollow	Small bird nest this season; an additional hollow in small branch in upper canopy.	142,143
459	<i>Eucalyptus marginata</i>	808	6135029.307	568676.834	Y	Trunk	7x3	Not currently occupied	Fresh chewing around hollow	Small bird nest this season.	144
476	<i>Eucalyptus marginata</i>	764	6134975.031	568536.496	Y	Trunk	12x3	Not currently occupied	Possum scratching	Small amount of fresh chewing around entrance. Additional small hollow in branch looks like it has been used by small birds this season.	150
479	<i>Eucalyptus marginata</i>	915	6134979.989	568517.077	Y	Branch	4x5	Not currently occupied	No scratching or chewing		152
482	<i>Eucalyptus marginata</i>	761	6134959.102	568520.583	N	Na	Na	Na	Na	Large hollow in trunk that has become unusable due to opening in side of tree associated with hollow butt.	153-155
485	<i>Eucalyptus marginata</i>	644	6134963.068	568485.175	Y	Branch	24x10	Possum	Possum scratching	Scratching up to and into hollow.	156
491	<i>Eucalyptus marginata</i>	718	6134933.511	568386.037	Y	Trunk	7x5	Na	Scratching up to and into hollow	Too small entrance to see into with torch. Possible small dasyurid.	157
496	<i>Corymbia calophylla</i>	649	6134897.613	568370.955	Y	Branch	3x4	Not currently occupied	No scratching or chewing	Two upright branches may also have hollows forming.	158
499	<i>Eucalyptus marginata</i>	727	6134869.808	568322.723	Y	Branch	12x9	Not currently occupied	No scratching or chewing	Shallow hollow.	160
510	<i>Eucalyptus marginata</i>	561	6134807.47	568179.973	N	Na	Na	Na	Possum scratching and scat		161

Table 8 Continued.

ID	Species	DBH (mm)	Northing	Eastings	Hollow Y/N	Location	Dimensions	Occupant	Fauna activity	Comments	Photo Id
518	<i>Eucalyptus marginata</i>	637	6134823.377	568152.735	Y	Branch	4x4	Not currently occupied	No scratching or chewing	Shallow hollow.	162
525	<i>Eucalyptus marginata</i>	660	6134901.376	568323.045	Y	Trunk	9x12	Feral Bees	Observed	Additional hollow forming higher.	163
527	<i>Eucalyptus marginata</i>	584	6134907.943	568334.758	Y	Branch	12x10	Not currently occupied	Fresh chewing around hollow	Some tracks leading up to hollow. Shallow and narrow hollow.	164
529	<i>Eucalyptus marginata</i>	558	6134378.086	567177.523	Y	Trunk	5x5	Not currently occupied	Small amount of scratching at side of hollow; cockatoo feeding debris around base of tree	Small and narrow.	166,67
530	<i>Eucalyptus marginata</i>	505	6134385.661	567190.573	Y	Trunk	8x7	Not currently occupied	No scratching or chewing	Spiderwebs across entrance; but chicken sized eggshell on ground.	168,169
531	<i>Eucalyptus marginata</i>	548	6134388.352	567200.137	Y	Trunk	18x12	Not currently occupied	No scratching or chewing	Spiderwebs across entrance.	170,171
546	<i>Eucalyptus marginata</i>	574	6134563.412	567576.047	Y	Branch	27x12	Not currently occupied	Possum scratching	Scratching not into hollow. Looks suitable for Black Cockatoo.	175
547	<i>Eucalyptus marginata</i>	790	6134552.962	567574.307	Y	Trunk	22x6	Not currently occupied	Scratching alongside hollow.		172
550	<i>Eucalyptus marginata</i>	622	6134543.133	567585.819	Y	Trunk	9x8	Possum	Possum scratching above and into hollow		173,74
556	<i>Eucalyptus marginata</i>	617	6134579.091	567602.888	Y	Branch	10x8	Not currently occupied	Fresh chewing around hollow	Medium bird has nested here this season.	177
565	<i>Corymbia calophylla</i>	889	6134588.987	567683.281	Y	Branch	35x32	Feral Bees	Bees observed		178,79
569	<i>Corymbia calophylla</i>	675	6134626.011	567708.676	Y	Branch	13x11	Not currently occupied	Possum scratching	Scratching around but not up to or into hollow. No bird chewing.	180
584	<i>Eucalyptus marginata</i>	661	6134674.879	567810.428	Y	Branch	7x3	Small bird	Fresh chewing around hollow	Additional hollow in adjoining branch. Slightly larger but no sign of recent activity.	181,82
585	<i>Eucalyptus marginata</i>	651	6134697.43	567857.248	Y	Branch	11x10	Not currently occupied	No scratching or chewing	Dead branch. Opens out to bottom. Section that is full hollow is very shallow.	183
609	<i>Eucalyptus marginata</i>	748	6134682.081	567882.599	Y	Branch	20x18	Not currently occupied	No scratching or chewing	Branch had dropped exposing the hollow. Shallow.	184
611	<i>Eucalyptus marginata</i>	493	6134672.174	567840.169	Y	Branch	35x30		Scratching alongside hollow.	Potential Black Cockatoo hollow. No signs of recent activity.	185
633	<i>Eucalyptus marginata</i>	608	6134356.943	567194.770	Y	Branch	26x26	Possum	Possum scratching	Scratching up to and into hollow; dead stag. Chimney hollow; good size for Black Cockatoo.	188
636	<i>Eucalyptus marginata</i>	912	6134367.973	567217.082	Y	Trunk	35x40	Not currently occupied	No scratching or chewing	Hollow shallow but has potential to become suitable for Black Cockatoos.	189
648	<i>Eucalyptus marginata</i>	1096	6134530.202	567559.132	Y	Branch	35x35	Not currently occupied	Scratching alongside hollow.	Dead top. Unstable.	190
672	<i>Eucalyptus marginata</i>	801	6134599.174	568342.655	Y	Trunk	28x30	Not currently occupied	Old nest remnants	Open hollow. Nest not this season.	192
675	<i>Eucalyptus marginata</i>	738	6134852.132	568621.931	Y	Trunk	9x8	Not currently occupied	Ravens	Large general hollow entrance. Main hollow inside is still quite shallow and narrow. Has good potential to form into a hollow suitable for Black Cockatoos.	193
676	<i>Eucalyptus marginata</i>	961	6134976.565	568583.213	Y	Branch	26x18	Possum	Possum scratching	Scratching up to and into hollow; dead stag. Side entrance hollow; good size for Black Cockatoo. Too unstable to climb.	194
677	<i>Eucalyptus marginata</i>	1151	6134888.714	568454.984	Y	Branch	22x26	Not currently occupied	No scratching or chewing	Good potential Black Cockatoo hollow.	195



Tree ID: 1  
Photo: 1



Tree ID: 2  
Photo: 2



Tree ID: 5  
Photo: 7



Tree ID: 6  
Photo: 8



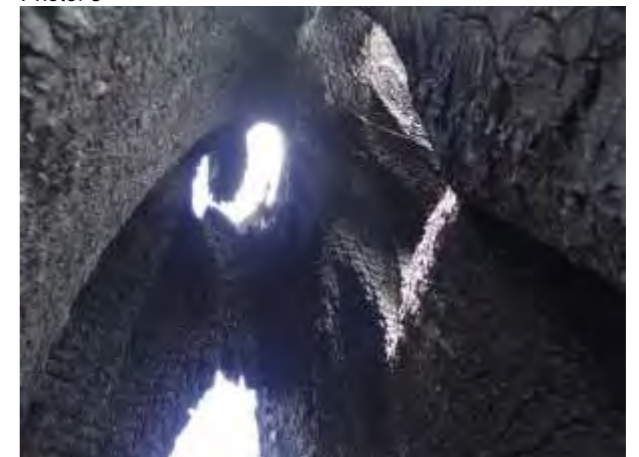
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Photo: 9



Tree ID: 11  
Photo: 10



Tree ID: 15  
Photo: 12



Tree ID: 23  
Photo: 13



Tree ID: 49  
Photo: 22



Tree ID: 55  
Photo: 24



Tree ID: 57  
Photo: 25



Tree ID: 76  
Photo: 29

Figure 15: Significant habitat trees with hollows or evidence of fauna activity within the survey area.



Tree ID: 79  
Photo: 30



Tree ID: 85  
Photo: 31



Tree ID: 86  
Photo: 32



Tree ID: 92  
Photo: 34



Tree ID: 95  
Photo: 35



Tree ID: 98  
Photo:



Tree ID: 106  
Photo: 41



Tree ID: 111  
Photo: 42



Tree ID: 112  
Photo: 43



Tree ID: 122  
Photo: 44



Tree ID: 126  
Photo: 45



Tree ID: 127  
Photo: 46

Figure 15 Continued.





Tree ID: 128  
Photo: 54



Tree ID: 128  
Photo: 59



Tree ID: 132  
Photo: 60



Tree ID: 149  
Photo: 65



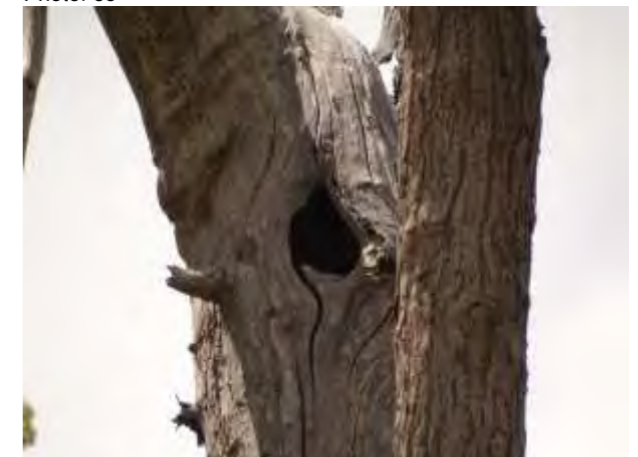
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Photo: 66



Tree ID: 158  
Photo: 67



Tree ID: 161  
Photo: 68



Tree ID: 166  
Photo: 70



Tree ID: 166  
Photo: 71



Tree ID: 177  
Photo: 72



Tree ID: 188  
Photo: 73



Tree ID: 228  
Photo: 76

Figure 15 Continued.



Tree ID: 230  
Photo: 77



Tree ID: 236  
Photo: 78



Tree ID: 241  
Photo: 80



Tree ID: 256  
Photo: 87



Tree ID: 265  
Photo: 88



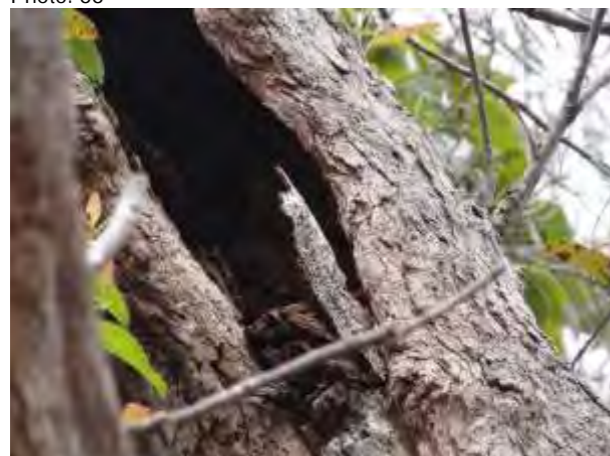
Tree ID: 265  
Photo: 94



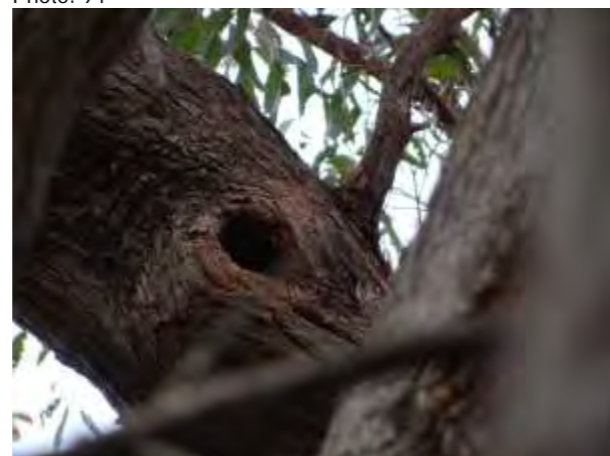
Tree ID: 268  
Photo: 97



Tree ID: 269  
Photo: 98



Tree ID: 270  
Photo: 99



Tree ID: 281  
Photo: 100



Tree ID: 281  
Photo: 101



Tree ID: 282  
Photo: 102

Figure 15 Continued.



Tree ID: 288  
Photo: 103



Tree ID: 310  
Photo: 104



Tree ID: 313  
Photo: 106



Tree ID: 314  
Photo: 112



Tree ID: 319  
Photo: 113



Tree ID: 321  
Photo: 114



Tree ID: 321  
Photo: 115



Tree ID: 330  
Photo: 117



Tree ID: 331  
Photo: 118



Tree ID: 332  
Photo: 120



Tree ID: 334  
Photo: 119



Tree ID: 351  
Photo: 122

Figure 15 Continued.



Tree ID: 351  
Photo: 123



Tree ID: 352  
Photo: 125



Tree ID: 356  
Photo: 126



Tree ID: 361  
Photo: 127



Tree ID: 361  
Photo: 128



Tree ID: 366  
Photo: 129



Tree ID: 369  
Photo: 130



Tree ID: 387  
Photo: 133



Tree ID: 389  
Photo: 134



Tree ID: 392  
Photo: 135



Tree ID: 393  
Photo: 136



Tree ID: 431  
Photo: 139

Figure 15 Continued.



Tree ID: 445  
Photo: 140



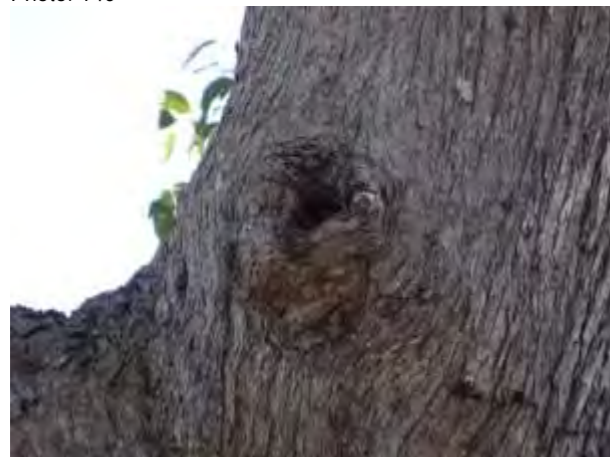
Tree ID: 447  
Photo: 141



Tree ID: 458  
Photo: 142



Tree ID: 458  
Photo: 143



Tree ID: 459  
Photo: 144



Tree ID: 476  
Photo: 150



Tree ID: 479  
Photo: 152



Tree ID: 482  
Photo: 155



Tree ID: 485  
Photo: 156



Tree ID: 491  
Photo: 157



Tree ID: 496  
Photo: 158



Tree ID: 499  
Photo: 160

Figure 15 Continued.



Tree ID: 510  
Photo: 161



Tree ID: 518  
Photo: 162



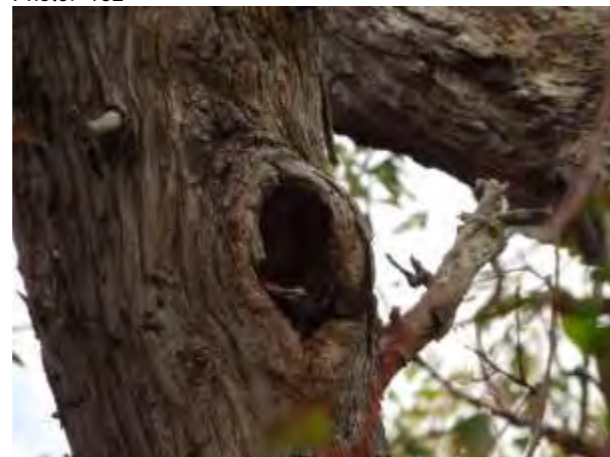
Tree ID: 525  
Photo: 163



Tree ID: 527  
Photo: 164



Tree ID: 529  
Photo: 166



Tree ID: 530  
Photo: 168



Tree ID: 531  
Photo: 170



Tree ID: 546  
Photo: 175



Tree ID: 547  
Photo: 172



Tree ID: 550  
Photo: 173



Tree ID: 556  
Photo: 177



Tree ID: 565  
Photo: 178

Figure 15 Continued.



Tree ID: 569  
Photo: 180



Tree ID: 584  
Photo: 181



Tree ID: 584  
Photo: 182



Tree ID: 585  
Photo: 183



Tree ID: 609  
Photo: 184



Tree ID: 611  
Photo: 185



Tree ID: 633  
Photo: 188



Tree ID: 636  
Photo: 189



Tree ID: 648  
Photo: 190



Tree ID: 675  
Photo: 193



Tree ID: 676  
Photo: 194



Tree ID: 677  
Photo: 195

Figure 15 Continued.

## 5. Summary

### 5.1. Vegetation, Threatened and Priority Flora and Ecological Communities

The scope for this survey was to provide the client with information on flora and vegetation types present and any potential threatened flora species or TECs present within the survey area. The survey area is comprised of six vegetation types. Of these six vegetation types three are associated with the Marbellup Flats, which is a South Coast Significant Wetland.

A total of 141 species were identified during the survey including 123 native and 18 introduced species. As some of the threatened species were not in their flowering period a risk assessment was carried out on the likelihood of the species presence, with those deemed unlikely to occur in the area due to unsuitable habitat (e.g. soil types, vegetation density etc). Of the 17 DRF and 41 Priority species potentially occurring in the area, none were found to be present. Based on the existing concept design the remnant vegetation areas will not be undergoing any development.

The vegetation complexes identified within the survey area do not meet the key diagnostic features of the two TECs potentially occurring in the area. As there were no threatened flora or TECs identified within the survey area, there are no constraints to threatened species subject to the *Wildlife Conservation Act 1950*.

Remnant vegetation condition within the survey area ranged from Completely Degraded to Pristine. Stands of isolated paddock trees within existing agricultural areas have been classified as Completely Degraded. Vegetation within the road reserves are both Excellent and Very Good. The majority of the vegetation in the western remnant is Pristine, and vegetation surrounding and within the creekline is Pristine and Very Good.

### 5.2. Fauna (including threatened)

The scope for this survey was to provide the client with information on fauna (including threatened) within the survey area and likelihood of habitat utilisation. The potential species list (Table 7) outlines presence / absence of species and outlines species that are unlikely to be present due to lack of suitable habitat (Table 7). The overall value of the habitat of the survey area is considered as high, due to the types of vegetation present and the associated fauna habitat, local and regional connectivity and for supporting both known and potential habitat values for conservation significant fauna species.

A total of 40 species were detected over 44 survey hours of these three introduced species were detected throughout the survey; *Felis catus* (Cat), *Vulpes Vulpes* (Red Fox) and *Oryctolagus cuniculus* (Rabbit). There is a high level of fox activity across the site, which may be a limiting factor to the presence of some mammal species. There was a high level of non-threatened bird activity throughout the site as evidenced through the number of species (27) observed. Multiple nests and hollows for non-threatened bird species such as: *Cracticus tibicen* (Australian Magpie), *Eolophus roseicapillus* (Galah), *Grallina cyanoleuca* (Magpie Lark) and *Purpureicephalus spurius* (Red Capped Parrot) were detected throughout the site. The subject site also provides suitable habitat for *Macropus fuliginosus* (Western Grey Kangaroo), *Rattus fuscipes* (Bush Rat) and *Trichosurus vulpecula* (Brush-tail Possum). Multiple hollows likely being utilised by *Trichosurus vulpecula* were identified across the survey area.

Threatened species found within the survey area include *Calyptorhynchus banksii subsp. naso* (Forest Red-tailed Black Cockatoo), *Calyptorhynchus baudinii* (Baudin's Cockatoo), *Isoodon obesulus fusciventer* (Quenda), and *Notamacropus irma* (Brush Wallaby). The most important habitats for these species are the creek line vegetation, the surrounding remnant vegetation associated with the creek (situated along the southern boundary) and the roadside vegetation along the northern boundary. This is evident through the identification of runnels, scats, diggings, significant tress with hollows and Black Cockatoo feed signs. There was some anecdotal evidence of activity in the western remnant vegetation for *Isoodon obesulus fusciventer*, however activity levels were not significantly high. The creek system holds high habitat value for *Isoodon obesulus fusciventer*, and *Notamacropus Irma*,

Potential habitat for threatened species within the survey area includes all remnant vegetation within the site, the creek system and the larger stands of paddock trees throughout the paddock areas. There is a high level of fauna activity in vegetation surrounding the creek line from both threatened and non-threatened fauna species as well as the highest occurrence of significant trees that contain hollows. This indicates that the area contains highly attractive habitat for fauna.



There is suitable habitat for *Galaxiella munda* (Western Mud Minnow) and *Galaxiella nigrostriatal* (Black-stripe Minnow) and *Lepidogalaxias salamandroides* (Salamanderfish) within the creek system. If any development or habitat modification in the creek area is proposed in the future, a targeted trapping survey would need to be undertaken to identify the occurrence of these species.

Under the definitions defined in the Black Cockatoo Referral Guidelines (DSEWPaC, 2012) individual trees of *Eucalyptus marginata*, *Corymbia calophylla*, *Eucalyptus staeri*, *Allocasuarina fraseriana* could be considered potential breeding, roosting and foraging trees. The vegetation throughout the survey area contained potential feed tree species for each of the three Black Cockatoos, including: *Eucalyptus marginata*, *Corymbia calophylla*, *Eucalyptus staeri*, *Allocasuarina fraseriana* and other Proteaceous species (DoE; 2017b, 2017c, 2017d).

The southern pocket of Jarrah / Marri remnant vegetation had the highest occurrences of *Calyptorhynchus banksii* subsp. *naso* and *Calyptorhynchus baudinii*, feeding signs. The majority of feeding evidence consisted of *Corymbia calophylla* nuts. As the number of significant Black Cockatoo feeding sites across the survey area was relatively low this indicates that although the site contains potential high value foraging habitat for the three species it is currently not a favoured feeding area. The presence of significant feeding signs in the remnant vegetation in the south appears to indicate this area is anecdotally more attractive for food than the other vegetated areas. Clearing of trees is not recommended and significant trees that contain active hollows or future Black Cockatoo hollows should be retained.

The vegetation types / wildlife habitat present within the survey area are well represented locally and in nearby reserves. The Jarrah / Marri dominated woodland and forest present are one of the most abundant habitat types present within the ARVS survey area, providing a significant proportion of wildlife habitat. The *Homalospermum* and *Callistemon* dominated thickets present with the survey area are not as common at a regional level based on ARVS mapping. However, these habitat types are well represented in surrounding remnant vegetation and nearby reserves such as the Down Road Nature Reserve.

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**7.** Appendices

Appendix A – Survey Area and Current Proposed Concept design

Appendix B – Database Searches

Appendix C - Relevé Datasheets

Appendix D – Significant Trees

Appendix A

Survey Area and Current Proposed Concept design



REPORT ITEM DIS245 REFERS



29 Hercules Crescent  
Albany, WA 6330  
Australia  
Tel: 08 9842 1575  
Fax: 08 9842 1575



Overview Map Scale 1:100,000

Legend

- Subject Site
- Cadastre
- 5m Contours



Scale  
1:8,500 @ A3  
GDA MGA 94 Zone 50

Data Sources  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

CLIENT  
City of Albany  
C/o Matt Thompson  
PO Box 484  
Albany, WA 6331

Survey Area

Assessor	QA Check <b>KK</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>MSC0137-002</b>	DATE <b>26/11/2018</b>





Appendix B

Database Searches

# NatureMap Flora Species Report 15Km

Created By Guest user on 19/10/2018

Current Names Only Yes

Core Datasets Only Yes

Method 'By Line'

Vertices 34° 55' 51" S,117° 44' 06" E 34° 55' 28" S,117° 45' 08" E 34° 56' 07" S,117° 45' 08" E 34° 56'

Group By 24° S,117° 43' 39" E 34° 56' 06" S,117° 43' 29" E 34° 55' 51" S,117° 44' 09" E

Family

Family	Species	Records
Acanthizidae	8	1520
Accipitridae	14	376
Acrobolbaceae	1	5
Actinopodidae	4	20
Aegothelidae	1	9
Aeshnidae	1	2
Agamidae	1	1
Agapanthaceae	1	2
Aizoaceae	1	1
Alariaceae	1	1
Alliaceae	1	1
Amaranthaceae	2	2
Amaryllidaceae	1	1
Amphisopodidae	1	1
Anapidae	1	2
Anarthriaceae	6	36
Anatidae	13	836
Ancylidae	1	3
Anhingidae	1	14
Anthracoideaceae	1	1
Apiaceae	10	47
Apocynaceae	1	1
Apodidae	1	2
Aracanidae	3	3
Araceae	2	3
Araliaceae	7	12
Araneidae	6	55
Archaeidae	1	20
Ardeidae	7	285
Argiolestidae	1	2
Arkyidae	2	3
Artamidae	2	105
Asparagaceae	26	82
Aspleniaceae	1	4
Asteraceae	40	61
Atherinidae	2	2
Atrichornithidae	1	1
Baetidae	1	2
Balaenopteridae	1	1
Bathysauridae	1	5
Belonidae	1	15
Berycidae	1	1
Boidae	1	4
Boraginaceae	2	2
Boryaceae	2	3
Bothriuridae	1	3
Brassicaceae	7	9
Bryaceae	3	3
Burramyidae	1	5
Cacatuidae	1	112
Caddidae	1	3
Caenidae	1	15
Callanthiidae	1	2
Callionymidae	1	1
Campanulaceae	7	23
Campephagidae	1	236
Candelariaceae	4	6
Canidae	1	1
Caprifoliaceae	2	2
Caprimulgidae	1	1
Carangidae	3	5
Carcharhinidae	2	2
Caryophyllaceae	5	7
Casuaridae	1	6
Casuarinaceae	2	6
Caulerpaceae	1	1
Ceinidae	1	10
Centrolepidaceae	8	20
Cephalotaceae	1	7
Cephalozellaceae	1	1
Ceratiidae	1	1
Ceratopogonidae	1	9
Charadriidae	8	82
Cheilodactylidae	1	1
Cheloniidae	1	1
Cheluidae	1	5
Chenopodiaceae	5	9

Chernetidae	1	1
Chironemidae	2	2
Chironomidae	3	67
Cladoniaceae	16	40
Clinidae	3	5
Clupeidae	2	7
Coccocarpiaceae	1	1
Coenagrionidae	1	5
Colchicaceae	2	7
Columbidae	5	515
Congiopodidae	1	1
Congridae	1	1
Convolvulaceae	1	1
Corduliidae	1	1
Corixidae	1	7
Cortinariaceae	1	1
Corvidae	2	553
Cracticidae	4	690
Cuculidae	4	158
Culicidae	1	3
Cupressaceae	1	1
Cyperaceae	60	164
Cyprididae	2	5
Cypridopsidae	1	4
Dasyatidae	1	1
Dasyornithidae	1	1
Dasyogonaceae	5	23
Dasyuridae	5	27
Delphinidae	2	4
Dennstaedtiaceae	1	2
Desidae	3	4
Dicaeidae	1	1
Dicranaceae	3	7
Dicruridae	4	1299
Dilleniaceae	16	36
Dinolestidae	1	2
Diodontidae	2	4
Diomedelidae	2	2
Droseraceae	25	49
Dugesidae	1	1
Dytiscidae	1	17
Echeneidae	1	1
Ecnomidae	1	14
Elaeocarpaceae	7	31
Elaphomycetaceae	2	2
Elapidae	7	23
Elopidae	1	1
Empididae	1	1
Engraulidae	1	7
Ephyridae	1	1
Ericaceae	50	305
Estrilidae	1	295
Euphorbiaceae	7	14
Exocoetidae	1	1
Fabaceae	136	489
Falconidae	8	116
Fissidentaceae	1	1
Funariaceae	1	2
Galaxiidae	4	28
Garypidae	1	1
Garypinidae	1	1
Gekkonidae	1	23
Gelastocoridae	1	2
Gelidiaceae	1	2
Gempylidae	1	1
Gentianaceae	3	3
Geotriidae	1	3
Geraniaceae	3	6
Gerreidae	1	2
Girellidae	1	1
Glossiphoniidae	1	3
Gnaphosidae	1	1
Gnathanacanthidae	1	1
Gobiidae	3	7
Gomphidae	1	4
Goodeniaceae	15	67
Gordiidae	1	1
Graphidaceae	1	3
Gripopterygidae	1	4
Gyrinidae	1	2
Gyrostemonaceae	1	2
Haematopodidae	2	22
Haemodoraceae	16	50
Halcyonidae	3	468
Halimedaceae	1	1
Haloragaceae	7	10
Hebridae	1	1
Hemerocallidaceae	10	25
Hemicorduliidae	1	5
Heterodontidae	1	3
Hirundinidae	3	527
Hydatellaceae	1	7
Hydraenidae	1	1
Hydrobiosidae	1	1
Hydrometridae	1	3
Hydrophilidae	1	12
Hydropsychidae	1	8
Hydroptilidae	1	3
Hylidae	2	8
Hypnidae	1	2
Hyriidae	1	1
Icmadophilaceae	1	1
Idiopidae	1	4
Iridaceae	18	29
Istiophoridae	1	1

Iulomorphidae	2	19
Ixodidae	1	1
Juncaceae	8	21
Juncaginaceae	1	1
Kyphosidae	1	1
Labridae	5	13
Lamiaceae	6	15
Lamniidae	1	1
Lamponidae	5	12
Laridae	6	158
Lauraceae	6	18
Lecanoraceae	4	5
Lecideaceae	2	2
Lentibulariaceae	3	7
Lepidogalaxiidae	1	1
Lepidoziaceae	1	2
Leporidae	1	1
Leptoceridae	1	16
Leptophlebiidae	1	3
Liagoraceae	1	1
Libellulidae	1	2
Lichinaceae	1	1
Limnodynastidae	2	59
Linaceae	2	2
Lindsaeaceae	1	4
Lobariaceae	1	2
Loganiaceae	6	23
Lophocoleaceae	2	11
Lophotidae	1	1
Loranthaceae	1	1
Lycopodiaceae	1	4
Lycosidae	5	30
Macropodidae	3	9
Maluridae	5	961
Malvaceae	9	25
Megalariaceae	1	2
Melanostomiidae	1	1
Meliphagidae	12	1735
Menyanthaceae	3	17
Mesophelliaceae	1	2
Micropholcommatidae	2	3
Mimetidae	1	1
Miturgidae	1	1
Molidae	1	6
Molossidae	1	1
Monacanthidae	13	23
Monoscutidae	1	3
Moridae	2	3
Motacillidae	2	4
Mugilidae	1	1
Mullidae	1	1
Muraenidae	2	2
Muridae	5	75
Mycoblastaceae	2	2
Myobatrachidae	6	75
Myrtaceae	83	361
Nannoperциidae	2	22
Nemesiidae	1	84
Neobalaenidae	1	1
Neosebasteidae	1	2
Neosittidae	2	22
Nomeidae	1	1
Notonectidae	1	2
Odacidae	2	2
Odontaspidae	1	1
Olacaceae	2	6
Oligochaeta	1	22
Onagraceae	2	6
Ophichthidae	2	8
Oplegnathidae	1	1
Orchidaceae	92	216
Orectolobidae	2	2
Orobanchaceae	3	6
Orsolobidae	2	48
Orthotrichaceae	1	1
Ostraciidae	1	1
Otariidae	3	4
Otididae	1	4
Oxalidaceae	2	3
Pachycephalidae	7	395
Palaemonidae	1	7
Pannariaceae	2	5
Papaveraceae	2	3
Paradoxosomatidae	1	9
Pararchaeidae	1	1
Parascylliidae	1	1
Parastacidae	4	34
Pardalotidae	4	182
Parmeliaceae	23	51
Passeridae	1	7
Patacidae	1	1
Pegasidae	1	2
Pelecanidae	1	150
Pelecanoididae	1	1
Pempheridae	1	1
Pentacerotidae	1	1
Peramelidae	1	35
Percichthyidae	4	43
Percidae	1	1
Peronosporaceae	1	46
Perthidae	1	11
Pertusariaceae	1	1
Petroicidae	5	372
Phalacrocoracidae	5	193
Phalangeridae	1	3

Phasianidae	4	37
Philydraceae	1	1
Phreatoicidae	1	1
Phyllanthaceae	4	7
Physciaceae	2	2
Physeteridae	1	6
Physidae	1	3
Phytolaccaceae	1	2
Pinguipedidae	1	1
Pittosporaceae	6	51
Planorbidae	1	2
Plantaginaceae	7	8
Platycephalidae	1	1
Plesiopidae	1	1
Pleuronectidae	1	1
Plotosidae	1	1
Poaceae	52	85
Podargidae	2	18
Podicipedidae	4	68
Poeciliidae	1	2
Polycentropodidae	1	1
Polygalaceae	8	25
Polygonaceae	6	12
Pomatostomidae	1	1
Potamogetonaceae	1	1
Potoroidae	1	3
Pottiaceae	3	7
Primulaceae	3	6
Pristiophoridae	1	1
Procellariidae	4	6
Prodidomidae	2	3
Proteaceae	105	612
Pseudocheiridae	1	176
Psittacidae	15	1700
Psittaculidae	1	1
Pteridaceae	1	1
Pygopodidae	2	5
Pyralidae	1	1
Racopilaceae	1	1
Rajidae	1	1
Rallidae	11	213
Ramalinaceae	2	2
Ranunculaceae	2	4
Recurvirostridae	3	28
Resedaceae	1	1
Restionaceae	31	130
Rhamnaceae	4	12
Rhinobatidae	1	1
Rhizocarpaceae	1	1
Rosaceae	2	6
Rubiaceae	2	7
Russulaceae	1	2
Rutaceae	21	118
Santalaceae	9	31
Sapindaceae	1	7
Scincidae	11	69
Sciomyzidae	1	1
Scolopacidae	10	44
Scolopendridae	2	10
Scomberesocidae	1	1
Scombridae	3	3
Scorpididae	1	2
Scrophulariaceae	1	1
Scyliorhinidae	2	3
Sebastidae	1	1
Selaginellaceae	1	1
Sematophyllaceae	1	5
Serranidae	4	6
Sillaginidae	2	31
Simuliidae	1	14
Siphonocladaceae	1	2
Siphonotidae	1	1
Solanaceae	4	4
Soleidae	3	3
Sparassidae	2	5
Sphaeriidae	1	1
Spheniscidae	1	19
Sphyracnidae	1	1
Sphyrnidae	1	1
Stereocaulaceae	1	1
Stratiomyidae	1	2
Sturmidae	2	5
Stylidiaceae	38	154
Sulidae	1	6
Sylviidae	4	51
Syngnathidae	7	36
Synodontidae	2	2
Synthemistidae	1	2
Talitridae	1	1
Tarsipedidae	1	64
Telephlebiidae	1	5
Teloschistaceae	7	10
Tetragnathidae	2	2
Tetraodontidae	3	3
Tetrarogidae	1	2
Threskiornithidae	3	239
Thuidiaceae	2	3
Thylacomyidae	1	1
Thymelaeaceae	12	47
Tipulidae	1	10
Triakidae	3	5
Triglidae	2	7
Tripterygiidae	1	6
Trombidiformes	1	12
Turnicidae	2	15

Tytonidae	3	11
Uranoscopidae	2	4
Urodacidae	1	4
Urolophidae	4	10
Usneaceae	4	11
Varanidae	1	1
Veliferidae	1	1
Veliidae	1	10
Verbenaceae	1	1
Vespertilionidae	5	17
Xanthorrhoeaceae	2	2
Xyridaceae	3	20
Zamiaceae	1	3
Zeidae	1	5
Ziphiidae	1	1
Zodariidae	2	16
Zoridae	1	1
Zosteropidae	1	496
<b>TOTAL</b>	<b>1778</b>	<b>21267</b>

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
<b>Acanthizidae</b>				
1.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
2.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
3.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
4.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
5.	24271 <i>Gerygone fusca</i> subsp. <i>fusca</i> (Western Gerygone)			
6.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
7.	24279 <i>Sericornis frontalis</i> subsp. <i>maculatus</i> (White-browed Scrubwren)			
8.	30948 <i>Smicromis brevirostris</i> (Weebill)			
<b>Accipitridae</b>				
9.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
10.	24281 <i>Accipiter cirrocephalus</i> subsp. <i>cirrocephalus</i> (Collared Sparrowhawk)			
11.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
12.	24282 <i>Accipiter fasciatus</i> subsp. <i>fasciatus</i> (Brown Goshawk)			
13.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
14.	24288 <i>Circus approximans</i> (Swamp Harrier)			
15.	24289 <i>Circus assimilis</i> (Spotted Harrier)			
16.	<i>Elanus axillaris</i>			
17.	24290 <i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
18.	24293 <i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)			
19.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
20.	47965 <i>Hieraaetus morphnoides</i> (Little Eagle)			
21.	<i>Lophoictinia isura</i>			
22.	48591 <i>Pandion cristatus</i> (Osprey, Eastern Osprey)		IA	
<b>Acrobolbaceae</b>				
23.	<i>Lethocolea pansa</i>			
<b>Actinopodidae</b>				
24.	<i>Missulena granulosa</i>			
25.	<i>Missulena hoggi</i>			
26.	<i>Missulena occatoria</i>			
27.	<i>Missulena torbayensis</i>			
<b>Aegothelidae</b>				
28.	25544 <i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
<b>Aeshnidae</b>				
29.	<i>Aeshnidae</i> sp.			
<b>Agamidae</b>				
30.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
<b>Agapanthaceae</b>				
31.	18380 <i>Agapanthus praecox</i> subsp. <i>orientalis</i>	Y		Y
<b>Aizoaceae</b>				
32.	2794 <i>Carpobrotus aequilaterus</i> (Angular Pigface)	Y		
<b>Alariaceae</b>				
33.	26805 <i>Ecklonia radiata</i>			
<b>Alliaceae</b>				
34.	1375 <i>Allium neapolitanum</i> (Naples Onion)	Y		
<b>Amaranthaceae</b>				
35.	2655 <i>Amaranthus albus</i> (Tumbleweed)	Y		
36.	2668 <i>Amaranthus powellii</i> (Powell's Amaranth)	Y		
<b>Amaryllidaceae</b>				
37.	44496 <i>Narcissus tazetta</i> subsp. <i>italicus</i>	Y		
<b>Amphisopodidae</b>				
38.	<i>Amphisopodidae</i> sp.			
<b>Anapidae</b>				
39.	<i>Chasmocephalon flinders</i>			
<b>Anarthriaceae</b>				
40.	1058 <i>Anarthria gracilis</i>			
41.	1060 <i>Anarthria laevis</i>			
42.	1062 <i>Anarthria prolifera</i>			
43.	1063 <i>Anarthria scabra</i>			
44.	1097 <i>Lyginia barbata</i>			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
45.	18049 <i>Lyginia imberbis</i>			
<b>Anatidae</b>				
46.	24310 <i>Anas castanea</i> (Chestnut Teal)			
47.	24312 <i>Anas gracilis</i> (Grey Teal)			
48.	24313 <i>Anas platyrhynchos</i> (Mallard)			
49.	24315 <i>Anas rhynchotis</i> (Australasian Shoveler)			
50.	25550 <i>Anas rhynchotis subsp. rhynchotis</i> (Australasian Shoveler)			
51.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
52.	24318 <i>Aythya australis</i> (Hardhead)			
53.	24319 <i>Biziura lobata</i> (Musk Duck)			
54.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
55.	24322 <i>Cygnus atratus</i> (Black Swan)			
56.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
57.	24328 <i>Oxyura australis</i> (Blue-billed Duck)		P4	
58.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
<b>Ancylidae</b>				
59.	<i>Ancylidae</i> sp.			
<b>Anhingidae</b>				
60.	47414 <i>Anhinga novaehollandiae</i> (Australasian Darter)			
<b>Anthracoidaceae</b>				
61.	45801 <i>Moreaua evandrae</i>			
<b>Apiaceae</b>				
62.	6203 <i>Actinotus glomeratus</i>			
63.	6206 <i>Actinotus omnifertilis</i>			
64.	6214 <i>Centella asiatica</i>			
65.	6218 <i>Daucus glochidiatus</i> (Australian Carrot)			
66.	6249 <i>Platysace compressa</i> (Tapeworm Plant)			
67.	6253 <i>Platysace filiformis</i>			
68.	6263 <i>Schoenolaena juncea</i>			
69.	6292 <i>Xanthosia rotundifolia</i> (Southern Cross)			
70.	6293 <i>Xanthosia singuliflora</i>			
71.	19330 <i>Xanthosia tasmanica</i>			
<b>Apocynaceae</b>				
72.	6565 <i>Alyxia buxifolia</i> (Dysentery Bush)			
<b>Apodidae</b>				
73.	25554 <i>Apus pacificus</i> (Fork-tailed Swift, Pacific Swift)		IA	
<b>Aracnidae</b>				
74.	<i>Aracana aurita</i>			
75.	<i>Caprichthys gymnura</i>			
76.	<i>Capropygia unistriata</i>			
<b>Araceae</b>				
77.	17659 <i>Alocasia brisbanensis</i>	Y		
78.	1049 <i>Zantedeschia aethiopica</i> (Arum Lily)	Y		
<b>Araliaceae</b>				
79.	18297 <i>Hedera helix</i>	Y		
80.	6223 <i>Hydrocotyle alata</i>			
81.	6226 <i>Hydrocotyle callicarpa</i> (Small Pennywort)			
82.	6229 <i>Hydrocotyle diantha</i>			
83.	19041 <i>Trachymene coerulea subsp. coerulea</i>			
84.	6279 <i>Trachymene ornata</i> (Spongefruit)			
85.	6280 <i>Trachymene pilosa</i> (Native Parsnip)			
<b>Araneidae</b>				
86.	<i>Arachnura higginsi</i>			
87.	<i>Araneus cyphoxis</i>			
88.	<i>Araneus senicaudatus</i>			
89.	<i>Austracantha minax</i>			
90.	<i>Backobourkia heroine</i>			
91.	<i>Nephila edulis</i>			
<b>Archaeidae</b>				
92.	42361 <i>Zephyrarchaea mainae</i> (Main's assassin spider)		T	
<b>Ardeidae</b>				
93.	25558 <i>Ardea ibis</i> (Cattle Egret)			
94.	41324 <i>Ardea modesta</i> (great egret, white egret)			
95.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			



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96.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
97.	24345 <i>Botaurus poiciloptilus</i> (Australasian Bittern)		T	
98.	<i>Egretta novaehollandiae</i>			
99.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
<b>Argiolestidae</b>				
100.	<i>Megapodagrionidae</i> sp.			
<b>Arkyidae</b>				
101.	<i>Arkys alticephala</i>			
102.	<i>Arkys walckenaeri</i>			
<b>Artamidae</b>				
103.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
104.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
<b>Asparagaceae</b>				
105.	1201 <i>Asparagus officinalis</i> (Asparagus)	Y		
106.	1302 <i>Laxmannia jamesii</i> (James' Paperlily)		P4	
107.	1304 <i>Laxmannia minor</i>			
108.	11464 <i>Laxmannia sessiliflora</i> subsp. <i>australis</i>			
109.	<i>Laxmannia</i> sp.			
110.	1222 <i>Lomandra brittanii</i>			
111.	1223 <i>Lomandra caespitosa</i> (Tufted Mat Rush)			
112.	1225 <i>Lomandra drummondii</i>			
113.	1229 <i>Lomandra integra</i>			
114.	14542 <i>Lomandra micrantha</i> subsp. <i>micrantha</i>			
115.	1234 <i>Lomandra nigricans</i>			
116.	1238 <i>Lomandra pauciflora</i>			
117.	1239 <i>Lomandra preissii</i>			
118.	1240 <i>Lomandra purpurea</i> (Purple Mat Rush)			
119.	1243 <i>Lomandra sericea</i> (Silky Mat Rush)			
120.	1244 <i>Lomandra sonderi</i>			
121.	1246 <i>Lomandra suaveolens</i>			
122.	1328 <i>Thysanotus dichotomus</i> (Branching Fringe Lily)			
123.	1333 <i>Thysanotus glaucifolius</i>			
124.	1335 <i>Thysanotus gracilis</i>			
125.	1336 <i>Thysanotus isantherus</i>		P4	
126.	1339 <i>Thysanotus multiflorus</i> (Many-flowered Fringe Lily)			
127.	1345 <i>Thysanotus pseudojunceus</i>			
128.	1351 <i>Thysanotus sparteus</i>			
129.	1356 <i>Thysanotus teretifolius</i>			
130.	1357 <i>Thysanotus thyrsoides</i>			
<b>Aspleniaceae</b>				
131.	61 <i>Asplenium aethiopicum</i> (Forked Spleenwort)			
<b>Asteraceae</b>				
132.	7851 <i>Asteridea pulverulenta</i> (Common Bristle Daisy)			
133.	7871 <i>Brachyscome ciliaris</i>			
134.	7909 <i>Carduus pycnocephalus</i> (Slender Thistle)	Y		
135.	7939 <i>Conyza bonariensis</i> (Flaxleaf Fleabane)	Y		
136.	20074 <i>Conyza sumatrensis</i>	Y		
137.	7943 <i>Cotula australis</i> (Common Cotula)			
138.	7945 <i>Cotula coronopifolia</i> (Waterbuttons)	Y		
139.	13354 <i>Craspedia variabilis</i>			
140.	7961 <i>Dittrichia graveolens</i> (Stinkwort)	Y		
141.	7962 <i>Dittrichia viscosa</i>	Y		
142.	9352 <i>Hypochoeris radicata</i> (Flat Weed, Cats-ear)	Y		
143.	8092 <i>Ixiolaena viscosa</i> (Sticky Ixiolaena)			
144.	8099 <i>Leontodon saxatilis</i> (Hairy Hawkbit)	Y		
145.	8127 <i>Olearia axillaris</i> (Coastal Daisybush)			
146.	8131 <i>Olearia ciliata</i> (Fringed Daisy Bush)			
147.	8133 <i>Olearia elaeophila</i>			
148.	8149 <i>Olearia rudis</i> (Rough Daisybush)			
149.	44401 <i>Olearia</i> sp. <i>Eremicola</i> (Diels & Pritzel s.n. PERTH 00449628)			
150.	42281 <i>Pithocarpa cordata</i>			
151.	8165 <i>Pithocarpa pulchella</i> (Beautiful Pithocarpa)			
152.	18352 <i>Pithocarpa pulchella</i> var. <i>melanostigma</i>			
153.	8175 <i>Podolepis gracilis</i> (Slender Podolepis)			
154.	8182 <i>Pododthea angustifolia</i> (Sticky Longheads)			
155.	8184 <i>Pododthea gnaphalioides</i> (Golden Long-heads)			
156.	8622 <i>Reichardia picroides</i>	Y		Y

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157.	13300 <i>Rhodanthe citrina</i>			
158.	20665 <i>Senecio angulatus</i>	Y		
159.	8204 <i>Senecio elegans</i> (Purple Groundsel)	Y		
160.	13554 <i>Senecio glastifolius</i>	Y		
161.	8215 <i>Senecio minimus</i> (Toothed Fireweed)			
162.	20663 <i>Senecio multicaulis</i> subsp. <i>multicaulis</i>			
163.	8218 <i>Senecio ramosissimus</i> (Auricled Groundsel)			
164.	8220 <i>Senecio vulgaris</i> (Common Groundsel)	Y		
165.	9367 <i>Sonchus hydrophilus</i> (Native Sowthistle)			
166.	8231 <i>Sonchus oleraceus</i> (Common Sowthistle)	Y		
167.	25902 <i>Symphotrichum squamatum</i> (Bushy Starwort)	Y		
168.	45613 <i>Taraxacum khatoonae</i>	Y		
169.	8251 <i>Trichocline spathulata</i> (Native Gerbera)			
170.	38388 <i>Ursinia anthemoides</i> subsp. <i>anthemoides</i>	Y		
171.	8257 <i>Vellereophyton dealbatum</i> (White Cudweed)	Y		
<b>Atherinidae</b>				
172.	<i>Atherinosoma</i> sp.			
173.	<i>Atherinosoma wallacei</i>			
<b>Atrichornithidae</b>				
174.	24358 <i>Atrichornis clamosus</i> (Noisy Scrub-bird, tjimiluk)		T	
<b>Baetidae</b>				
175.	<i>Baetidae</i> sp.			
<b>Balaenopteridae</b>				
176.	24048 <i>Balaenoptera musculus</i> subsp. <i>brevicauda</i> (Pygmy Blue Whale)		T	
<b>Bathysauridae</b>				
177.	<i>Saurida tumbil</i>			
<b>Belonidae</b>				
178.	? ?			
<b>Berycidae</b>				
179.	<i>Centroberyx gerrardi</i>			
<b>Boidae</b>				
180.	25240 <i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)			
<b>Boraginaceae</b>				
181.	6681 <i>Echium plantagineum</i> (Paterson's Curse)	Y		
182.	31013 <i>Halgania anagaloides</i> var. <i>Southern</i> (A.E. Orchard 1609)			
<b>Boryaceae</b>				
183.	1271 <i>Borya nitida</i> (Pincushions)			
184.	1273 <i>Borya sphaerocephala</i> (Pincushions)			
<b>Bothriuridae</b>				
185.	<i>Cercophonius sulcatus</i>			
<b>Brassicaceae</b>				
186.	2999 <i>Brassica rapa</i>	Y		
187.	2994 <i>Brassica x juncea</i> (Indian Mustard)	Y		
188.	3002 <i>Cakile maritima</i> (Sea Rocket)	Y		
189.	19989 <i>Lepidium didymum</i>	Y		
190.	3027 <i>Lepidium foliosum</i> (Leafy Peppergrass)			
191.	3061 <i>Raphanus raphanistrum</i> (Wild Radish)	Y		
192.	3068 <i>Sinapis arvensis</i> (Charlock)	Y		
<b>Bryaceae</b>				
193.	32417 <i>Ptychostomum angustifolium</i>			
194.	32424 <i>Rosulabryum albolimbatum</i>			
195.	32426 <i>Rosulabryum campylotheicum</i>			
<b>Burramyidae</b>				
196.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
<b>Cacatuidae</b>				
197.	<i>Eolophus roseicapillus</i>			
<b>Caddidae</b>				
198.	<i>Hesperopilio mainae</i>			
<b>Caenidae</b>				
199.	<i>Caenidae</i> sp.			
<b>Callanthiidae</b>				

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200.	<i>Callanthias australis</i>			
<b>Callionymidae</b>				
201.	<i>Foetorepus calauropomus</i>			
<b>Campanulaceae</b>				
202.	7396 <i>Isotoma hypocrateriformis</i> (Woodbridge Poison)			
203.	7399 <i>Isotoma scapigera</i> (Long-scaped Isotome)			
204.	9289 <i>Lobelia anceps</i> (Angled Lobelia)			
205.	7403 <i>Lobelia heterophylla</i> (Wing-seeded Lobelia)			
206.	7405 <i>Lobelia rarifolia</i>			
207.	7406 <i>Lobelia rhombifolia</i> (Tufted Lobelia)			
208.	37440 <i>Monopsis debilis</i> var. <i>depressa</i>	Y		
<b>Campephagidae</b>				
209.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
<b>Candelariaceae</b>				
210.	27641 <i>Candelaria concolor</i>			
211.	27642 <i>Candelariella antennaria</i>			
212.	<i>Candelariella</i> sp.			
213.	27644 <i>Candelariella xanthostigma</i>			
<b>Canidae</b>				
214.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		
<b>Caprifoliaceae</b>				
215.	35322 <i>Centranthus ruber</i> subsp. <i>ruber</i>	Y		
216.	7365 <i>Lonicera japonica</i> (Japanese Honeysuckle)	Y		
<b>Caprimulgidae</b>				
217.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
<b>Carangidae</b>				
218.	<i>Naucrates ductor</i>			
219.	<i>Seriola lalandi</i>			
220.	<i>Trachurus declivis</i>			
<b>Carcharhinidae</b>				
221.	<i>Carcharhinus obscurus</i>			
222.	<i>Prionace glauca</i>			
<b>Caryophyllaceae</b>				
223.	19825 <i>Petrorhagia dubia</i>	Y		
224.	15972 <i>Silene gallica</i> var. <i>gallica</i>	Y		
225.	11803 <i>Silene gallica</i> var. <i>quinquevulnera</i>	Y		
226.	2912 <i>Spergula arvensis</i> (Corn Spurry)	Y		
227.	2918 <i>Stellaria media</i> (Chickweed)	Y		
<b>Casuariidae</b>				
228.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
<b>Casuarinaceae</b>				
229.	1728 <i>Allocasuarina fraseriana</i> (Sheoak, Kondil)			
230.	1732 <i>Allocasuarina humilis</i> (Dwarf Sheoak)			
<b>Caulerpaceae</b>				
231.	26573 <i>Caulerpa racemosa</i>			
<b>Ceinidae</b>				
232.	<i>Ceinidae</i> sp.			
<b>Centrolepidaceae</b>				
233.	1116 <i>Aphelia brizula</i>			
234.	1117 <i>Aphelia cyperoides</i>			
235.	43548 <i>Aphelia</i> sp. Albany (B.G. Briggs 596)			
236.	1121 <i>Centrolepis aristata</i> (Pointed Centrolepis)			
237.	1123 <i>Centrolepis caespitosa</i>		P4	
238.	1129 <i>Centrolepis glabra</i> (Smooth Centrolepis)			
239.	1132 <i>Centrolepis mutica</i>			
240.	13125 <i>Centrolepis strigosa</i> subsp. <i>strigosa</i>			
<b>Cephalotaceae</b>				
241.	3148 <i>Cephalotus follicularis</i> (Albany Pitcher Plant)			
<b>Cephaloziellaceae</b>				
242.	<i>Cephaloziella exiliflora</i>			
<b>Ceratiidae</b>				

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
243.	<i>Ceratias tentaculatus</i>			
<b>Ceratopogonidae</b>				
244.	<i>Ceratopogonidae</i> sp.			
<b>Charadriidae</b>				
245.	25575 <i>Charadrius leschenaultii</i> (Greater Sand Plover)		IA	
246.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
247.	47937 <i>Eiseyornis melanops</i> (Black-fronted Dotterel)			
248.	24379 <i>Erythrogonys cinctus</i> (Red-kneed Dotterel)			
249.	24382 <i>Pluvialis fulva</i> (Pacific Golden Plover)		IA	
250.	24383 <i>Pluvialis squatarola</i> (Grey Plover)		IA	
251.	48135 <i>Thinornis rubricollis</i> (Hooded Plover, Hooded Dotterel)		P4	
252.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
<b>Cheilodactylidae</b>				
253.	<i>Nemadactylus macropterus</i>			
<b>Cheloniidae</b>				
254.	25335 <i>Caretta caretta</i> (Loggerhead Turtle)		T	
<b>Cheluidae</b>				
255.	43380 <i>Chelodina colliei</i> (South-western Snake-necked Turtle)			
<b>Chenopodiaceae</b>				
256.	2471 <i>Atriplex prostrata</i> (Hastate Orache)	Y		
257.	33480 <i>Dysphania pumilio</i> (Clammy Goosefoot)			
258.	2578 <i>Rhagodia baccata</i> (Berry Saltbush)			
259.	11341 <i>Rhagodia baccata</i> subsp. <i>baccata</i>			
260.	2639 <i>Suaeda australis</i> (Seablite)			
<b>Chernetidae</b>				
261.	<i>Nesidiochernes slateri</i>			
<b>Chironemidae</b>				
262.	<i>Chironemus georgianus</i>			
263.	<i>Threpterus maculosus</i>			
<b>Chironomidae</b>				
264.	<i>Chironominae</i> sp.			
265.	<i>Orthoclaudiinae</i> sp.			
266.	<i>Tanypodinae</i> sp.			
<b>Cladoniaceae</b>				
267.	27663 <i>Cladia aggregata</i>			
268.	27668 <i>Cladia schizopora</i>			
269.	27671 <i>Cladonia angustata</i>			
270.	27673 <i>Cladonia capitellata</i>			
271.	28205 <i>Cladonia capitellata</i> var. <i>capitellata</i>			
272.	28208 <i>Cladonia cervicornis</i> subsp. <i>verticillata</i>			
273.	27677 <i>Cladonia crispata</i>			
274.	27681 <i>Cladonia glebosa</i>			
275.	27683 <i>Cladonia imbricata</i>			
276.	27684 <i>Cladonia krempelhuberi</i>			
277.	27690 <i>Cladonia praetermissa</i>			
278.	27692 <i>Cladonia rigida</i>			
279.	27693 <i>Cladonia scabriuscula</i>			
280.	27695 <i>Cladonia subradiata</i>			
281.	30457 <i>Notocladonia cochleata</i>			
282.	28071 <i>Thysanothecium scutellatum</i>			
<b>Clinidae</b>				
283.	<i>Cristiceps aurantiacus</i>			
284.	<i>Cristiceps australis</i>			
285.	<i>Heteroclinus roseus</i>			
<b>Clupeidae</b>				
286.	<i>Sardinella lemuru</i> ?			
287.	<i>Sardinops neopilchardus</i>			
<b>Coccocarpiaceae</b>				
288.	27699 <i>Coccocarpia erythroxilli</i>			
<b>Coenagrionidae</b>				
289.	<i>Coenagrionidae</i> sp.			
<b>Colchicaceae</b>				
290.	12770 <i>Burchardia congesta</i>			

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291.	1385 <i>Burchardia multiflora</i> (Dwarf Burchardia)			
<b>Columbidae</b>				
292.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
293.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
294.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
295.	25587 <i>Phaps elegans</i> (Brush Bronzewing)			
296.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
<b>Congiopodidae</b>				
297.	<i>Perryena leucometopon</i>			
<b>Congridae</b>				
298.	<i>Scalanago lateralis</i>			
<b>Convolvulaceae</b>				
299.	13732 <i>Cuscuta campestris</i> (Golden dodder)	Y		
<b>Corduliidae</b>				
300.	<i>Corduliidae</i> sp.			
<b>Corixidae</b>				
301.	<i>Corixidae</i> sp.			
<b>Cortinariaceae</b>				
302.	41681 <i>Cortinarius basipurpureus</i>			
<b>Corvidae</b>				
303.	25592 <i>Corvus coronoides</i> (Australian Raven)			
304.	24417 <i>Corvus coronoides</i> subsp. <i>perplexus</i> (Australian Raven)			
<b>Cracticidae</b>				
305.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
306.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
307.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
308.	24426 <i>Strepera versicolor</i> subsp. <i>plumbea</i> (Grey Currawong)			
<b>Cuculidae</b>				
309.	25598 <i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
310.	24427 <i>Cacomantis flabelliformis</i> subsp. <i>flabelliformis</i> (Fan-tailed Cuckoo)			
311.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
312.	24432 <i>Chrysococcyx lucidus</i> subsp. <i>plagosus</i> (Shining Bronze Cuckoo)			
<b>Culicidae</b>				
313.	<i>Culicidae</i> sp.			
<b>Cupressaceae</b>				
314.	97 <i>Callitris roei</i> (Roe's Cypress Pine)			
<b>Cyperaceae</b>				
315.	739 <i>Baumea acuta</i> (Pale Twig-rush)			
316.	741 <i>Baumea articulata</i> (Jointed Rush)			
317.	743 <i>Baumea juncea</i> (Bare Twigrush)			
318.	746 <i>Baumea riparia</i>			
319.	747 <i>Baumea rubiginosa</i>			
320.	753 <i>Carex appressa</i> (Tall Sedge)			
321.	761 <i>Caustis pentandra</i> (Thick Twist Rush)			
322.	768 <i>Cyathochaeta avenacea</i>			
323.	17618 <i>Cyathochaeta equitans</i>			
324.	783 <i>Cyperus congestus</i> (Dense Flat-sedge)	Y		
325.	815 <i>Cyperus tenellus</i> (Tiny Flatsedge)	Y		
326.	834 <i>Evandra aristata</i>			
327.	835 <i>Evandra pauciflora</i>			
328.	20216 <i>Ficinia nodosa</i> (Knotted Club Rush)			
329.	899 <i>Gahnia ancistrophylla</i> (Hooked-leaf Saw Sedge)			
330.	902 <i>Gahnia decomposita</i>			
331.	907 <i>Gahnia trifida</i> (Coast Saw-sedge)			
332.	908 <i>Gymnoschoenus anceps</i>			
333.	20200 <i>Isolepis cernua</i> var. <i>setiformis</i>			
334.	912 <i>Isolepis cyperoides</i>			
335.	916 <i>Isolepis inundata</i> (Swamp Club Rush)			
336.	917 <i>Isolepis marginata</i> (Coarse Club-rush)			
337.	10831 <i>Isolepis prolifera</i> (Budding Club-rush)	Y		
338.	925 <i>Lepidosperma angustatum</i>			
339.	931 <i>Lepidosperma drummondii</i>			
340.	932 <i>Lepidosperma effusum</i> (Spreading Sword-sedge)			
341.	933 <i>Lepidosperma gladiatum</i> (Coast Sword-sedge, Kerbin)			

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342.	934 <i>Lepidosperma gracile</i> (Slender Sword Sedge)			
343.	14642 <i>Lepidosperma obtusum</i>			
344.	<i>Lepidosperma</i> sp.			
345.	945 <i>Lepidosperma squamatum</i>			
346.	946 <i>Lepidosperma striatum</i>			
347.	953 <i>Mesomelaena graciliceps</i>			
348.	956 <i>Mesomelaena stygia</i>			
349.	957 <i>Mesomelaena tetragona</i> (Semaphore Sedge)			
350.	970 <i>Schoenus acuminatus</i>			
351.	975 <i>Schoenus bifidus</i>			
352.	978 <i>Schoenus brevisetis</i>			
353.	979 <i>Schoenus caespititius</i>			
354.	983 <i>Schoenus cruentus</i>			
355.	984 <i>Schoenus curvifolius</i>			
356.	985 <i>Schoenus discifer</i>			
357.	986 <i>Schoenus efoliatus</i>			
358.	996 <i>Schoenus laevigatus</i>			
359.	997 <i>Schoenus lanatus</i> (Woolly Bog-rush)			
360.	1001 <i>Schoenus multiglumis</i>			
361.	1005 <i>Schoenus obtusifolius</i>			
362.	17614 <i>Schoenus plumosus</i>			
363.	1017 <i>Schoenus subbulbosus</i>			
364.	1018 <i>Schoenus subfascicularis</i>			
365.	1020 <i>Schoenus sublateralis</i>			
366.	1021 <i>Schoenus subluxus</i>			
367.	1022 <i>Schoenus submicrostachyus</i>			
368.	1023 <i>Schoenus tenellus</i>			
369.	1034 <i>Tetraria capillaris</i> (Hair Sedge)			
370.	1036 <i>Tetraria octandra</i>			
371.	35582 <i>Tetraria</i> sp. Mt Madden (C.D. Turley 40 BP/897)			
372.	43207 <i>Tricostularia exsul</i>			
373.	1038 <i>Tricostularia neesii</i>			
374.	20428 <i>Tricostularia</i> sp. south coast (R.T. Wills 1423)			
<b>Cyprididae</b>				
375.	<i>Candonocypris novaezelandiae</i>			
376.	<i>Ilyodromus ellipticus</i>			
<b>Cypridopsidae</b>				
377.	<i>Sarscypridopsis aculeata</i>			
<b>Dasyatidae</b>				
378.	<i>Dasyatis brevicaudata</i>			
<b>Dasyornithidae</b>				
379.	24440 <i>Dasyornis longirostris</i> (Western Bristlebird)		T	
<b>Dasypogonaceae</b>				
380.	1212 <i>Baxteria australis</i>			
381.	1213 <i>Calectasia cyanea</i> (Blue Tinsel Lily)		T	
382.	45758 <i>Calectasia demarzii</i> (Demar's Tinsel Lily)			
383.	1218 <i>Dasypogon bromeliifolius</i> (Pineapple Bush)			
384.	1221 <i>Kingia australis</i> (Kingia, Pulonok)			
<b>Dasyuridae</b>				
385.	24088 <i>Antechinus flavipes</i> subsp. <i>leucogaster</i> (Yellow-footed Antechinus, Mardo)			
386.	24092 <i>Dasyurus geoffroii</i> (Chuditch, Western Quoll)		T	
387.	24111 <i>Sminthopsis gilberti</i> (Gilbert's Dunnart)			
388.	25515 <i>Sminthopsis griseoventer</i> (Grey-bellied Dunnart)			
389.	<i>Sminthopsis murina</i>			
<b>Delphinidae</b>				
390.	24052 <i>Delphinus delphis</i> (Common Dolphin)			
391.	30954 <i>Tursiops aduncus</i> (Indo-Pacific Bottlenose Dolphin)			
<b>Dennstaedtiaceae</b>				
392.	13758 <i>Histiopteris incisa</i>			
<b>Desidae</b>				
393.	<i>Badumna microps</i>			
394.	<i>Baiami torbayensis</i>			
395.	<i>Desis hartmeyeri</i>			Y
<b>Dicaeidae</b>				
396.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			

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<b>Dicranaceae</b>				
397.	32335 <i>Campylopus bicolor</i>			
398.	32461 <i>Campylopus bicolor</i> var. <i>bicolor</i>			
399.	32338 <i>Campylopus introflexus</i>	Y		
<b>Dicruridae</b>				
400.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
401.	25610 <i>Myiagra inquieta</i> (Restless Flycatcher)			
402.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
403.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
<b>Dilleniaceae</b>				
404.	5108 <i>Hibbertia acerosa</i> (Needle Leaved Guinea Flower)			
405.	5109 <i>Hibbertia amplexicaulis</i>			
406.	5117 <i>Hibbertia cuneiformis</i> (Cutleaf Hibbertia)			
407.	5118 <i>Hibbertia cunninghamii</i>			
408.	5119 <i>Hibbertia depressa</i>			
409.	20051 <i>Hibbertia diamesogenos</i>			
410.	5126 <i>Hibbertia furfuracea</i>			
411.	5131 <i>Hibbertia gracilipes</i>			
412.	5132 <i>Hibbertia grossulariifolia</i>			
413.	5137 <i>Hibbertia inconspicua</i>			
414.	5143 <i>Hibbertia lineata</i>			
415.	5144 <i>Hibbertia microphylla</i>			
416.	5159 <i>Hibbertia pulchra</i>			
417.	20031 <i>Hibbertia pulchra</i> var. <i>crassinervia</i>			
418.	5162 <i>Hibbertia racemosa</i> (Stalked Guinea Flower)			
419.	<i>Hibbertia</i> sp.			
<b>Dinolestidae</b>				
420.	<i>Dinolestes lewini</i>			
<b>Diodontidae</b>				
421.	<i>Allomycterus pilatus</i>			
422.	<i>Diodon nichthemerus</i>			
<b>Diomedidae</b>				
423.	30836 <i>Diomedea exulans</i> subsp. <i>exulans</i> (Snowy Albatross)		T	
424.	34007 <i>Thalassarche chlororhynchos</i> (Atlantic Yellow-nosed Albatross)		T	
<b>Droseraceae</b>				
425.	3094 <i>Drosera dichrosepala</i> (Rusty Sundew)			
426.	13200 <i>Drosera enodes</i>			
427.	13218 <i>Drosera erythrogyne</i>			
428.	3096 <i>Drosera fimbriata</i> (Manypeaks Sundew)		P4	
429.	3098 <i>Drosera glanduligera</i> (Pimpernel Sundew)			
430.	3102 <i>Drosera huegelii</i> (Bold Sundew)			
431.	19256 <i>Drosera intricata</i>			
432.	3105 <i>Drosera leucoblasta</i> (Wheel Sundew)			
433.	3106 <i>Drosera macrantha</i> (Bridal Rainbow)			
434.	3109 <i>Drosera menziesii</i> (Pink Rainbow)			
435.	11853 <i>Drosera menziesii</i> subsp. <i>menziesii</i>			
436.	48710 <i>Drosera micrantha</i>			
437.	3110 <i>Drosera microphylla</i> (Golden Rainbow)			
438.	3111 <i>Drosera modesta</i> (Modest Rainbow)			
439.	3112 <i>Drosera myriantha</i> (Star Rainbow)			
440.	3113 <i>Drosera neesii</i> (Jewel Rainbow)			
441.	3118 <i>Drosera pallida</i> (Pale Rainbow)			
442.	3122 <i>Drosera platypoda</i> (Fan-leaved Sundew)			
443.	3124 <i>Drosera pulchella</i> (Pretty Sundew)			
444.	3128 <i>Drosera ramellosa</i> (Branched Sundew)			
445.	13186 <i>Drosera roseana</i>			
446.	3130 <i>Drosera scorpioides</i> (Shaggy Sundew)			
447.	<i>Drosera</i> sp.			
448.	3131 <i>Drosera stolonifera</i> (Leafy Sundew)			
449.	8914 <i>Drosera sulphurea</i> (Sulphur-flowered Sundew)			
<b>Dugesidae</b>				
450.	<i>Dugesidae</i> sp.			
<b>Dytiscidae</b>				
451.	<i>Dytiscidae</i> sp.			
<b>Echeneidae</b>				

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452.	<i>Remora remora</i>			
<b>Ecnomidae</b>				
453.	<i>Ecnomidae sp.</i>			
<b>Elaeocarpaceae</b>				
454.	4524 <i>Platytheca galioides</i>			
455.	4526 <i>Tetratheca affinis</i>			
456.	4536 <i>Tetratheca hispidissima</i>			
457.	4544 <i>Tetratheca setigera</i>			
458.	4546 <i>Tetratheca virgata</i>			
459.	4547 <i>Tremandra diffusa</i>			
460.	4548 <i>Tremandra stelligera</i>			
<b>Elaphomycetaceae</b>				
461.	39900 <i>Elaphomyces chlorocarpus</i>			
462.	39901 <i>Elaphomyces symeae</i>			
<b>Elapidae</b>				
463.	25251 <i>Echiopsis curta</i> (Bardick)			
464.	25250 <i>Elapognathus coronatus</i> (Crowned Snake)			
465.	43384 <i>Hydrophis platurus</i> (Yellow-bellied Seasnake)			
466.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
467.	25255 <i>Parasuta nigriceps</i>			
468.	25259 <i>Pseudonaja affinis subsp. affinis</i> (Dugite)			
469.	30818 <i>Rhinoplocephalus bicolor</i> (Square-nosed Snake)			
<b>Elopidae</b>				
470.	<i>Elops hawaiensis</i>			
<b>Empididae</b>				
471.	<i>Empididae sp.</i>			
<b>Engraulidae</b>				
472.	<i>Engraulis australis</i>			
<b>Ephydriidae</b>				
473.	<i>Ephydriidae sp.</i>			
<b>Ericaceae</b>				
474.	6295 <i>Acrotriche cordata</i> (Coast Ground Berry)			
475.	6301 <i>Andersonia auriculata</i>		P3	
476.	6306 <i>Andersonia caerulea</i> (Foxtails)			
477.	25844 <i>Andersonia caerulea subsp. caerulea</i>			
478.	19623 <i>Andersonia depressa</i>			
479.	6317 <i>Andersonia micrantha</i>			
480.	6320 <i>Andersonia simplex</i> (Spiked Andersonia)			
481.	41737 <i>Andersonia sp. Jamesii</i> (J. Liddelow 84)		P4	
482.	16997 <i>Andersonia sp. Mitchell River</i> (B.G. Hammersley 925)		P3	
483.	6321 <i>Andersonia sprengelioides</i>			
484.	6323 <i>Astroloma ciliatum</i> (Candle Cranberry)			
485.	6334 <i>Astroloma pallidum</i> (Kick Bush)			
486.	46733 <i>Brachyloma baxteri</i>			
487.	6352 <i>Cosmelia rubra</i> (Spindle Heath)			
488.	6355 <i>Leucopogon alternifolius</i>		P3	
489.	6358 <i>Leucopogon assimilis</i>			
490.	6360 <i>Leucopogon australis</i> (Spiked Beard-heath)			
491.	6384 <i>Leucopogon cymbiformis</i>		P2	
492.	6385 <i>Leucopogon denticulatus</i>			
493.	6387 <i>Leucopogon distans</i>			
494.	6394 <i>Leucopogon gibbosus</i>			
495.	6396 <i>Leucopogon glabellus</i>			
496.	6399 <i>Leucopogon gracilis</i>			
497.	6402 <i>Leucopogon hirsutus</i>			
498.	40940 <i>Leucopogon obovatus subsp. obovatus</i>			
499.	40941 <i>Leucopogon obovatus subsp. revolutus</i>			
500.	6425 <i>Leucopogon oxycedrus</i>			
501.	6427 <i>Leucopogon parviflorus</i> (Coast Beard-heath)			
502.	6428 <i>Leucopogon pendulus</i>			
503.	6435 <i>Leucopogon polystachyus</i>			
504.	6436 <i>Leucopogon propinquus</i>			
505.	6440 <i>Leucopogon racemosus</i>			
506.	6441 <i>Leucopogon reflexus</i> (Heart-leaf Beard-heath)			
507.	10755 <i>Leucopogon rubricaulis</i>			
508.	14637 <i>Leucopogon sp. Coujinup</i> (M.A. Burgman 1085)			



Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
509.	34718 <i>Leucopogon</i> sp. <i>Southern Forests (B.G. Hammersley 1000)</i>			
510.	6449 <i>Leucopogon tamariscinus</i>			
511.	6454 <i>Leucopogon verticillatus</i> ( <i>Tassel Flower</i> )			
512.	6456 <i>Lysinema ciliatum</i> ( <i>Curry Flower</i> )			
513.	6457 <i>Lysinema conspicuum</i>			
514.	6459 <i>Lysinema fimbriatum</i>			
515.	6460 <i>Lysinema lasianthum</i>		P4	
516.	34736 <i>Lysinema pentapetalum</i>			
517.	6464 <i>Needhamiella pumilio</i>			
518.	31931 <i>Sphenotoma capitata</i>			
519.	6467 <i>Sphenotoma dracophylloides</i>			
520.	31952 <i>Sphenotoma gracilis</i> ( <i>Swamp Paper-heath</i> )			
521.	31951 <i>Sphenotoma parviflora</i>			
522.	48617 <i>Styphelia</i> sp. <i>Albany (M. Hislop 2218)</i>			
523.	6476 <i>Styphelia tenuiflora</i> ( <i>Common Pinheath</i> )			
<b>Estrilidae</b>				
524.	24645 <i>Stagonopleura oculata</i> ( <i>Red-eared Firetail</i> )			
<b>Euphorbiaceae</b>				
525.	4585 <i>Amperea ericoides</i>			
526.	4588 <i>Amperea volubilis</i>			
527.	4636 <i>Euphorbia paralias</i> ( <i>Sea Spurge</i> )	Y		
528.	4638 <i>Euphorbia peplus</i> ( <i>Petty Spurge</i> )	Y		
529.	4648 <i>Euphorbia terracina</i> ( <i>Geraldton Carnation Weed</i> )	Y		
530.	4666 <i>Monotaxis occidentalis</i>			
531.	4695 <i>Ricinocarpos glaucus</i>			
<b>Exocoetidae</b>				
532.	<i>Cypselurus</i> sp.			
<b>Fabaceae</b>				
533.	15429 <i>Acacia alata</i> var. <i>alata</i>			
534.	15466 <i>Acacia applanata</i>			
535.	3239 <i>Acacia biflora</i>			
536.	3247 <i>Acacia browniana</i>			
537.	11731 <i>Acacia browniana</i> var. <i>browniana</i>			
538.	3262 <i>Acacia cochlearis</i> ( <i>Rigid Wattle</i> )			
539.	3275 <i>Acacia crassiuscula</i>			
540.	3282 <i>Acacia cyclops</i> ( <i>Coastal Wattle</i> )			
541.	17858 <i>Acacia dealbata</i>	Y		
542.	16975 <i>Acacia decurrens</i>	Y		
543.	11192 <i>Acacia drummondii</i> subsp. <i>elegans</i>			
544.	3331 <i>Acacia extensa</i> ( <i>Wiry Wattle</i> )			
545.	3363 <i>Acacia hastulata</i>			
546.	3383 <i>Acacia incurva</i>			
547.	3413 <i>Acacia leioderma</i>			
548.	3424 <i>Acacia littorea</i>			
549.	17861 <i>Acacia longifolia</i>	Y		
550.	3428 <i>Acacia luteola</i>			
551.	10955 <i>Acacia melanoxylon</i>	Y		
552.	3453 <i>Acacia myrtifolia</i>			
553.	3482 <i>Acacia paradoxa</i> ( <i>Kangaroo Thorn</i> )	Y		
554.	3497 <i>Acacia prismifolia</i>		X	
555.	3502 <i>Acacia pulchella</i> ( <i>Prickly Moses</i> )			
556.	15482 <i>Acacia pulchella</i> var. <i>goadbyi</i>			
557.	15483 <i>Acacia pulchella</i> var. <i>pulchella</i>			
558.	3504 <i>Acacia pycnantha</i> ( <i>Golden Wattle</i> )	Y		
559.	3523 <i>Acacia robiniae</i>			
560.	3564 <i>Acacia subcaerulea</i>			
561.	3569 <i>Acacia sulcata</i>			
562.	13504 <i>Acacia sulcata</i> var. <i>sulcata</i>			
563.	3576 <i>Acacia tetragonocarpa</i>			
564.	3588 <i>Acacia uliginosa</i>			
565.	15487 <i>Acacia varia</i> var. <i>varia</i>			
566.	3602 <i>Acacia willdenowiana</i> ( <i>Grass Wattle</i> )			
567.	3689 <i>Aotus intermedia</i>			
568.	3690 <i>Aotus passerinoides</i>			
569.	14396 <i>Bossiaea aquifolium</i> subsp. <i>aquifolium</i>			
570.	3707 <i>Bossiaea dentata</i>			
571.	3713 <i>Bossiaea linophylla</i>			
572.	3714 <i>Bossiaea ornata</i> ( <i>Broad Leaved Brown Pea</i> )			

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573.	14291 <i>Bossiaea praetermissa</i>			
574.	3718 <i>Bossiaea rufa</i>			
575.	10861 <i>Callistachys lanceolata</i> (Wonnich)			
576.	14724 <i>Callistachys</i> sp. south-coast variant (M. Carter 180)			
577.	18156 <i>Chamaecytisus palmensis</i> (Tagasaste)	Y		
578.	13112 <i>Chorizema aciculare</i> subsp. <i>aciculare</i>			
579.	13113 <i>Chorizema carinatum</i>		P3	
580.	3754 <i>Chorizema diversifolium</i>			
581.	3757 <i>Chorizema glycinifolium</i>			
582.	3758 <i>Chorizema ilicifolium</i> (Holly Flame Pea)			
583.	12765 <i>Chorizema nanum</i>			
584.	3760 <i>Chorizema reticulatum</i> (Showy Flame Pea)			
585.	3761 <i>Chorizema rhombeum</i>			
586.	14586 <i>Chorizema spathulatum</i>			
587.	3763 <i>Chorizema uncinatum</i>			
588.	3791 <i>Daviesia alternifolia</i>			
589.	3799 <i>Daviesia cordata</i> (Bookleaf)			
590.	3811 <i>Daviesia flexuosa</i>			
591.	3812 <i>Daviesia gracilis</i>			
592.	15505 <i>Daviesia incrassata</i> subsp. <i>incrassata</i>			
593.	3817 <i>Daviesia inflata</i>			
594.	3818 <i>Daviesia lancifolia</i>			
595.	3840 <i>Daviesia spinosissima</i>			
596.	3867 <i>Dipogon lignosus</i> (Dolichos Pea)	Y		
597.	3872 <i>Euchilopsis linearis</i> (Swamp Pea)			
598.	3876 <i>Eutaxia epacridoides</i>			
599.	20214 <i>Eutaxia myrtifolia</i>			
600.	3879 <i>Eutaxia parvifolia</i>			
601.	3880 <i>Eutaxia virgata</i>			
602.	3891 <i>Gastrolobium bilobum</i> (Heart Leaf Poison)			
603.	3893 <i>Gastrolobium brownii</i>			
604.	20490 <i>Gastrolobium coriaceum</i>			
605.	19190 <i>Gastrolobium cuneatum</i>			
606.	20511 <i>Gastrolobium minus</i>			
607.	20503 <i>Gastrolobium rubrum</i>			
608.	20500 <i>Gastrolobium sericeum</i>			
609.	3932 <i>Gastrolobium velutinum</i> (Stirling Range Poison)			
610.	3948 <i>Gompholobium capitatum</i>			
611.	10909 <i>Gompholobium confertum</i>			
612.	3950 <i>Gompholobium knightianum</i>			
613.	3951 <i>Gompholobium marginatum</i>			
614.	3953 <i>Gompholobium ovatum</i>			
615.	3954 <i>Gompholobium polymorphum</i>			
616.	3955 <i>Gompholobium preissii</i>			
617.	11083 <i>Gompholobium scabrum</i>			
618.	3958 <i>Gompholobium venustum</i> (Handsome Wedge-pea)			
619.	11115 <i>Gompholobium villosum</i>			
620.	3961 <i>Hardenbergia comptoniana</i> (Native Wisteria)			
621.	3964 <i>Hovea chorizemifolia</i> (Holly-leaved Hovea)			
622.	3965 <i>Hovea elliptica</i> (Tree Hovea)			
623.	3968 <i>Hovea trisperma</i> (Common Hovea)			
624.	3992 <i>Isotropis cuneifolia</i> (Granny Bonnets)			
625.	19700 <i>Isotropis cuneifolia</i> subsp. <i>cuneifolia</i>			
626.	4028 <i>Jacksonia spinosa</i>			
627.	4036 <i>Kennedia carinata</i>			
628.	4037 <i>Kennedia coccinea</i> (Coral Vine)			
629.	37960 <i>Kennedia coccinea</i> subsp. <i>calcaria</i>			
630.	37961 <i>Kennedia coccinea</i> subsp. <i>esotera</i>			
631.	4047 <i>Lathyrus tingitanus</i> (Tangier Pea)	Y		
632.	4048 <i>Latrobea brunonis</i>			
633.	4049 <i>Latrobea diosmifolia</i>			
634.	4050 <i>Latrobea genistoides</i>			
635.	17757 <i>Latrobea</i> sp. South Coast (A.M. Ashby 1949)			
636.	8564 <i>Lotus subbiflorus</i>	Y		
637.	4063 <i>Lotus uliginosus</i> (Greater Lotus)	Y		
638.	4076 <i>Medicago lupulina</i> (Black Medic)	Y		
639.	4079 <i>Medicago polymorpha</i> (Burr Medic)	Y		
640.	4114 <i>Ornithopus pinnatus</i> (Slender Serradella)	Y		
641.	17114 <i>Paraserianthes lophantha</i> subsp. <i>lophantha</i>			
642.	4140 <i>Phyllota barbata</i>			

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643.	4155 <i>Psoralea pinnata</i> (African Scurfpea)	Y		
644.	4164 <i>Pultenaea aspalathoides</i>			
645.	4172 <i>Pultenaea ericifolia</i>			
646.	4181 <i>Pultenaea reticulata</i>			
647.	4186 <i>Pultenaea tenuifolia</i>			
648.	4187 <i>Pultenaea verruculosa</i>			
649.	4200 <i>Sphaerolobium alatum</i>			
650.	17551 <i>Sphaerolobium drummondii</i>			
651.	4202 <i>Sphaerolobium fornicatum</i>			
652.	4204 <i>Sphaerolobium grandiflorum</i>			
653.	20302 <i>Sphaerolobium hygrophilum</i>			
654.	4206 <i>Sphaerolobium macranthum</i>			
655.	4207 <i>Sphaerolobium medium</i>			
656.	4208 <i>Sphaerolobium nudiflorum</i>			
657.	17547 <i>Sphaerolobium pubescens</i>			
658.	17548 <i>Sphaerolobium rostratum</i>			
659.	4211 <i>Sphaerolobium vimineum</i> (Leafless Globe Pea)			
660.	4292 <i>Trifolium campestre</i> (Hop Clover)	Y		
661.	4293 <i>Trifolium cernuum</i> (Drooping Flower Clover)	Y		
662.	4295 <i>Trifolium dubium</i> (Suckling Clover)	Y		
663.	4307 <i>Trifolium repens</i> (White Clover)	Y		
664.	17115 <i>Trifolium repens</i> var. <i>repens</i>	Y		
665.	4315 <i>Trifolium tomentosum</i> (Woolly Clover)	Y		
666.	4317 <i>Ulex europaeus</i> (Gorse)	Y		
667.	11474 <i>Vicia sativa</i> subsp. <i>nigra</i>	Y		
668.	4325 <i>Viminaria juncea</i> (Swishbush, Koweda)			
<b>Falconidae</b>				
669.	25621 <i>Falco berigora</i> (Brown Falcon)			
670.	24471 <i>Falco berigora</i> subsp. <i>berigora</i> (Brown Falcon)			
671.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
672.	24472 <i>Falco cenchroides</i> subsp. <i>cenchrroides</i> (Australian Kestrel, Nankeen Kestrel)			
673.	25623 <i>Falco longipennis</i> (Australian Hobby)			
674.	24474 <i>Falco longipennis</i> subsp. <i>longipennis</i> (Australian Hobby)			
675.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
676.	24475 <i>Falco peregrinus</i> subsp. <i>macropus</i> (Australian Peregrine Falcon)		S	
<b>Fissidentaceae</b>				
677.	32369 <i>Fissidens tenellus</i>			
<b>Funariaceae</b>				
678.	32370 <i>Funaria hygrometrica</i>			
<b>Galaxiidae</b>				
679.	<i>Galaxias maculatus</i>			
680.	34028 <i>Galaxias occidentalis</i> (Western Minnow)			
681.	34026 <i>Galaxiella munda</i> (mud minnow, western dwarf galaxias)		T	
682.	34027 <i>Galaxiella nigrostriata</i> (Black-stripe Minnow, black-striped dwarf galaxias)		T	
<b>Garypidae</b>				
683.	<i>Synsphyronus magnus</i>			
<b>Garypinidae</b>				
684.	<i>Protogarypinus giganteus</i>			
<b>Gekkonidae</b>				
685.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
<b>Gelastocoridae</b>				
686.	<i>Gelastocoridae</i> sp.			
<b>Gelidiaceae</b>				
687.	27196 <i>Pterocladia rectangularis</i>			
<b>Gempylidae</b>				
688.	<i>Thyrsites atun</i>			
<b>Gentianaceae</b>				
689.	6542 <i>Centaurium tenuiflorum</i>	Y		
690.	6543 <i>Cicendia filiformis</i> (Slender Cicendia)	Y		
691.	41660 <i>Schenkia australis</i>			
<b>Geotriidae</b>				
692.	34030 <i>Geotria australis</i> (Pouched Lamprey)		P1	
<b>Geraniaceae</b>				
693.	4339 <i>Geranium molle</i> (Dove's Foot Cranesbill)			

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694.	4342 <i>Pelargonium australe</i> (Wild Geranium)	Y		
695.	4343 <i>Pelargonium capitatum</i> (Rose Pelargonium)	Y		
<b>Gerreidae</b>				
696.	<i>Parequula melbournensis</i>			
<b>Girellidae</b>				
697.	<i>Girella zebra</i>			
<b>Glossiphoniidae</b>				
698.	<i>Glossiphoniidae</i> sp.			
<b>Gnaphosidae</b>				
699.	<i>Megamyrmecon penicillatum</i>			Y
<b>Gnathanacanthidae</b>				
700.	<i>Gnathanacanthus goetzei</i>			
<b>Gobiidae</b>				
701.	<i>Callogobius mucosus</i>			
702.	<i>Favonigobius lateralis</i>			
703.	<i>Pseudogobius olorum</i>			
<b>Gomphidae</b>				
704.	<i>Gomphidae</i> sp.			
<b>Goodeniaceae</b>				
705.	7411 <i>Anthotium humile</i> (Dwarf Anthotium)			
706.	7439 <i>Dampiera fasciculata</i> (Bundled-leaf Dampiera)			
707.	7452 <i>Dampiera leptoclada</i> (Slender-shooted Dampiera)			
708.	7454 <i>Dampiera linearis</i> (Common Dampiera)			
709.	7462 <i>Dampiera pedunculata</i>			
710.	7487 <i>Diaspasis filifolia</i> (Thread-leaved Diaspasis)			
711.	7508 <i>Goodenia filiformis</i> (Thread-leaved Goodenia)			
712.	7517 <i>Goodenia incana</i> (Hoary Goodenia)			
713.	7523 <i>Goodenia leptoclada</i> (Thin-stemmed Goodenia)			
714.	7572 <i>Lechenaultia expansa</i>			
715.	7614 <i>Scaevola globulifera</i>			
716.	7626 <i>Scaevola nitida</i> (Shining Fanflower)			
717.	7646 <i>Scaevola striata</i> (Royal Robe)			
718.	13175 <i>Scaevola striata</i> var. <i>striata</i>			
719.	7665 <i>Velleia trinervis</i>			
<b>Gordiidae</b>				
720.	<i>Gordiidae</i> sp.			
<b>Graphidaceae</b>				
721.	41267 <i>Halegrapha mucronata</i>			
<b>Gripopterygidae</b>				
722.	<i>Gripopterygidae</i> sp.			
<b>Gyrinidae</b>				
723.	<i>Gyrinidae</i> sp.			
<b>Gyrostemonaceae</b>				
724.	2787 <i>Gyrostemon sheathii</i>			
<b>Haematopodidae</b>				
725.	25627 <i>Haematopus fuliginosus</i> (Sooty Oystercatcher)			
726.	24487 <i>Haematopus longirostris</i> (Pied Oystercatcher)			
<b>Haemodoraceae</b>				
727.	11931 <i>Anigozanthos bicolor</i> subsp. <i>decrescens</i>			
728.	1407 <i>Anigozanthos flavidus</i> (Tall Kangaroo Paw)			
729.	1413 <i>Anigozanthos preissii</i> (Albany Catpaw)			
730.	1418 <i>Conostylis aculeata</i> (Prickly Conostylis)			
731.	11826 <i>Conostylis aculeata</i> subsp. <i>aculeata</i>			
732.	1441 <i>Conostylis misera</i> (Grass Conostylis)			T
733.	1447 <i>Conostylis pusilla</i>			
734.	1453 <i>Conostylis serrulata</i>			
735.	1454 <i>Conostylis setigera</i> (Bristly Cottonhead)			
736.	11597 <i>Conostylis setigera</i> subsp. <i>setigera</i>			
737.	1468 <i>Haemodorum laxum</i>			
738.	1474 <i>Haemodorum sparsiflorum</i>			
739.	1475 <i>Haemodorum spicatum</i> (Mardja)			
740.	1478 <i>Phlebocarya ciliata</i>			

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741.	1481 <i>Tribonanthes australis</i>			
742.	1485 <i>Tribonanthes violacea</i>			
<b>Halcyonidae</b>				
743.	30901 <i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
744.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
745.	24309 <i>Todiramphus sanctus</i> subsp. <i>sanctus</i> (Sacred Kingfisher)			
<b>Halimedaceae</b>				
746.	47213 <i>Halimeda versatilis</i>			
<b>Haloragaceae</b>				
747.	33620 <i>Glischrocaryon angustifolium</i>			
748.	6160 <i>Gonocarpus paniculatus</i>			
749.	6162 <i>Gonocarpus pusillus</i>		P4	
750.	6166 <i>Gonocarpus simplex</i>		P4	
751.	6171 <i>Haloragis digyna</i>			
752.	34676 <i>Meionectes brownii</i> (Swamp Raspwort)			
753.	34964 <i>Trihaloragis hexandra</i> subsp. <i>hexandra</i>			
<b>Hebridae</b>				
754.	<i>Hebridae</i> sp.			
<b>Hemerocallidaceae</b>				
755.	23474 <i>Agrostocrinum hirsutum</i>			
756.	1276 <i>Caesia micrantha</i> (Pale Grass Lily)			
757.	1277 <i>Caesia occidentalis</i>			
758.	1285 <i>Corynotheca micrantha</i> (Sand Lily)			
759.	12012 <i>Corynotheca micrantha</i> var. <i>panda</i>			
760.	1297 <i>Johnsonia lupulina</i> (Hooded Lily)			
761.	1299 <i>Johnsonia teretifolia</i> (Hooded Lily)			
762.	1260 <i>Stypandra glauca</i> (Blind Grass)			
763.	1361 <i>Tricoryne elatior</i> (Yellow Autumn Lily)			
764.	29478 <i>Tricoryne</i> sp. South Coast (T.E.H. Aplin 2653)			
<b>Hemicorduliidae</b>				
765.	<i>Hemicorduliidae</i> sp.			
<b>Heterodontidae</b>				
766.	<i>Heterodontus portusjacksoni</i>			
<b>Hirundinidae</b>				
767.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
768.	48060 <i>Petrochelidon ariel</i> (Fairy Martin)			
769.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
<b>Hydatellaceae</b>				
770.	1139 <i>Trithuria bibracteata</i>			
<b>Hydraenidae</b>				
771.	<i>Hydraenidae</i> sp.			
<b>Hydrobiosidae</b>				
772.	<i>Hydrobiosidae</i> sp.			
<b>Hydrometridae</b>				
773.	<i>Hydrometridae</i> sp.			
<b>Hydrophilidae</b>				
774.	<i>Hydrophilidae</i> sp.			
<b>Hydropsychidae</b>				
775.	<i>Hydropsychidae</i> sp.			
<b>Hydroptilidae</b>				
776.	<i>Hydroptilidae</i> sp.			
<b>Hylidae</b>				
777.	25378 <i>Litoria adelaidensis</i> (Slender Tree Frog)			
778.	25388 <i>Litoria moorei</i> (Motorbike Frog)			
<b>Hypnidae</b>				
779.	<i>Hypnos monopterygium</i>			
<b>Hyriidae</b>				
780.	<i>Hyriidae</i> sp.			
<b>Icmadophilaceae</b>				
781.	28060 <i>Siphula coriacea</i>			

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<b>Idiopidae</b>				
782.	<i>Aganippe raphiduca</i>			
<b>Iridaceae</b>				
783.	18279 <i>Babiana angustifolia</i>	Y		
784.	11445 <i>Ferraria crispa</i> subsp. <i>crispa</i>	Y		
785.	18392 <i>Freesia alba</i> x <i>leichtlinii</i>	Y		
786.	1524 <i>Gladiolus undulatus</i> ( <i>Wild Gladiolus</i> )	Y		
787.	29193 <i>Iris laevigata</i>	Y		Y
788.	1533 <i>Ixia paniculata</i>	Y		
789.	1534 <i>Ixia polystachya</i> ( <i>Variable Ixia</i> )	Y		
790.	1542 <i>Patersonia babianoides</i>			
791.	1547 <i>Patersonia lanata</i> ( <i>Woolly Patersonia</i> )			
792.	1550 <i>Patersonia occidentalis</i> ( <i>Purple Flag, Koma</i> )			
793.	30471 <i>Patersonia occidentalis</i> var. <i>angustifolia</i>			
794.	30476 <i>Patersonia occidentalis</i> var. <i>latifolia</i>			
795.	1553 <i>Patersonia umbrosa</i> ( <i>Yellow Flags</i> )			
796.	14432 <i>Patersonia umbrosa</i> var. <i>umbrosa</i>			
797.	1558 <i>Sparaxis bulbifera</i>	Y		
798.	13103 <i>Watsonia borbonica</i>	Y		
799.	18108 <i>Watsonia meriana</i> var. <i>bulbillifera</i>	Y		
800.	18118 <i>Watsonia meriana</i> var. <i>meriana</i>	Y		
<b>Istiophoridae</b>				
801.	<i>Makaira indica</i>			
<b>Iulomorphidae</b>				
802.	<i>Atelomastix mainae</i>			
803.	<i>Samichus decoratus</i>			
<b>Ixodidae</b>				
804.	<i>Ixodes australiensis</i>			
<b>Juncaceae</b>				
805.	1178 <i>Juncus bufonius</i> ( <i>Toad Rush</i> )	Y		
806.	1180 <i>Juncus capitatus</i> ( <i>Capitate Rush</i> )	Y		
807.	1185 <i>Juncus kraussii</i> ( <i>Sea Rush</i> )			
808.	14631 <i>Juncus meianthus</i>		P3	
809.	1186 <i>Juncus microcephalus</i>	Y		
810.	1187 <i>Juncus oxycarpus</i>	Y		
811.	1188 <i>Juncus pallidus</i> ( <i>Pale Rush</i> )			
812.	1190 <i>Juncus planifolius</i> ( <i>Broadleaf Rush</i> )			
<b>Juncaginaceae</b>				
813.	18587 <i>Triglochin nana</i>			
<b>Kyphosidae</b>				
814.	<i>Kyphosus gladius</i> MS			
<b>Labridae</b>				
815.	<i>Achoerodus gouldii</i>			
816.	<i>Austrolabrus maculatus</i>			
817.	<i>Haletta semifasciata</i>			
818.	<i>Ophthalmolepis lineolatus</i>			
819.	<i>Siphonognathus argyrophanes</i>			
<b>Lamiaceae</b>				
820.	6855 <i>Hemigenia humilis</i>			
821.	6865 <i>Hemigenia podalyrina</i>			
822.	6880 <i>Leonotis leonurus</i> ( <i>Lion's Ear</i> )	Y		
823.	6904 <i>Microcorys virgata</i>			
824.	6913 <i>Prostanthera canaliculata</i>			
825.	6939 <i>Westringia dampieri</i>			
<b>Lamnidae</b>				
826.	34031 <i>Carcharodon carcharias</i> ( <i>Great White Shark</i> )		T	
<b>Lamponidae</b>				
827.	<i>Lampona cylindrata</i>			
828.	<i>Lampona foliifera</i>			
829.	<i>Lampona punctigera</i>			
830.	<i>Lampona torbay</i>			Y
831.	<i>Prionosternum scutatatum</i>			
<b>Laridae</b>				
832.	<i>Chroicocephalus novaehollandiae</i>			

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833.	48587 <i>Hydroprogne caspia</i> (Caspian Tern)		IA	
834.	24511 <i>Larus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Silver Gull)			
835.	25638 <i>Larus pacificus</i> (Pacific Gull)			
836.	24522 <i>Sterna bergii</i> (Crested Tern)			
837.	48597 <i>Thalasseus bergii</i> (Crested Tern)		IA	
<b>Lauraceae</b>				
838.	2951 <i>Cassytha flava</i> (Dodder Laurel)			
839.	2952 <i>Cassytha glabella</i> (Tangled Dodder Laurel)			
840.	11857 <i>Cassytha glabella</i> forma <i>glabella</i>			
841.	2954 <i>Cassytha micrantha</i>			
842.	2957 <i>Cassytha racemosa</i> (Dodder Laurel)			
843.	11242 <i>Cassytha racemosa</i> forma <i>pilosa</i>			
<b>Lecanoraceae</b>				
844.	27698 <i>Clauzadeana macula</i>			
845.	27803 <i>Lecanora farinacea</i>			
846.	<i>Lecanora</i> sp.			
847.	28037 <i>Ramboldia stuartii</i>			
<b>Lecideaceae</b>				
848.	27826 <i>Lecidea sarcogynoides</i>			
849.	<i>Lecidea</i> sp.			
<b>Lentibulariaceae</b>				
850.	7145 <i>Utricularia menziesii</i> (Redcoats)			
851.	7148 <i>Utricularia multifida</i>			
852.	7153 <i>Utricularia tenella</i>			
<b>Lepidogalaxiidae</b>				
853.	47983 <i>Lepidogalaxias salamandroides</i> (Salamanderfish)		T	
<b>Lepidoziaceae</b>				
854.	<i>Kurzia compacta</i>			
<b>Leporidae</b>				
855.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
<b>Leptoceridae</b>				
856.	<i>Leptoceridae</i> sp.			
<b>Leptophlebiidae</b>				
857.	<i>Leptophlebiidae</i> sp.			
<b>Liagoraceae</b>				
858.	27030 <i>Liagora wilsoniana</i>			
<b>Libellulidae</b>				
859.	<i>Libellulidae</i> sp.			
<b>Lichinaceae</b>				
860.	<i>Pterygiopsis</i> sp.			
<b>Limnodynastidae</b>				
861.	25410 <i>Heleioporus eyrei</i> (Moaning Frog)			
862.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
<b>Linaceae</b>				
863.	4362 <i>Linum marginale</i> (Wild Flax)			
864.	4363 <i>Linum trigynum</i> (French Flax)	Y		
<b>Lindsaeaceae</b>				
865.	59 <i>Lindsaea linearis</i> (Screw Fern)			
<b>Lobariaceae</b>				
866.	27997 <i>Pseudocyphellaria neglecta</i>			
<b>Loganiaceae</b>				
867.	6504 <i>Logania buxifolia</i>			
868.	6515 <i>Logania vaginalis</i> (White Spray)			
869.	46255 <i>Orianthera campanulata</i>			
870.	46314 <i>Orianthera serpyllifolia</i>			
871.	46315 <i>Orianthera serpyllifolia</i> subsp. <i>serpyllifolia</i>			
872.	16177 <i>Phyllangium paradoxum</i>			
<b>Lophocoleaceae</b>				
873.	<i>Chiloscyphus semiteres</i>			
874.	<i>Chiloscyphus semiteres</i> var. <i>semiteres</i>			

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<b>Lophotidae</b>				
875.	<i>Eumecichthys fiski</i>			Y
<b>Loranthaceae</b>				
876.	2401 <i>Nuytsia floribunda</i> (Christmas Tree, Mudja)			
<b>Lycopodiaceae</b>				
877.	12783 <i>Lycopodiella serpentina</i>			
<b>Lycosidae</b>				
878.	<i>Artonia cingulipes</i>			
879.	<i>Artonia flavimana</i>			
880.	<i>Artoriopsis eccentrica</i>			
881.	<i>Tasmanicos leuckartii</i>			
882.	<i>Venatrix pullastra</i>			
<b>Macropodidae</b>				
883.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
884.	48022 <i>Notamacropus irma</i> (Western Brush Wallaby)		P4	
885.	24145 <i>Setonix brachyurus</i> (Quokka)		T	
<b>Maluridae</b>				
886.	25650 <i>Malurus elegans</i> (Red-winged Fairy-wren)			
887.	24551 <i>Malurus pulcherrimus</i> (Blue-breasted Fairy-wren)			
888.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
889.	25655 <i>Stipiturus malachurus</i> (Southern Emu-wren)			
890.	24554 <i>Stipiturus malachurus</i> subsp. <i>westernensis</i> (Southern Emu-wren)			
<b>Malvaceae</b>				
891.	48634 <i>Commersonia corniculata</i>			
892.	40863 <i>Commersonia corylifolia</i> (Hazel-leaved Rulingia)			
893.	40920 <i>Commersonia grandiflora</i>			
894.	36522 <i>Malva pseudolavatera</i>	Y		
895.	5092 <i>Thomasia pauciflora</i> (Few Flowered Thomasia)			
896.	5094 <i>Thomasia purpurea</i>			
897.	5096 <i>Thomasia quercifolia</i> (Oak Leaved Thomasia)		P4	
898.	5100 <i>Thomasia solanacea</i>		P4	
899.	5105 <i>Thomasia triphylla</i>			
<b>Megalariaceae</b>				
900.	27850 <i>Megalaria grossa</i>			
<b>Melanostomiidae</b>				
901.	<i>Opostomias micripnus</i>			Y
<b>Meliphagidae</b>				
902.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
903.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
904.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
905.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
906.	47962 <i>Glyciphila melanops</i> (Tawny-crowned Honeyeater)			
907.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
908.	24582 <i>Lichmera indistincta</i> subsp. <i>indistincta</i> (Brown Honeyeater)			
909.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
910.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
911.	24587 <i>Melithreptus chloropsis</i> (Western White-naped Honeyeater)			
912.	48071 <i>Phylidonyris niger</i> (White-cheeked Honeyeater)			
913.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
<b>Menyanthaceae</b>				
914.	36178 <i>Liparophyllum lasiospermum</i>			
915.	36177 <i>Ornduffia albiflora</i>			
916.	36181 <i>Ornduffia parnassifolia</i>			
<b>Mesophelliaceae</b>				
917.	<i>Castoreum radicum</i>			
<b>Micropholcommatidae</b>				
918.	<i>Raveniella peckorum</i>			
919.	<i>Taphiassa robertsi</i>			
<b>Mimetidae</b>				
920.	<i>Australomimetes diabolicus</i>			
<b>Miturgidae</b>				
921.	<i>Mituliodon tarantulinus</i>			



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<b>Molidae</b>				
922.	<i>Ranzania laevis</i>			
<b>Molossidae</b>				
923.	24183 <i>Mormopterus loriae</i> (Little Northern Freetail-bat)			
<b>Monacanthidae</b>				
924.	<i>Acanthaluteres brownii</i>			
925.	<i>Acanthaluteres vittiger</i>			
926.	<i>Anacanthus barbatus</i>			
927.	<i>Brachaluteres jacksonianus</i>			
928.	<i>Cantheschenia longipinnis</i>			
929.	<i>Eubalichthys caeruleoguttatus</i>			
930.	<i>Eubalichthys cyanoura</i>			
931.	<i>Eubalichthys mosaicus</i>			
932.	<i>Meuschenia freycineti</i>			
933.	<i>Meuschenia galii</i>			
934.	<i>Meuschenia hippocrepis</i>			
935.	<i>Parika scaber</i>			
936.	<i>Scobinichthys granulatus</i>			
<b>Monoscutidae</b>				
937.	<i>Hypomegalopsalis tanisphyros</i>			
<b>Moridae</b>				
938.	<i>Lotella</i> sp.			Y
939.	<i>Pseudophycis barbata</i>			
<b>Motacillidae</b>				
940.	24599 <i>Anthus australis</i> subsp. <i>australis</i> (Australian Pipit)			
941.	24600 <i>Anthus cervinus</i> (Red-throated Pipit)			
<b>Mugilidae</b>				
942.	<i>Liza vaigiensis</i>			
<b>Mullidae</b>				
943.	<i>Upeneus tragula</i>			
<b>Muraenidae</b>				
944.	<i>Gymnothorax prasinus</i>			
945.	<i>Gymnothorax richardsoni</i>			
<b>Muridae</b>				
946.	24215 <i>Hydromys chrysogaster</i> (Water-rat, Rakali)		P4	
947.	24223 <i>Mus musculus</i> (House Mouse)	Y		
948.	24230 <i>Pseudomys albocinereus</i> (Ash-grey Mouse)			
949.	24243 <i>Rattus fuscipes</i> (Western Bush Rat)			
950.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
<b>Mycoblastaceae</b>				
951.	35477 <i>Tephromela alectoronica</i>			
952.	28068 <i>Tephromela atra</i>			
<b>Myobatrachidae</b>				
953.	25398 <i>Crinia georgiana</i> (Quacking Frog)			
954.	25399 <i>Crinia glauerti</i> (Clicking Frog)			
955.	25401 <i>Crinia pseudinsignifera</i> (Bleating Froglet)			
956.	25402 <i>Crinia subinsignifera</i> (South Coast Froglet)			
957.	25404 <i>Geocrinia leai</i> (Ticking Frog)			
958.	25433 <i>Pseudophryne guentheri</i> (Crawling Toadlet)			
<b>Myrtaceae</b>				
959.	5315 <i>Actinodium cunninghamii</i> (Albany Daisy)			
960.	5316 <i>Agonis flexuosa</i> (Peppermint, Wonil)			
961.	17202 <i>Agonis flexuosa</i> var. <i>flexuosa</i>			
962.	19789 <i>Agonis theiformis</i>			
963.	20361 <i>Astartea arbuscula</i> (Minute Astartea)			
964.	20125 <i>Astartea corniculata</i>			
965.	20127 <i>Astartea glomerulosa</i> (Early Astartea)			
966.	45213 <i>Astartea pulchella</i>			
967.	20283 <i>Astartea scoparia</i> (Common Astartea)			
968.	42820 <i>Astartea transversa</i>		P2	
969.	5364 <i>Baeckea pygmaea</i>			
970.	5376 <i>Beaufortia anisandra</i> (Dark Beaufortia)			
971.	5379 <i>Beaufortia cyrtodonta</i> (Stirling Range Bottlebrush, Stirling Range Beaufortia)			
972.	5381 <i>Beaufortia decussata</i> (Gravel Bottlebrush)			

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973.	5392 <i>Beaufortia sparsa</i> (Swamp Bottlebrush)			
974.	5394 <i>Callistemon glaucus</i>			
975.	5415 <i>Calothamnus lateralis</i>			
976.	5425 <i>Calothamnus preissii</i>			
977.	5430 <i>Calothamnus schaueri</i>			
978.	5440 <i>Calytrix asperula</i> (Brush Starflower)			
979.	5458 <i>Calytrix flavescens</i> (Summer Starflower)			
980.	48451 <i>Calytrix hirta</i>			
981.	5491 <i>Chamelaucium ciliatum</i>			
982.	5501 <i>Conothamnus neglectus</i>			
983.	17104 <i>Corymbia calophylla</i> (Marri)			
984.	5519 <i>Darwinia oederoides</i>			
985.	5533 <i>Darwinia vestita</i> (Pom-pom Darwinia)			
986.	45244 <i>Ericomyrtus serpyllifolia</i>			
987.	5550 <i>Eucalyptus angulosa</i> (Ridge-fruited Mallee, Kwararl)			
988.	5605 <i>Eucalyptus cornuta</i> (Yate, Yeid)			
989.	5616 <i>Eucalyptus decurva</i> (Slender Mallee)			
990.	5625 <i>Eucalyptus diversicolor</i> (Karri)			
991.	5627 <i>Eucalyptus doratoxylon</i> (Spearwood Mallee, Keidjgund)			
992.	5643 <i>Eucalyptus falcata</i> (Silver Mallet, Dulyumuk)			
993.	18216 <i>Eucalyptus globulus</i>	Y		
994.	11458 <i>Eucalyptus goniantha</i> subsp. <i>goniantha</i> (Jerdacuttup Mallee)			
995.	5704 <i>Eucalyptus macrandra</i> (Long-flowered Marlock, Dwed)			
996.	13547 <i>Eucalyptus marginata</i> subsp. <i>marginata</i> (Jarrah)			
997.	5709 <i>Eucalyptus megacarpa</i> (Bullich, Pulidj)			
998.	42063 <i>Eucalyptus notactites</i>			
999.	5723 <i>Eucalyptus occidentalis</i> (Flat-topped Yate, Moidj)			
1000.	5739 <i>Eucalyptus patens</i> (Swan River Blackbutt, Dwuda)			
1001.	5776 <i>Eucalyptus staeri</i> (Albany Blackbutt)			
1002.	5816 <i>Homalospermum firmum</i>			
1003.	5817 <i>Hypocalymma angustifolium</i> (White Myrtle, Kudjid)			
1004.	5818 <i>Hypocalymma cordifolium</i>			
1005.	13106 <i>Hypocalymma scarosum</i>			
1006.	5827 <i>Hypocalymma strictum</i>			
1007.	44873 <i>Kunzea ambigua</i>	Y		
1008.	17512 <i>Kunzea clavata</i>			
1009.	5832 <i>Kunzea ericifolia</i> (Spearwood, Pondil)			
1010.	17506 <i>Kunzea ericifolia</i> subsp. <i>ericifolia</i>			
1011.	5835 <i>Kunzea micrantha</i>			
1012.	5841 <i>Kunzea recurva</i>			
1013.	5850 <i>Leptospermum laevigatum</i> (Coast Teatree)	Y		
1014.	5853 <i>Leptospermum oligandrum</i>			
1015.	18184 <i>Melaleuca croxfordiae</i>			
1016.	5902 <i>Melaleuca densa</i>			
1017.	5905 <i>Melaleuca diosmitolia</i>			
1018.	5938 <i>Melaleuca microphylla</i>			
1019.	5946 <i>Melaleuca pauciflora</i>			
1020.	5948 <i>Melaleuca pentagona</i>			
1021.	5952 <i>Melaleuca preissiana</i> (Moonah)			
1022.	13277 <i>Melaleuca ringens</i>		P3	
1023.	5968 <i>Melaleuca spathulata</i>			
1024.	5971 <i>Melaleuca striata</i>			
1025.	5980 <i>Melaleuca thymoides</i>			
1026.	5987 <i>Melaleuca viminea</i> (Mohan)			
1027.	11109 <i>Pericalymma crassipes</i>			
1028.	6006 <i>Pericalymma ellipticum</i> (Swamp Teatree)			
1029.	15501 <i>Pericalymma spongiocaula</i>			
1030.	6014 <i>Regelia inops</i>			
1031.	6027 <i>Rinzia schollerifolia</i> (Cranberry Rinzia)			
1032.	20100 <i>Taxandria angustifolia</i>			
1033.	20105 <i>Taxandria conspicua</i> subsp. <i>conspicua</i>			
1034.	20114 <i>Taxandria fragrans</i>			
1035.	20115 <i>Taxandria juniperina</i>			
1036.	20135 <i>Taxandria linearifolia</i>			
1037.	20134 <i>Taxandria marginata</i>			
1038.	20133 <i>Taxandria parviceps</i>			
1039.	12424 <i>Verticordia fimbripes</i> subsp. <i>australis</i>		T	
1040.	6084 <i>Verticordia habrantha</i> (Hidden Featherflower)			
1041.	15618 <i>Verticordia plumosa</i> var. <i>plumosa</i>			

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<b>Nannopercidae</b>				
1042.	<i>Edelia vittata</i>			
1043.	34033 <i>Nannatherina balstoni</i> (Balston's Pygmy Perch)		T	
<b>Nemeseiidae</b>				
1044.	<i>Aname tepperi</i>			
<b>Neobalaenidae</b>				
1045.	24072 <i>Caperea marginata</i> (Pygmy Right Whale)			
<b>Neosebastidae</b>				
1046.	<i>Maxillcosta scabriceps</i>			
<b>Neositidae</b>				
1047.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
1048.	24606 <i>Daphoenositta chrysoptera subsp. pileata</i> (Varied Sittella, Black-capped Sittella)			
<b>Nomeidae</b>				
1049.	<i>Cubiceps cf. baxteri</i>			Y
<b>Notonectidae</b>				
1050.	<i>Notonectidae sp.</i>			
<b>Odacidae</b>				
1051.	<i>Odax acroptilus</i>			
1052.	<i>Odax cyanomelas</i>			
<b>Odontaspidae</b>				
1053.	34034 <i>Carcharias taurus</i> (Grey Nurse Shark)		T	
<b>Olacaceae</b>				
1054.	2365 <i>Olax benthamiana</i>			
1055.	2366 <i>Olax phyllanthi</i>			
<b>Oligochaeta</b>				
1056.	<i>Oligochaeta sp.</i>			
<b>Onagraceae</b>				
1057.	6133 <i>Epilobium hirtigerum</i> (Hairy Willow Herb)			
1058.	14292 <i>Oenothera stricta subsp. stricta</i>	Y		
<b>Ophichthidae</b>				
1059.	<i>Muraenichthys breviceps</i>			
1060.	<i>Ophisurus serpens</i>			
<b>Oplegnathidae</b>				
1061.	<i>Oplegnathus woodwardi</i>			
<b>Orchidaceae</b>				
1062.	1581 <i>Caladenia corynephora</i>			
1063.	10776 <i>Caladenia ensata</i>			
1064.	15348 <i>Caladenia flava subsp. flava</i>			
1065.	15350 <i>Caladenia flava subsp. sylvestris</i>			
1066.	15353 <i>Caladenia heberleana</i>			
1067.	15362 <i>Caladenia longicauda subsp. crassa</i>			
1068.	1603 <i>Caladenia longiclavata</i> (Clubbed Spider Orchid)			
1069.	15371 <i>Caladenia nana subsp. nana</i>			
1070.	15372 <i>Caladenia nana subsp. unita</i>			
1071.	1609 <i>Caladenia pectinata</i> (King Spider Orchid)			
1072.	15375 <i>Caladenia pholcoidea</i>			
1073.	1610 <i>Caladenia plicata</i> (Crab-lipped Spider Orchid)			
1074.	15379 <i>Caladenia serotina</i>			
1075.	1589 <i>Caladenia x ericksoniae</i>			
1076.	33160 <i>Calochilus uliginosus</i>			
1077.	12935 <i>Corybas abditus</i>		P3	
1078.	12946 <i>Corybas limpidus</i>		P4	
1079.	1627 <i>Cryptostylis ovata</i> (Slipper Orchid)			
1080.	15114 <i>Cyanicula gemmata</i>			
1081.	15404 <i>Cyanicula sericea</i>			
1082.	10964 <i>Cyrtostylis robusta</i>			
1083.	10942 <i>Cyrtostylis tenuissima</i>			
1084.	19649 <i>Disa bracteata</i>	Y		
1085.	1632 <i>Diuris emarginata</i> (Tall Donkey Orchid)			
1086.	1633 <i>Diuris laevis</i> (Nannygoat Orchid)			
1087.	46873 <i>Diuris littoralis</i>			
1088.	1640 <i>Drakaea glyptodon</i> (King-in-his-carriage)			
1089.	15406 <i>Drakaea gracilis</i>			

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1090.	11156 <i>Drakaea livida</i>			
1091.	1642 <i>Drakaea thynniphila</i>			
1092.	1643 <i>Elythranchera brunonis</i> (Purple Enamel Orchid)			
1093.	1644 <i>Elythranchera emarginata</i> (Pink Enamel Orchid)			
1094.	1645 <i>Epiblema grandiflorum</i> (Babe-in-a-cradle)			
1095.	1646 <i>Eriochilus dilatatus</i> (White Bunny Orchid)			
1096.	15412 <i>Eriochilus dilatatus</i> subsp. <i>multiflorus</i>			
1097.	15415 <i>Eriochilus scaber</i> subsp. <i>scaber</i>			
1098.	15416 <i>Eriochilus valens</i>			
1099.	12932 <i>Gastrodia lacista</i>			
1100.	1653 <i>Leporella fimbriata</i> (Hare Orchid)			
1101.	15418 <i>Leptoceras menziesii</i>			
1102.	1656 <i>Lyperanthus serratus</i> (Rattle Beak Orchid)			
1103.	1657 <i>Microtis alba</i> (White Mignonette Orchid)			
1104.	34158 <i>Microtis alboboviridis</i>			
1105.	1658 <i>Microtis atrata</i> (Swamp Mignonette Orchid)			
1106.	8814 <i>Microtis brownii</i>			
1107.	12199 <i>Microtis familiaris</i>			
1108.	1659 <i>Microtis globula</i> (South-coast Mignonette Orchid)		T	
1109.	15419 <i>Microtis media</i> subsp. <i>media</i>			
1110.	1660 <i>Microtis orbicularis</i> (Dark Mignonette Orchid)			
1111.	1662 <i>Microtis pulchella</i> (Beautiful Mignonette Orchid)		P4	
1112.	23483 <i>Paracaleana brockmanii</i>			
1113.	23504 <i>Paracaleana disjuncta</i>			
1114.	23500 <i>Paracaleana hortiorum</i>			
1115.	1667 <i>Paracaleana nigrita</i> (Flying Duck Orchid)			
1116.	20460 <i>Pheledenia deformis</i>			
1117.	15424 <i>Praecoxanthus aphyllus</i>			
1118.	1668 <i>Prasophyllum brownii</i>			
1119.	11066 <i>Prasophyllum cucullatum</i> (Hooded Leek Orchid)			
1120.	1671 <i>Prasophyllum elatum</i> (Tall Leek Orchid)			
1121.	1672 <i>Prasophyllum fimbria</i> (Fringed Leek Orchid)			
1122.	1674 <i>Prasophyllum giganteum</i> (Bronze Leek Orchid)			
1123.	16688 <i>Prasophyllum gracile</i>			
1124.	1676 <i>Prasophyllum hians</i> (Yawning Leek Orchid)			
1125.	1677 <i>Prasophyllum macrostachyum</i> (Laughing Leek Orchid)			
1126.	1680 <i>Prasophyllum parvifolium</i> (Autumn Leek Orchid)			
1127.	48478 <i>Prasophyllum paulinae</i> (Pauline's Laughing Leek Orchid)		P1	
1128.	1681 <i>Prasophyllum regium</i> (King Leek Orchid)			
1129.	44084 <i>Prasophyllum</i> sp. <i>early</i> (G. Brockman GBB 1626)			
1130.	1683 <i>Prasophyllum triangulare</i> (Dark Leek Orchid)			
1131.	17267 <i>Pterostylis brevisepala</i>			
1132.	48485 <i>Pterostylis heberlei</i>		P2	
1133.	44725 <i>Pterostylis microphylla</i>			
1134.	11118 <i>Pterostylis pyramidalis</i> (Snail Orchid)			
1135.	1694 <i>Pterostylis rogersii</i> (Curled-tongue Shell Orchid)			
1136.	<i>Pterostylis</i> sp.			
1137.	18655 <i>Pterostylis</i> sp. <i>crinkled leaf</i> (G.J. Keighery 13426)			
1138.	10998 <i>Pterostylis turfosa</i> (Bird Orchid)			
1139.	1698 <i>Pterostylis vittata</i> (Banded Greenhood)			
1140.	16367 <i>Pyrorchis nigricans</i> (Red beaks, Elephants ears)			
1141.	10856 <i>Thelymitra benthamiana</i> (Leopard Orchid)			
1142.	1703 <i>Thelymitra canaliculata</i> (Blue Sun Orchid)			
1143.	1705 <i>Thelymitra crinita</i> (Blue Lady Orchid)			
1144.	1706 <i>Thelymitra cucullata</i> (Swamp Sun Orchid)			
1145.	1707 <i>Thelymitra flexuosa</i> (Twisted Sun Orchid)			
1146.	11143 <i>Thelymitra graminea</i>			
1147.	11053 <i>Thelymitra macrophylla</i>			
1148.	1710 <i>Thelymitra mucida</i> (Plum Orchid)			
1149.	1715 <i>Thelymitra spiralis</i> (Curlylocks)			
1150.	1716 <i>Thelymitra tigrina</i> (Tiger Orchid)			
1151.	20727 <i>Thelymitra uliginosa</i>			
1152.	1717 <i>Thelymitra variegata</i> (Queen of Sheba)		P2	
1153.	20737 <i>X Cyanthera glossodioides</i>			
<b>Orectolobidae</b>				
1154.	<i>Orectolobus hutchinsi</i>			
1155.	<i>Sutorectus tentaculatus</i>			
<b>Orobanchaceae</b>				
1156.	15037 <i>Bartsia trixago</i>	Y		

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
1157.	7122 <i>Orobanche minor</i> (Lesser Broomrape)	Y		
1158.	7090 <i>Parentucellia viscosa</i> (Sticky Bartsia)	Y		
<b>Orsolobidae</b>				
1159.	<i>Australobus torbay</i>			
1160.	<i>Tasmanoonops mainae</i>			
<b>Orthotrichaceae</b>				
1161.	36218 <i>Zygodon menziesii</i>			
<b>Ostraciidae</b>				
1162.	<i>Lactoria concatenatus</i>			
<b>Otariidae</b>				
1163.	24208 <i>Arctocephalus forsteri</i> (New Zealand Fur Seal, long-nosed fur-seal)		S	
1164.	24209 <i>Arctocephalus tropicalis</i> (Subantarctic fur-seal)		T	
1165.	24210 <i>Neophoca cinerea</i> (Australian Sea-lion)		T	
<b>Otididae</b>				
1166.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
<b>Oxalidaceae</b>				
1167.	4356 <i>Oxalis pes-caprae</i> (Soursob)	Y		
1168.	4358 <i>Oxalis purpurea</i> (Largeflower Wood Sorrel)	Y		
<b>Pachycephalidae</b>				
1169.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
1170.	24613 <i>Colluricincla harmonica</i> subsp. <i>rufiventris</i> (Grey Shrike-thrush)			
1171.	25677 <i>Falcunculus frontatus</i> (Crested Shrike-tit)			
1172.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
1173.	34011 <i>Oreoica gutturalis</i> subsp. <i>gutturalis</i> (Crested Bellbird (southern))			
1174.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
1175.	24624 <i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i> (Rufous Whistler)			
<b>Palaemonidae</b>				
1176.	<i>Palaemonidae</i> sp.			
<b>Pannariaceae</b>				
1177.	18016 <i>Degelia flabellata</i>		P2	
1178.	27709 <i>Degelia subcrustata</i>			
<b>Papaveraceae</b>				
1179.	2969 <i>Fumaria capreolata</i> (Whiteflower Fumitory)	Y		
1180.	31532 <i>Fumaria muralis</i> subsp. <i>muralis</i>	Y		
<b>Paradoxosomatidae</b>				
1181.	<i>Akamptogonus novarae</i>			
<b>Pararchaeidae</b>				
1182.	<i>Ozarchaea westraliensis</i>			
<b>Parascylliidae</b>				
1183.	<i>Parascyllum variolatum</i>			
<b>Parastacidae</b>				
1184.	33939 <i>Cherax cainii</i> (Marron)			
1185.	<i>Cherax destructor</i>			
1186.	<i>Cherax preissii</i>			
1187.	<i>Parastacidae</i> sp.			
<b>Pardalotidae</b>				
1188.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
1189.	24625 <i>Pardalotus punctatus</i> subsp. <i>punctatus</i> (Spotted Pardalote)			
1190.	24626 <i>Pardalotus punctatus</i> subsp. <i>xanthopyge</i> (Yellow-rumped Pardalote)			
1191.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
<b>Parmeliaceae</b>				
1192.	27743 <i>Flavoparmelia diffracta</i>			
1193.	27748 <i>Flavoparmelia rutidota</i>			
1194.	27787 <i>Hypogymnia subphysodes</i>			
1195.	28218 <i>Hypogymnia subphysodes</i> var. <i>austerodioides</i>			
1196.	28219 <i>Hypogymnia subphysodes</i> var. <i>subphysodes</i>			
1197.	27852 <i>Menegazzia caesiopruinosa</i>			
1198.	27855 <i>Menegazzia subpertusa</i>			
1199.	27919 <i>Parmelinopsis minarum</i>			
1200.	27923 <i>Parmotrema cooperi</i>			
1201.	30458 <i>Parmotrema reticulatum</i>			
1202.	29035 <i>Xanthoparmelia atrobarbatca</i>			

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1203.	28107 <i>Xanthoparmelia australasica</i>			
1204.	28110 <i>Xanthoparmelia burmeisteri</i>			
1205.	28122 <i>Xanthoparmelia dichotoma</i>			
1206.	29033 <i>Xanthoparmelia glabrans</i>			
1207.	28151 <i>Xanthoparmelia mexicana</i>			
1208.	28155 <i>Xanthoparmelia mougeotina</i>			
1209.	29036 <i>Xanthoparmelia pulla</i>			
1210.	<i>Xanthoparmelia</i> sp.			
1211.	28330 <i>Xanthoparmelia subprolixa</i>			
1212.	28181 <i>Xanthoparmelia taractica</i>			
1213.	28182 <i>Xanthoparmelia tasmanica</i>			
1214.	28191 <i>Xanthoparmelia xanthomelaena</i>			
<b>Passeridae</b>				
1215.	24642 <i>Passer montanus</i> (Eurasian Tree Sparrow)	Y		
<b>Pataecidae</b>				
1216.	<i>Neopataecus waterhousii</i>			
<b>Pegasidae</b>				
1217.	<i>Pegasus lancifer</i>			
<b>Pelecanidae</b>				
1218.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
<b>Pelecanoididae</b>				
1219.	24649 <i>Pelecanoides urinatrix</i> subsp. <i>exsul</i> (Common Diving Petrel)			
<b>Pempheridae</b>				
1220.	<i>Pempheris multiradiata</i>			
<b>Pentacerotidae</b>				
1221.	<i>Paristiopterus gallipavo</i>			
<b>Peramelidae</b>				
1222.	48588 <i>Isoodon fusciventer</i> (Quenda, southwestern brown bandicoot)		P4	
<b>Percichthyidae</b>				
1223.	<i>Bostockia porosa</i>			
1224.	<i>Maccullochella peelii</i>			Y
1225.	<i>Nannoperca vittata</i>			
1226.	<i>Polyprion americanus</i>			Y
<b>Percidae</b>				
1227.	<i>Perca fluviatilis</i>			
<b>Peronosporaceae</b>				
1228.	<i>Phytophthora cinnamomi</i>			
<b>Perthidae</b>				
1229.	<i>Perthiidae</i> sp.			
<b>Pertusariaceae</b>				
1230.	27949 <i>Pertusaria leucostomoides</i>			
<b>Petroicidae</b>				
1231.	24651 <i>Eopsaltria australis</i> subsp. <i>griseogularis</i> (Western Yellow Robin)			
1232.	24652 <i>Eopsaltria georgiana</i> (White-breasted Robin)			
1233.	25693 <i>Microeca fascinans</i> (Jacky Winter)			
1234.	48066 <i>Petroica boodang</i> (Scarlet Robin)			
1235.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
<b>Phalacrocoracidae</b>				
1236.	<i>Microcarbo melanoleucos</i>			
1237.	25697 <i>Phalacrocorax carbo</i> (Great Cormorant)			
1238.	24666 <i>Phalacrocorax melanoleucos</i> subsp. <i>melanoleucos</i> (Little Pied Cormorant)			
1239.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
1240.	25699 <i>Phalacrocorax varius</i> (Pied Cormorant)			
<b>Phalangeridae</b>				
1241.	24158 <i>Trichosurus vulpecula</i> subsp. <i>vulpecula</i> (Common Brushtail Possum)			
<b>Phasianidae</b>				
1242.	24671 <i>Coturnix pectoralis</i> (Stubble Quail)			
1243.	25701 <i>Coturnix ypsilophora</i> (Brown Quail)			
1244.	24673 <i>Coturnix ypsilophora</i> subsp. <i>australis</i> (Brown Quail)			
1245.	24672 <i>Coturnix ypsilophora</i> subsp. <i>cervina</i> (Brown Quail)			
<b>Philydraceae</b>				

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1246.	1173 <i>Philydrella pygmaea</i> (Butterfly Flowers)			
<b>Phreatoicidae</b>				
1247.	<i>Phreatoicidae</i> sp.			
<b>Phyllanthaceae</b>				
1248.	4675 <i>Phyllanthus calycinus</i> (False Boronia)			
1249.	4689 <i>Poranthera ericoides</i> (Heath Poranthera)			
1250.	4690 <i>Poranthera huegelii</i>			
1251.	4691 <i>Poranthera microphylla</i> (Small Poranthera)			
<b>Physciaceae</b>				
1252.	27597 <i>Buellia disciformis</i>			
1253.	28308 <i>Pyxine fallax</i>			
<b>Physeteridae</b>				
1254.	24073 <i>Physeter macrocephalus</i> (Sperm Whale)			T
<b>Physidae</b>				
1255.	<i>Physidae</i> sp.			
<b>Phytolaccaceae</b>				
1256.	2793 <i>Phytolacca octandra</i> (Red Ink Plant)	Y		
<b>Pinguipedidae</b>				
1257.	<i>Parapercis haackei</i>			
<b>Pittosporaceae</b>				
1258.	3157 <i>Billardiera floribunda</i> (White-flowered Billardiera)			
1259.	25798 <i>Billardiera fusiformis</i> (Australian Bluebell)			
1260.	3159 <i>Billardiera laxiflora</i>			
1261.	3165 <i>Billardiera variifolia</i>			
1262.	25779 <i>Billardiera venusta</i>			
1263.	16322 <i>Pittosporum undulatum</i>	Y		
<b>Planorbidae</b>				
1264.	<i>Planorbidae</i> sp.			
<b>Plantaginaceae</b>				
1265.	4717 <i>Callitriche stagnalis</i> (Common Starwort)	Y		
1266.	19625 <i>Cymbalaria muralis</i> subsp. <i>muralis</i>	Y		
1267.	14282 <i>Gratiola pubescens</i>			
1268.	7303 <i>Plantago lanceolata</i> (Ribwort Plantain)	Y		
1269.	7108 <i>Veronica arvensis</i> (Wall Speedwell)	Y		
1270.	7110 <i>Veronica distans</i>			
1271.	7112 <i>Veronica plebeia</i> (Creeping Speedwell)			
<b>Platycephalidae</b>				
1272.	<i>Neoplatycephalus conatus</i>			
<b>Plesiopidae</b>				
1273.	<i>Paraplesiops meleagris</i>			
<b>Pleuronectidae</b>				
1274.	<i>Ammotretis rostratus</i>			
<b>Plotosidae</b>				
1275.	<i>Cnidoglanis macrocephalus</i>			
<b>Poaceae</b>				
1276.	185 <i>Aira cupaniana</i> (Silvery Hairgrass)	Y		
1277.	186 <i>Aira elegantissima</i>	Y		
1278.	187 <i>Aira praecox</i> (Early Hairgrass)	Y		
1279.	194 <i>Amphipogon amphipogonoides</i>			
1280.	195 <i>Amphipogon avenaceus</i>			
1281.	197 <i>Amphipogon debilis</i>			
1282.	20184 <i>Amphipogon laguroides</i> subsp. <i>laguroides</i>			
1283.	20196 <i>Amphipogon setaceus</i>			
1284.	200 <i>Amphipogon turbinatus</i>			
1285.	202 <i>Anthoxanthum odoratum</i> (Sweet Vernal Grass)	Y		
1286.	17233 <i>Austrostipa campylachne</i>			
1287.	17242 <i>Austrostipa juncifolia</i>			
1288.	244 <i>Briza maxima</i> (Blowfly Grass)	Y		
1289.	245 <i>Briza minor</i> (Shivery Grass)	Y		
1290.	248 <i>Bromus catharticus</i> (Prairie Grass)	Y		
1291.	249 <i>Bromus diandrus</i> (Great Brome)	Y		
1292.	250 <i>Bromus hordeaceus</i> (Soft Brome)	Y		
1293.	48259 <i>Cortaderia selloana</i> subsp. <i>selloana</i>			

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		Y		
1294.	287 <i>Dactylis glomerata</i> (Cocksfoot)	Y		
1295.	299 <i>Deyeuxia quadriseta</i> (Reed Bentgrass)			
1296.	306 <i>Dichelachne crinita</i> (Longhair Plumegrass)			
1297.	311 <i>Digitaria ciliaris</i> (Summer Grass)	Y		
1298.	11105 <i>Echinochloa crus-galli</i>	Y		
1299.	348 <i>Ehrharta erecta</i> (Panic Veldt Grass)	Y		
1300.	349 <i>Ehrharta longiflora</i> (Annual Veldt Grass)	Y		
1301.	353 <i>Eleusine indica</i> (Crowsfoot Grass)	Y		
1302.	373 <i>Eragrostis brownii</i> (Brown's Lovegrass)			
1303.	376 <i>Eragrostis curvula</i> (African Lovegrass)	Y		
1304.	17043 <i>Glyceria declinata</i>	Y		
1305.	444 <i>Holcus lanatus</i> (Yorkshire Fog)	Y		
1306.	449 <i>Hordeum leporinum</i> (Barley Grass)	Y		
1307.	20019 <i>Lachnagrostis filiformis</i>			
1308.	467 <i>Lagurus ovatus</i> (Hare's Tail Grass)	Y		
1309.	10957 <i>Lolium perenne x rigidum</i>	Y		
1310.	478 <i>Lolium rigidum</i> (Wimmera Ryegrass)	Y		
1311.	485 <i>Microlaena stipoides</i> (Weeping Grass)			
1312.	492 <i>Neurachne alopecuroidea</i> (Foxtail Mulga Grass)			
1313.	516 <i>Parapholis incurva</i> (Coast Barbgrass)	Y		
1314.	527 <i>Paspalum dilatatum</i>	Y		
1315.	557 <i>Piptatherum miliaceum</i> (Rice Millet)	Y		
1316.	571 <i>Poa annua</i> (Winter Grass)	Y		
1317.	577 <i>Poa poliformis</i> (Coastal Poa)			
1318.	578 <i>Poa porphyroclados</i>			
1319.	40426 <i>Rytidosperma occidentale</i>			
1320.	40427 <i>Rytidosperma setaceum</i>			
1321.	19453 <i>Setaria parviflora</i>	Y		
1322.	613 <i>Setaria verticillata</i> (Whorled Pigeon Grass)	Y		
1323.	624 <i>Spinifex hirsutus</i> (Hairy Spinifex)			
1324.	8710 <i>Sporobolus africanus</i> (Parramatta Grass)	Y		
1325.	667 <i>Tetrarrhena laevis</i> (Forest Ricegrass)			
1326.	11137 <i>Vulpia fasciculata</i>	Y		
1327.	724 <i>Vulpia myuros</i> (Rat's Tail Fescue)	Y		
<b>Podargidae</b>				
1328.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
1329.	24679 <i>Podargus strigoides</i> subsp. <i>brachypterus</i> (Tawny Frogmouth)			
<b>Podicipedidae</b>				
1330.	25704 <i>Podiceps cristatus</i> (Great Crested Grebe)			
1331.	24680 <i>Podiceps cristatus</i> subsp. <i>australis</i> (Great Crested Grebe)			
1332.	24681 <i>Polyocephalus polyocephalus</i> (Hoary-headed Grebe)			
1333.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
<b>Poeciliidae</b>				
1334.	<i>Gambusia affinis</i>			
<b>Polycentropodidae</b>				
1335.	<i>Polycentropodidae</i> sp.			
<b>Polygalaceae</b>				
1336.	4550 <i>Comesperma calymega</i> (Blue-spike Milkwort)			
1337.	4552 <i>Comesperma confertum</i>			
1338.	4554 <i>Comesperma flavum</i>			
1339.	4557 <i>Comesperma nudiusculum</i>			
1340.	4559 <i>Comesperma polygaloides</i> (Small Milkwort)			
1341.	4564 <i>Comesperma virgatum</i> (Milkwort)			
1342.	8395 <i>Polygala myrtifolia</i> (Myrtleleaf Milkwort)	Y		
1343.	4578 <i>Polygala virgata</i>	Y		
<b>Polygonaceae</b>				
1344.	13911 <i>Persicaria decipiens</i>			
1345.	2429 <i>Rumex acetosella</i> (Sorrel)	Y		
1346.	2430 <i>Rumex brownii</i> (Swamp Dock)	Y		
1347.	2432 <i>Rumex conglomeratus</i> (Clustered Dock)	Y		
1348.	17994 <i>Rumex obtusifolius</i> subsp. <i>obtusifolius</i>	Y		
1349.	12017 <i>Rumex pulcher</i> subsp. <i>pulcher</i> (Fiddle Dock)	Y		
<b>Pomatostomidae</b>				
1350.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
<b>Potamogetonaceae</b>				



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1351.	110 <i>Potamogeton drummondii</i>			
<b>Potoroidae</b>				
1352.	24162 <i>Bettongia penicillata</i> subsp. <i>ogilbyi</i> (Woylie, Brush-tailed Bettong)		T	
<b>Pottiaceae</b>				
1353.	32315 <i>Barbula calycina</i>			
1354.	36137 <i>Pseudocrossidium crinitum</i>			
1355.	32451 <i>Triquetrella papillata</i>			
<b>Primulaceae</b>				
1356.	36375 <i>Lysimachia arvensis</i> (Pimpernel)	Y		
1357.	6483 <i>Samolus junceus</i>			
1358.	6484 <i>Samolus repens</i> (Creeping Brookweed)			
<b>Pristiophoridae</b>				
1359.	<i>Pristiophorus cirratus</i>			
<b>Procellariidae</b>				
1360.	41326 <i>Ardenna carneipes</i> (Flesh-footed Shearwater, Fleishy-footed Shearwater)		T	
1361.	24690 <i>Macronectes giganteus</i> (Southern Giant Petrel)		IA	
1362.	<i>Pterodroma macroptera</i> subsp. <i>macroptera</i>			
1363.	24711 <i>Puffinus assimilis</i> subsp. <i>assimilis</i> (Little Shearwater)			
<b>Prodidomidae</b>				
1364.	<i>Molycrta quadricauda</i>			
1365.	<i>Nomindra leeuweni</i>			
<b>Proteaceae</b>				
1366.	10824 <i>Acidonia microcarpa</i>			
1367.	1769 <i>Adenanthos apiculatus</i>			
1368.	1773 <i>Adenanthos cuneatus</i> (Coastal Jugflower)			
1369.	1791 <i>Adenanthos obovatus</i> (Basket Flower)			
1370.	1794 <i>Adenanthos sericeus</i> (Woolly Bush)			
1371.	11685 <i>Adenanthos sericeus</i> subsp. <i>sericeus</i> (Coastal Woollybush)			
1372.	16876 <i>Adenanthos x cunninghamii</i>		P4	
1373.	32684 <i>Banksia arctotidis</i>			
1374.	1800 <i>Banksia attenuata</i> (Slender Banksia, Piara)			
1375.	32676 <i>Banksia biterax</i>			
1376.	1806 <i>Banksia brownii</i> (Feather-leaved Banksia)		T	
1377.	1811 <i>Banksia coccinea</i> (Scarlet Banksia)			
1378.	32616 <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i>			
1379.	1814 <i>Banksia dryandroides</i> (Dryandra-leaved Banksia)			
1380.	32525 <i>Banksia formosa</i> (Showy Dryandra)			
1381.	1817 <i>Banksia gardneri</i> (Prostrate Banksia)			
1382.	11764 <i>Banksia gardneri</i> var. <i>brevidentata</i>			
1383.	11532 <i>Banksia gardneri</i> var. <i>gardneri</i>			
1384.	1818 <i>Banksia goodii</i> (Good's Banksia)		T	
1385.	1819 <i>Banksia grandis</i> (Bull Banksia, Pulgarla)			
1386.	1822 <i>Banksia ilicifolia</i> (Holly-leaved Banksia)			
1387.	1830 <i>Banksia littoralis</i> (Swamp Banksia, Pungura)			
1388.	<i>Banksia marginata</i>			
1389.	32207 <i>Banksia mucronulata</i> (Swordfish Dryandra)			
1390.	32202 <i>Banksia nivea</i> (Honeypot Dryandra, Pudjam)			
1391.	11941 <i>Banksia nutans</i> var. <i>cernuella</i>			
1392.	1837 <i>Banksia occidentalis</i> (Red Swamp Banksia)			
1393.	1841 <i>Banksia praemorsa</i> (Cut-leaf Banksia)			
1394.	1844 <i>Banksia quercifolia</i> (Oak-leaved Banksia)			
1395.	32085 <i>Banksia seneciifolia</i>		P4	
1396.	32084 <i>Banksia serra</i> (Serrate-leaved Dryandra)		P4	
1397.	32080 <i>Banksia sessilis</i> var. <i>sessilis</i>			
1398.	1851 <i>Banksia sphaerocarpa</i> (Round-fruit Banksia)			
1399.	12111 <i>Banksia sphaerocarpa</i> var. <i>sphaerocarpa</i> (Fox Banksia)			
1400.	32044 <i>Banksia squarrosa</i> (Pingle)			
1401.	32045 <i>Banksia squarrosa</i> subsp. <i>squarrosa</i>			
1402.	1854 <i>Banksia verticillata</i> (Albany Banksia)		T	
1403.	1862 <i>Conospermum caeruleum</i> (Blue Brother)			
1404.	15610 <i>Conospermum caeruleum</i> subsp. <i>caeruleum</i>			
1405.	1863 <i>Conospermum capitatum</i>			
1406.	14723 <i>Conospermum coeruleascens</i> subsp. <i>adpressum</i>			
1407.	1872 <i>Conospermum flexuosum</i> (Tangled Smokebush)			
1408.	17109 <i>Conospermum flexuosum</i> subsp. <i>flexuosum</i>			
1409.	1873 <i>Conospermum floribundum</i>			
1410.	1879 <i>Conospermum petiolare</i>			

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1411.	1883 <i>Conospermum teretifolium</i> (Spider Smokebush)			
1412.	1944 <i>Franklandia fucifolia</i> (Lanoline Bush)			
1413.	1987 <i>Grevillea depauperata</i>			
1414.	2005 <i>Grevillea fasciculata</i>			
1415.	2052 <i>Grevillea occidentalis</i>			
1416.	2078 <i>Grevillea pulchella</i> (Beautiful Grevillea)			
1417.	15991 <i>Grevillea pulchella</i> subsp. <i>pulchella</i>			
1418.	2112 <i>Grevillea trifida</i>			
1419.	2115 <i>Grevillea umbellulata</i>			
1420.	2128 <i>Hakea amplexicaulis</i> (Prickly Hakea)			
1421.	2137 <i>Hakea ceratophylla</i> (Horned Leaf Hakea)			
1422.	2150 <i>Hakea cucullata</i> (Hood Leaved Hakea)			
1423.	12227 <i>Hakea drupacea</i>			
1424.	2160 <i>Hakea ferruginea</i>			
1425.	2162 <i>Hakea florida</i>			
1426.	2169 <i>Hakea lasiantha</i> (Woolly Flowered Hakea)			
1427.	2174 <i>Hakea linearis</i>			
1428.	2191 <i>Hakea oleifolia</i> (Dungyn)			
1429.	2197 <i>Hakea prostrata</i> (Harsh Hakea)			
1430.	2203 <i>Hakea ruscifolia</i> (Candle Hakea)			
1431.	2212 <i>Hakea sulcata</i> (Furrowed Hakea)			
1432.	2214 <i>Hakea trifurcata</i> (Two-leaf Hakea)			
1433.	16640 <i>Hakea tuberculata</i>			
1434.	2215 <i>Hakea undulata</i> (Wavy-leaved Hakea)			
1435.	2216 <i>Hakea varia</i> (Variable-leaved Hakea)			
1436.	2222 <i>Isopogon attenuatus</i>			
1437.	2223 <i>Isopogon axillaris</i>			
1438.	12908 <i>Isopogon buxifolius</i> var. <i>buxifolius</i>		P2	
1439.	2226 <i>Isopogon cuneatus</i> (Coneflower)			
1440.	16880 <i>Isopogon formosus</i> subsp. <i>formosus</i>			
1441.	2233 <i>Isopogon longifolius</i>			
1442.	2237 <i>Isopogon sphaerocephalus</i> (Drumstick Isopogon)			
1443.	2238 <i>Isopogon teretifolius</i> (Nodding Coneflower)			
1444.	2242 <i>Isopogon uncinatus</i>		T	
1445.	14878 <i>Lambertia echinata</i> subsp. <i>citrina</i>			
1446.	2248 <i>Lambertia inermis</i> (Chittick, Djidiok)			
1447.	2250 <i>Lambertia orbifolia</i> (Round-leaf Honeysuckle)			Y
1448.	19187 <i>Lambertia orbifolia</i> subsp. <i>orbifolia</i>		T	
1449.	2253 <i>Lambertia uniflora</i>			
1450.	2262 <i>Persoonia elliptica</i> (Spreading Snottygobble)			
1451.	2264 <i>Persoonia graminea</i>			
1452.	2267 <i>Persoonia longifolia</i> (Snottygobble)			
1453.	2282 <i>Petrophile acicularis</i>			
1454.	2292 <i>Petrophile divaricata</i>			
1455.	2293 <i>Petrophile diversifolia</i>			
1456.	2300 <i>Petrophile longifolia</i> (Long Leaved Cone Bush)			
1457.	2302 <i>Petrophile media</i>			
1458.	2306 <i>Petrophile rigida</i>			
1459.	17765 <i>Petrophile squamata</i> subsp. <i>squamata</i>			
1460.	12910 <i>Stirlingia seselifolia</i>			
1461.	2318 <i>Stirlingia tenuifolia</i>			
1462.	2322 <i>Synaphea favosa</i>			
1463.	2323 <i>Synaphea gracillima</i>			
1464.	16859 <i>Synaphea incurva</i>		P1	
1465.	16866 <i>Synaphea intricata</i>		P3	
1466.	12911 <i>Synaphea obtusata</i>			
1467.	2324 <i>Synaphea petiolaris</i> ( <i>Synaphea</i> )			
1468.	16864 <i>Synaphea petiolaris</i> subsp. <i>petiolaris</i>			
1469.	2326 <i>Synaphea polymorpha</i> ( <i>Albany Synaphea</i> , <i>Pinda</i> )			
1470.	2327 <i>Synaphea preissii</i>		P3	
<b>Pseudocheiridae</b>				
1471.	24166 <i>Pseudocheirus occidentalis</i> (Western Ringtail Possum, <i>ngwayir</i> )		T	
<b>Psittacidae</b>				
1472.	<i>Barnardius zonarius</i>			
1473.	25713 <i>Cacatua galerita</i> (Sulphur-crested Cockatoo)			
1474.	24725 <i>Cacatua roseicapilla</i> subsp. <i>assimilis</i> (Galah)			
1475.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
1476.	24731 <i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black Cockatoo)		T	
1477.	24733 <i>Calyptorhynchus baudinii</i> ( <i>Baudin's Cockatoo</i> , <i>White-tailed Long-billed Black</i> )			

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	<i>Cockatoo</i>		T	
1478.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)		T	
1479.	48400 <i>Calyptorhynchus</i> sp. (white-tailed black cockatoo)		T	
1480.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
1481.	24739 <i>Neophema petrophila</i> (Rock Parrot)			
1482.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
1483.	24745 <i>Platycercus icterotis</i> subsp. <i>icterotis</i> (Western Rosella)			
1484.	24747 <i>Platycercus spurius</i> (Red-capped Parrot)			
1485.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
1486.	<i>Purpureicephalus spurius</i>			
<b>Psittaculidae</b>				
1487.	48085 <i>Psittacula krameri</i> (Indian Ringnecked Parrot, Rose-ringed Parakeet)	Y		
<b>Pteridaceae</b>				
1488.	31 <i>Cheilanthes austrotenuifolia</i>			
<b>Pygopodidae</b>				
1489.	24994 <i>Aprasia striolata</i> (Lined Worm-lizard)			
1490.	25008 <i>Pygopus lepidopodus</i> (Common Scaly Foot)			
<b>Pyralidae</b>				
1491.	<i>Pyralidae</i> sp.			
<b>Racopilaceae</b>				
1492.	32480 <i>Racopilum cuspidigerum</i> var. <i>convolutaceum</i>			
<b>Rajidae</b>				
1493.	<i>Raja</i> sp.			
<b>Rallidae</b>				
1494.	25727 <i>Fulica atra</i> (Eurasian Coot)			
1495.	24761 <i>Fulica atra</i> subsp. <i>australis</i> (Eurasian Coot)			
1496.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
1497.	25730 <i>Gallirallus philippensis</i> (Buff-banded Rail)			
1498.	24765 <i>Gallirallus philippensis</i> subsp. <i>mellori</i> (Buff-banded Rail)			
1499.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
1500.	24767 <i>Porphyrio porphyrio</i> subsp. <i>bellus</i> (Purple Swamphen)			
1501.	24769 <i>Porzana fluminea</i> (Australian Spotted Crane)			
1502.	25732 <i>Porzana pusilla</i> (Baillon's Crane)			
1503.	24771 <i>Porzana tabuensis</i> (Spotless Crane)			
1504.	48141 <i>Tribonyx ventralis</i> (Black-tailed Native-hen)			
<b>Ramalinaceae</b>				
1505.	27653 <i>Catnaria atropurpurea</i>			
1506.	28030 <i>Ramalina glaucescens</i>			
<b>Ranunculaceae</b>				
1507.	2929 <i>Clematis pubescens</i> (Common Clematis)			
1508.	2933 <i>Ranunculus muricatus</i> (Sharp Buttercup)	Y		
<b>Recurvirostridae</b>				
1509.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
1510.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
1511.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
<b>Resedaceae</b>				
1512.	3084 <i>Reseda lutea</i> (Cutleaf Mingnonette)	Y		
<b>Restionaceae</b>				
1513.	17685 <i>Chaetanthus aristatus</i>			
1514.	1065 <i>Chaetanthus leptocarpoides</i>			
1515.	17687 <i>Chaetanthus tenellus</i>			
1516.	17705 <i>Chordifex abortivus</i>		T	
1517.	17828 <i>Chordifex isomorphus</i>			
1518.	17689 <i>Chordifex laxus</i>			
1519.	46358 <i>Desmocladius confertospicatus</i>			
1520.	17691 <i>Desmocladius fasciculatus</i>			
1521.	16595 <i>Desmocladius flexuosus</i>			
1522.	1067 <i>Empodisma gracillimum</i>			
1523.	1070 <i>Hypolaena exsulca</i>			
1524.	1071 <i>Hypolaena fastigiata</i>			
1525.	19918 <i>Hypolaena grandiuscula</i>			
1526.	17054 <i>Leptocarpus crassipes</i>		P3	
1527.	46381 <i>Leptocarpus crebriculmis</i>			

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1528.	46375 <i>Leptocarpus decipiens</i>			
1529.	46376 <i>Leptocarpus denmarkicus</i>			
1530.	46380 <i>Leptocarpus kraussii</i>			
1531.	19833 <i>Leptocarpus laxus</i>			
1532.	1080 <i>Leptocarpus scariosus</i>			
1533.	46377 <i>Leptocarpus scoparius</i>			
1534.	1082 <i>Leptocarpus tenax</i> (Slender Twine Rush)			
1535.	46383 <i>Leptocarpus tephrius</i>			
1536.	46379 <i>Leptocarpus thysananthus</i>			
1537.	1084 <i>Lepyrodia drummondiana</i>			
1538.	1087 <i>Lepyrodia hermaphrodita</i>			
1539.	1089 <i>Lepyrodia monoica</i>			
1540.	1092 <i>Loxocarya cinerea</i>			
1541.	17682 <i>Melanostachya ustulata</i>			
1542.	14915 <i>Sporadanthus strictus</i>			
1543.	17684 <i>Tremulina tremula</i>			
<b>Rhamnaceae</b>				
1544.	4828 <i>Spyridium globulosum</i> (Basket Bush)			
1545.	14355 <i>Spyridium majoranifolium</i>			
1546.	4833 <i>Spyridium spadicum</i>		P4	
1547.	33438 <i>Trymalium odoratissimum</i> subsp. <i>trifidum</i>			
<b>Rhinobatidae</b>				
1548.	<i>Trygonorrhina fasciata</i>			
<b>Rhizocarpaceae</b>				
1549.	28041 <i>Rhizocarpon polycarpum</i>			
<b>Rosaceae</b>				
1550.	18320 <i>Cotoneaster pannosus</i>	Y		
1551.	20506 <i>Rubus anglocandicans</i>	Y		
<b>Rubiaceae</b>				
1552.	7348 <i>Opercularia hispidula</i> (Hispid Stinkweed)			
1553.	18255 <i>Opercularia vaginata</i> (Dog Weed)			
<b>Russulaceae</b>				
1554.	<i>Cystangium pisiglarea</i>			
<b>Rutaceae</b>				
1555.	4403 <i>Boronia alata</i> (Winged Boronia)			
1556.	4412 <i>Boronia crassipes</i>		P3	
1557.	4413 <i>Boronia crenulata</i> (Aniseed Boronia)			
1558.	29274 <i>Boronia crenulata</i> subsp. <i>crenulata</i>			
1559.	11503 <i>Boronia crenulata</i> var. <i>crenulata</i>			
1560.	4416 <i>Boronia denticulata</i>			
1561.	4423 <i>Boronia heterophylla</i> (Kalgan Boronia)			
1562.	4426 <i>Boronia juncea</i>			
1563.	16630 <i>Boronia juncea</i> subsp. <i>laniflora</i>			
1564.	16631 <i>Boronia juncea</i> subsp. <i>micrantha</i>			
1565.	16632 <i>Boronia juncea</i> subsp. <i>minima</i>			
1566.	4428 <i>Boronia megastigma</i> (Scented Boronia)			
1567.	4429 <i>Boronia molloyae</i> (Tall Boronia)			
1568.	4441 <i>Boronia spathulata</i> (Boronia)			
1569.	4442 <i>Boronia stricta</i>			
1570.	4443 <i>Boronia subsessilis</i>			
1571.	4447 <i>Boronia virgata</i>		P4	
1572.	4448 <i>Chorilaena quercifolia</i> (Chorilaena)			
1573.	4451 <i>Crowea angustifolia</i> (Crowea)			
1574.	17729 <i>Crowea angustifolia</i> var. <i>platyphylla</i>			
1575.	18547 <i>Rhadinothamnus anceps</i>			
<b>Santalaceae</b>				
1576.	2335 <i>Choretrum lateriflorum</i> (Dwarf Sour Bush)			
1577.	10907 <i>Exocarpos odoratus</i> (Scented Ballart)			
1578.	10765 <i>Exocarpos sparteus</i> (Broom Ballart, Djuk)			
1579.	17703 <i>Leptomeria ellytes</i>			
1580.	2345 <i>Leptomeria ericoides</i>			
1581.	2347 <i>Leptomeria lehmannii</i>			
1582.	2350 <i>Leptomeria pauciflora</i> (Sparse-flowered Currant Bush)			
1583.	2353 <i>Leptomeria scrobiculata</i>			
1584.	2355 <i>Leptomeria squarrolosa</i>			

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<b>Sapindaceae</b>				
1585.	4757 <i>Dodonaea ceratocarpa</i>			
<b>Scincidae</b>				
1586.	25027 <i>Ctenotus australis</i>			
1587.	25031 <i>Ctenotus catenifer</i>			
1588.	25049 <i>Ctenotus labillardieri</i>			
1589.	25096 <i>Egernia kingii (King's Skink)</i>			
1590.	25100 <i>Egernia napoleonis</i>			
1591.	30919 <i>Hemiergis gracilipes (skink)</i>			
1592.	25117 <i>Hemiergis peronii subsp. peronii</i>			
1593.	41416 <i>Liopholis pulchra subsp. pulchra (South-western Rock Skink, Spectacled Rock Skink)</i>			
1594.	42413 <i>Lissolepis luctuosa (Western Swamp Skink)</i>			
1595.	25203 <i>Tiliqua occipitalis (Western Bluetongue)</i>			
1596.	25207 <i>Tiliqua rugosa subsp. rugosa</i>			
<b>Sciomyzidae</b>				
1597.	<i>Sciomyzidae sp.</i>			
<b>Scolopacidae</b>				
1598.	41323 <i>Actitis hypoleucos (Common Sandpiper)</i>		IA	
1599.	24780 <i>Calidris alba (Sanderling)</i>		IA	
1600.	25738 <i>Calidris canutus (Red Knot, knot)</i>		IA	
1601.	24784 <i>Calidris ferruginea (Curlew Sandpiper)</i>		T	
1602.	24788 <i>Calidris ruficollis (Red-necked Stint)</i>		IA	
1603.	24790 <i>Calidris tenuirostris (Great Knot)</i>		T	
1604.	30932 <i>Limosa lapponica (Bar-tailed Godwit)</i>		IA	
1605.	24802 <i>Philomachus pugnax (Ruff, reeve)</i>		IA	
1606.	24806 <i>Tringa glareola (Wood Sandpiper)</i>		IA	
1607.	24808 <i>Tringa nebularia (Common Greenshank, greenshank)</i>		IA	
<b>Scolopendridae</b>				
1608.	<i>Cormocephalus aurantiipes</i>			
1609.	<i>Cormocephalus michaelsoni</i>			
<b>Scomberesocidae</b>				
1610.	<i>Scomberesox saurus</i>			
<b>Scombridae</b>				
1611.	<i>Auxis thazard</i>			
1612.	<i>Thunnus alalunga</i>			
1613.	<i>Thunnus maccoyii</i>			
<b>Scorpididae</b>				
1614.	<i>Tilodon sexfasciatum</i>			
<b>Scrophulariaceae</b>				
1615.	7292 <i>Myoporum oppositifolium (Twin-leaf Myoporum)</i>			
<b>Scyliorhinidae</b>				
1616.	<i>Aulohaelurus labiosus</i>			
1617.	<i>Aulohaelurus labiosus?</i>			
<b>Sebastidae</b>				
1618.	<i>Helicolenus percoides</i>			
<b>Selaginellaceae</b>				
1619.	6 <i>Selaginella gracillima (Tiny Clubmoss)</i>			
<b>Sematophyllaceae</b>				
1620.	32483 <i>Sematophyllum subhumile var. contiguum</i>			
<b>Serranidae</b>				
1621.	<i>Acanthistius serratus</i>			
1622.	<i>Caesiooperca rasor</i>			
1623.	<i>Caesiocorpsis theagenes</i>			
1624.	<i>Epinephelides armatus</i>			
<b>Sillaginidae</b>				
1625.	<i>Sillaginodes punctata</i>			
1626.	<i>Sillago bassensis</i>			
<b>Simuliidae</b>				
1627.	<i>Simuliidae sp.</i>			
<b>Siphonocladaceae</b>				
1628.	26770 <i>Dictyosphaeria sericea</i>			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
<b>Siphonotidae</b>				
1629.	<i>Siphonotus flavomarginatus</i>			
<b>Solanaceae</b>				
1630.	6950 <i>Anthocercis viscosa</i> (Sticky Tailflower)			
1631.	11505 <i>Anthocercis viscosa</i> subsp. <i>viscosa</i>			
1632.	7017 <i>Solanum laciniatum</i> (Kangaroo Apple)	Y		
1633.	7022 <i>Solanum nigrum</i> (Black Berry Nightshade)	Y		
<b>Soleidae</b>				
1634.	<i>Aseraggodes haackeanus</i>			
1635.	<i>Synaptura hediste</i>			
1636.	<i>Zebrias cancellatus</i>			
<b>Sparassidae</b>				
1637.	<i>Isopeda leishmanni</i>			
1638.	<i>Isopedella cana</i>			
<b>Sphaeriidae</b>				
1639.	<i>Sphaeriidae</i> sp.			
<b>Spheniscidae</b>				
1640.	24818 <i>Eudyptula minor</i> subsp. <i>novaehollandiae</i> (Little Penguin)			
<b>Sphyraenidae</b>				
1641.	<i>Sphyraena barracuda</i>			
<b>Sphyrnidae</b>				
1642.	<i>Sphyrna lewini</i>			
<b>Stereocaulaceae</b>				
1643.	41263 <i>Lepraria squamatica</i>			
<b>Stratiomyidae</b>				
1644.	<i>Stratiomyidae</i> sp.			
<b>Sturnidae</b>				
1645.	25752 <i>Sturnus vulgaris</i> (Common Starling)	Y		
1646.	24824 <i>Sturnus vulgaris</i> subsp. <i>vulgaris</i> (Common Starling)	Y		
<b>Stylidiaceae</b>				
1647.	7673 <i>Levenhookia pauciflora</i> (Deceptive Stylewort)			
1648.	7676 <i>Levenhookia pusilla</i> (Midget Stylewort)			
1649.	39881 <i>Stylidium acuminatum</i> subsp. <i>meridionale</i>			
1650.	7684 <i>Stylidium amoenum</i> (Lovely Triggerplant)			
1651.	39880 <i>Stylidium angustifolium</i> subsp. <i>glaucofolium</i>			
1652.	7687 <i>Stylidium assimile</i> (Bronze-leaved Triggerplant)			
1653.	7689 <i>Stylidium beauleholei</i>			
1654.	7695 <i>Stylidium caespitosum</i> (Fly-away Triggerplant)			
1655.	7696 <i>Stylidium calcaratum</i> (Book Triggerplant)			
1656.	7708 <i>Stylidium crassifolium</i> (Thick-leaved Triggerplant)			
1657.	7712 <i>Stylidium despectum</i> (Dwarf Triggerplant)			
1658.	31355 <i>Stylidium diademum</i>			
1659.	7718 <i>Stylidium diversifolium</i> (Touch-me-not)			
1660.	7724 <i>Stylidium falcatum</i> (Slender Beaked Triggerplant)			P1
1661.	7725 <i>Stylidium fasciculatum</i> (Pale Beaked Triggerplant)			
1662.	20691 <i>Stylidium gloeophyllum</i>			P4
1663.	7734 <i>Stylidium guttatum</i> (Dotted Triggerplant)			
1664.	7735 <i>Stylidium hirsutum</i> (Hairy Triggerplant)			
1665.	7738 <i>Stylidium imbricatum</i> (Tile Leaved Triggerplant)			
1666.	7742 <i>Stylidium inundatum</i> (Hundreds and Thousands)			
1667.	7745 <i>Stylidium junceum</i> (Reed Triggerplant)			
1668.	7757 <i>Stylidium luteum</i> (Yellow Triggerplant)			
1669.	25851 <i>Stylidium nymphaeum</i>			
1670.	7774 <i>Stylidium piliferum</i> (Common Butterfly Triggerplant)			
1671.	7776 <i>Stylidium plantagineum</i> (Plantagenet Triggerplant)			
1672.	7778 <i>Stylidium pritzelianum</i> (Royal Triggerplant)			
1673.	7782 <i>Stylidium pulchellum</i> (Thumbelina Triggerplant)			
1674.	7784 <i>Stylidium pygmaeum</i> (Pygmy Triggerplant)			
1675.	7785 <i>Stylidium repens</i> (Matted Triggerplant)			
1676.	7796 <i>Stylidium scandens</i> (Climbing Triggerplant)			
1677.	7798 <i>Stylidium schoenoides</i> (Cow Kicks)			
1678.	<i>Stylidium</i> sp.			
1679.	7799 <i>Stylidium spathulatum</i> (Creamy Triggerplant)			
1680.	7800 <i>Stylidium spinulosum</i> (Topsy-turvy Triggerplant)			
1681.	11223 <i>Stylidium spinulosum</i> subsp. <i>spinulosum</i>			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
1682.	7802 <i>Stylidium squamosotuberosum</i> (Fleshy-rhizomed Trigger Plant)			
1683.	25804 <i>Stylidium thryonides</i>			
1684.	7808 <i>Stylidium violaceum</i> (Violet Triggerplant)			
<b>Sulidae</b>				
1685.	48008 <i>Morus serrator</i> (Australasian Gannet)			
<b>Sylviidae</b>				
1686.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
1687.	24831 <i>Acrocephalus australis</i> subsp. <i>gouldi</i> (Australian Reed Warbler)			
1688.	25758 <i>Megalurus gramineus</i> (Little Grassbird)			
1689.	24838 <i>Megalurus gramineus</i> subsp. <i>gramineus</i> (Little Grassbird)			
<b>Syngnathidae</b>				
1690.	<i>Leptoichthys fistularius</i>			
1691.	34039 <i>Phycodurus eques</i> (Leafy Sea Dragon)		P2	
1692.	<i>Phyllopteryx taeniolatus</i>			
1693.	<i>Solegnathus lettiensis</i>			
1694.	<i>Stigmatopora argus</i>			
1695.	<i>Vanacampus philippi</i>			
1696.	<i>Vanacampus poecilolaemus</i>			
<b>Synodontidae</b>				
1697.	<i>Saurida grandisquamis</i>			
1698.	<i>Saurida undosquamis</i>			
<b>Synthemistidae</b>				
1699.	<i>Synthemistidae</i> sp.			
<b>Talitridae</b>				
1700.	<i>Talitridae</i> sp.			
<b>Tarsipedidae</b>				
1701.	24167 <i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			
<b>Telephlebiidae</b>				
1702.	<i>Telephlebiidae</i> sp.			
<b>Teloschistaceae</b>				
1703.	27625 <i>Caloplaca cinnabarina</i>			
1704.	27638 <i>Caloplaca marina</i>			
1705.	<i>Caloplaca</i> sp.			
1706.	45301 <i>Jackelixia ligulata</i>			
1707.	28065 <i>Teloschistes chrysophthalmus</i>			
1708.	44996 <i>Xanthoria coomae</i>			
1709.	28194 <i>Xanthoria parietina</i>			
<b>Tetragnathidae</b>				
1710.	<i>Pinkfloydia harveii</i>			
1711.	<i>Tetragnatha caudifera</i>			Y
<b>Tetraodontidae</b>				
1712.	<i>Contusus brevicaudus</i>			
1713.	<i>Omegophora armilla</i>			
1714.	<i>Torquigener vicinus</i>			
<b>Tetrarogidae</b>				
1715.	<i>Gymnapistes marmoratus</i>			
<b>Threskiornithidae</b>				
1716.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
1717.	24843 <i>Plegadis falcinellus</i> (Glossy Ibis)		IA	
1718.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
<b>Thuidiaceae</b>				
1719.	32442 <i>Thuidium sparsum</i>			
1720.	32486 <i>Thuidium sparsum</i> var. <i>hastatum</i>			
<b>Thylacomyidae</b>				
1721.	24168 <i>Macrotis lagotis</i> (Bilby, Dalgyte, Ninu)		T	
<b>Thymelaeaceae</b>				
1722.	5231 <i>Pimelea angustifolia</i> (Narrow-leaved Pimelea)			
1723.	11928 <i>Pimelea ciliata</i> subsp. <i>ciliata</i>			
1724.	5239 <i>Pimelea clavata</i>			
1725.	5243 <i>Pimelea ferruginea</i>			
1726.	5249 <i>Pimelea hispida</i> (Bristly Pimelea)			
1727.	5251 <i>Pimelea imbricata</i>			

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1728.	11533 <i>Pimelea imbricata</i> var. <i>imbricata</i>			
1729.	11472 <i>Pimelea lehmanniana</i> subsp. <i>lehmanniana</i>			
1730.	5255 <i>Pimelea longiflora</i>			
1731.	18115 <i>Pimelea rosea</i> subsp. <i>annelsii</i>		P3	
1732.	18117 <i>Pimelea rosea</i> subsp. <i>rosea</i>			
1733.	5270 <i>Pimelea tinctoria</i>			
<b>Tipulidae</b>				
1734.	<i>Tipulidae</i> sp.			
<b>Triakidae</b>				
1735.	<i>Furgaleus macki</i>			
1736.	<i>Galeorhinus galeus</i>			
1737.	<i>Mustelus antarcticus</i>			
<b>Triglidae</b>				
1738.	<i>Lepidotrigla papiio</i>			
1739.	<i>Pterygotrigla polyommata</i>			
<b>Tripterygiidae</b>				
1740.	<i>Lepidoblennius marmoratus</i>			
<b>Trombidiformes</b>				
1741.	<i>Acariformes</i> sp.			
<b>Turnicidae</b>				
1742.	48147 <i>Turnix varius</i> (Painted Button-quail)			
1743.	24851 <i>Turnix velox</i> (Little Button-quail)			
<b>Tytonidae</b>				
1744.	25762 <i>Tyto alba</i> (Barn Owl)			
1745.	24852 <i>Tyto alba</i> subsp. <i>delicatula</i> (Barn Owl)			
1746.	24855 <i>Tyto novaehollandiae</i> subsp. <i>novaehollandiae</i> (Masked Owl (southwest))		P3	
<b>Uranoscopidae</b>				
1747.	<i>Kathetostoma laeve</i>			
1748.	<i>Kathetostoma nigrofasciatum</i>			
<b>Urodacidae</b>				
1749.	<i>Urodacus novaehollandiae</i>			
<b>Urolophidae</b>				
1750.	<i>Trygonoptera mucosa</i>			
1751.	<i>Urolophus gigas</i>			
1752.	<i>Urolophus paucimaculatus</i>			
1753.	<i>Urolophus</i> sp.			
<b>Usneaceae</b>				
1754.	28086 <i>Usnea dasaea</i>			
1755.	28087 <i>Usnea inermis</i>			
1756.	28088 <i>Usnea maculata</i>			
1757.	18015 <i>Usnea pulvinata</i>		P1	
<b>Varanidae</b>				
1758.	25225 <i>Varanus rosenbergi</i> (Heath Monitor)			
<b>Veliferidae</b>				
1759.	<i>Metavelifer multiradiatus</i>			
<b>Veliidae</b>				
1760.	<i>Veliidae</i> sp.			
<b>Verbenaceae</b>				
1761.	6733 <i>Lantana camara</i> (Common Lantana)	Y		
<b>Vespertilionidae</b>				
1762.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
1763.	24187 <i>Chalinolobus morio</i> (Chocolate Wattled Bat)			
1764.	24189 <i>Falsistrellus mackenziei</i> (Western False Pipistrelle, Western Falsistrelle)		P4	
1765.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
1766.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
<b>Xanthorrhoeaceae</b>				
1767.	1280 <i>Chamaescilla corymbosa</i> (Blue Squill)			
1768.	1256 <i>Xanthorrhoea preissii</i> (Grass tree, Palga)			
<b>Xyridaceae</b>				
1769.	1144 <i>Xyris flexifolia</i>			
1770.	1149 <i>Xyris lacera</i>			



Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
1771.	1150 <i>Xyris lanata</i>			
<b>Zamiaceae</b>				
1772.	85 <i>Macrozamia riedlei</i> ( <i>Zamia</i> , <i>Djiridji</i> )			
<b>Zeidae</b>				
1773.	<i>Zeus faber</i>			
<b>Ziphiidae</b>				
1774.	24080 <i>Mesoplodon layardii</i> ( <i>Strap-toothed Beaked Whale</i> )			
<b>Zodariidae</b>				
1775.	<i>Holasteron reinholdae</i>			Y
1776.	<i>Storosa tetrica</i>			
<b>Zoridae</b>				
1777.	<i>Argoctenus bidentatus</i>			
<b>Zosteropidae</b>				
1778.	25765 <i>Zosterops lateralis</i> ( <i>Grey-breasted White-eye</i> , <i>Silvereye</i> )			

**Conservation Codes**

T - Rare or likely to become extinct  
X - Presumed extinct  
IA - Protected under international agreement  
S - Other specially protected fauna  
1 - Priority 1  
2 - Priority 2  
3 - Priority 3  
4 - Priority 4  
5 - Priority 5

<sup>1</sup> For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

# NatureMap Fauna Species Report 15Km

Created By Guest user on 19/10/2018

**Kingdom** Animalia  
**Current Names Only** Yes  
**Core Datasets Only** Yes  
**Method** 'By Line'  
**Vertices** 34° 55' 54" S,117° 43' 56" E 34° 55' 28" S,117° 45' 08" E 34° 56' 06" S,117° 45' 09" E 34° 56'  
**Group By** 22° S,117° 43' 39" E 34° 56' 06" S,117° 43' 28" E 34° 55' 54" S,117° 43' 58" E  
 Family

Family	Species	Records
Acanthizidae	8	1520
Accipitridae	14	376
Actinopodidae	4	20
Aegothelidae	1	9
Aeshnidae	1	2
Agamidae	1	1
Amphisopodidae	1	1
Anapidae	1	2
Anatidae	13	836
Ancylidae	1	3
Anhingidae	1	14
Apodidae	1	2
Aracnidae	3	3
Araneidae	6	55
Archaeidae	1	20
Ardeidae	7	285
Argiolestidae	1	2
Arkyidae	2	3
Artamidae	2	105
Atherinidae	2	2
Atrichornithidae	1	1
Baetidae	1	2
Balaenopteridae	1	1
Bathysauridae	1	5
Belonidae	1	15
Berycidae	1	1
Boidae	1	4
Bothriuridae	1	3
Burramyidae	1	5
Cacatuidae	1	112
Caddidae	1	3
Caenidae	1	15
Callanthiidae	1	2
Callionymidae	1	1
Campephagidae	1	236
Canidae	1	1
Caprimulgidae	1	1
Carangidae	3	5
Carcharhinidae	2	2
Casuariidae	1	6
Ceinidae	1	10
Ceratiidae	1	1
Ceratopogonidae	1	9
Charadriidae	8	82
Cheilodactylidae	1	1
Cheloniidae	1	1
Cheluidae	1	5
Chernetidae	1	1
Chironemidae	2	2
Chironomidae	3	67
Clinidae	3	5
Clupeidae	2	7
Coenagrionidae	1	5
Columbidae	5	515
Congiopodidae	1	1
Congridae	1	1
Corduliidae	1	1
Corixidae	1	7
Corvidae	2	553
Cracticidae	4	690
Cuculidae	4	158
Culicidae	1	3
Cypridae	2	5
Cypridopsidae	1	4
Dasyatidae	1	1
Dasyornithidae	1	1
Dasyuridae	5	27
Delphinidae	2	4
Desidae	3	4
Dicaeidae	1	1
Dicruridae	4	1299
Dinolestidae	1	2
Diodontidae	2	4
Diomedidae	2	2
Dugesidae	1	1

Dytiscidae	1	17
Echeneidae	1	1
Ecnomidae	1	14
Elapidae	7	23
Elopidae	1	1
Empididae	1	1
Engraulidae	1	7
Ephyridae	1	1
Estrilidae	1	295
Exocoetidae	1	1
Falconidae	8	116
Galaxiidae	4	28
Garypidae	1	1
Garypinidae	1	1
Gekkonidae	1	23
Gelastocoridae	1	2
Gempylidae	1	1
Geotriidae	1	3
Gerreidae	1	2
Girellidae	1	1
Glossiphoniidae	1	3
Gnaphosidae	1	1
Gnathanacanthidae	1	1
Gobiidae	3	7
Gomphidae	1	4
Gordiidae	1	1
Gripopterygidae	1	4
Gyrinidae	1	2
Haematopodidae	2	22
Halcyonidae	3	468
Hebridae	1	1
Hemicorduliidae	1	5
Heterodontidae	1	3
Hirundinidae	3	527
Hydraenidae	1	1
Hydrobiosidae	1	1
Hydrometridae	1	3
Hydrophilidae	1	12
Hydropsychidae	1	8
Hydroptilidae	1	3
Hylidae	2	8
Hypnidae	1	2
Hyriidae	1	1
Idiopidae	1	4
Istiophoridae	1	1
Iulomorphidae	2	19
Ixodidae	1	1
Kyphosidae	1	1
Labridae	5	13
Lamnidae	1	1
Lamponidae	5	12
Laridae	6	158
Lepidogalaxiidae	1	1
Leporidae	1	1
Leptoceridae	1	16
Leptophlebiidae	1	3
Libellulidae	1	2
Limnodynastidae	2	59
Lophotidae	1	1
Lycosidae	5	30
Macropodidae	3	9
Maluridae	5	961
Melanostomiidae	1	1
Meliphagidae	12	1735
Micropholcommatidae	2	3
Mimetidae	1	1
Miturgidae	1	1
Molidae	1	6
Molossidae	1	1
Monacanthidae	13	23
Monoscutidae	1	3
Moridae	2	3
Motacillidae	2	4
Mugilidae	1	1
Mullidae	1	1
Muraenidae	2	2
Muridae	5	75
Myobatrachidae	6	75
Nannoperidae	2	22
Nemesiidae	1	84
Neobalaenidae	1	1
Neosebastidae	1	2
Neosittidae	2	22
Nomeidae	1	1
Notonectidae	1	2
Odacidae	2	2
Odontaspidae	1	1
Oligochaeta	1	22
Ophichthidae	2	8
Oplegnathidae	1	1
Orectolobidae	2	2
Orsolobidae	2	48
Ostraciidae	1	1
Otariidae	3	4
Otididae	1	4
Pachycephalidae	7	395
Palaemonidae	1	7
Paradoxosomatidae	1	9
Pararchaeidae	1	1
Parascylliidae	1	1
Parastacidae	4	34
Pardalotidae	4	182
Passeridae	1	7
Pataecidae	1	1
Pegasidae	1	2

Pelecanidae	1	150
Pelecanoididae	1	1
Pempheridae	1	1
Pentacerotidae	1	1
Peramelidae	1	35
Percichthyidae	4	43
Percidae	1	1
Perthidae	1	11
Petroicidae	5	372
Phalacrocoracidae	5	193
Phalangeridae	1	3
Phasianidae	4	37
Phreatoicidae	1	1
Physeteridae	1	6
Physidae	1	3
Pinguipedidae	1	1
Planorbidae	1	2
Platycephalidae	1	1
Plesiopidae	1	1
Pleuronectidae	1	1
Plotosidae	1	1
Podargidae	2	18
Podicipedidae	4	68
Poeciliidae	1	2
Polycentropodidae	1	1
Pomatomidae	1	1
Potoroidae	1	3
Pristiophoridae	1	1
Procellariidae	4	6
Prodidomidae	2	3
Pseudocheiridae	1	177
Psittacidae	15	1700
Psittaculidae	1	1
Pygopodidae	2	5
Pyrallidae	1	1
Rajidae	1	1
Rallidae	11	213
Recurvirostridae	3	28
Rhinobatidae	1	1
Scincidae	11	69
Sciomyzidae	1	1
Scolopacidae	10	44
Scolopendridae	2	10
Scomberesocidae	1	1
Scombridae	3	3
Scorpididae	1	2
Scyliorhinidae	2	3
Sebastidae	1	1
Serranidae	4	6
Sillaginidae	2	31
Simuliidae	1	14
Siphonotidae	1	1
Soleidae	3	3
Sparassidae	2	5
Sphaeriidae	1	1
Spheniscidae	1	19
Sphyraenidae	1	1
Sphyrnidae	1	1
Stratiomyidae	1	2
Sturnidae	2	5
Sulidae	1	6
Sylviidae	4	51
Syngnathidae	7	36
Synodontidae	2	2
Synthemistidae	1	2
Talitridae	1	1
Tarsipedidae	1	64
Telephlebiidae	1	5
Tetragrathidae	2	2
Tetraodontidae	3	3
Tetrarogidae	1	2
Threskiornithidae	3	239
Thylacomyidae	1	1
Tipulidae	1	10
Triakidae	3	5
Triglidae	2	7
Tripterygiidae	1	6
Trombidiformes	1	12
Turnicidae	2	15
Tytonidae	3	11
Uranoscopidae	2	4
Urodacidae	1	4
Urolophidae	4	10
Varanidae	1	1
Veliiferidae	1	1
Veliidae	1	10
Vespertilionidae	5	17
Zeidae	1	5
Ziphiidae	1	1
Zodariidae	2	16
Zoridae	1	1
Zosteropidae	1	496
<b>TOTAL</b>	<b>578</b>	<b>17247</b>

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
<b>Acanthizidae</b>				
1.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
2.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
3.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
4.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
5.	24271 <i>Gerygone fusca</i> subsp. <i>fusca</i> (Western Gerygone)			
6.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
7.	24279 <i>Sericornis frontalis</i> subsp. <i>maculatus</i> (White-browed Scrubwren)			
8.	30948 <i>Smicromis brevirostris</i> (Weebill)			
<b>Accipitridae</b>				
9.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
10.	24281 <i>Accipiter cirrocephalus</i> subsp. <i>cirrocephalus</i> (Collared Sparrowhawk)			
11.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
12.	24282 <i>Accipiter fasciatus</i> subsp. <i>fasciatus</i> (Brown Goshawk)			
13.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
14.	24288 <i>Circus approximans</i> (Swamp Harrier)			
15.	24289 <i>Circus assimilis</i> (Spotted Harrier)			
16.	<i>Elanus axillaris</i>			
17.	24290 <i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
18.	24293 <i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)			
19.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
20.	47965 <i>Hieraaetus morphnoides</i> (Little Eagle)			
21.	<i>Lophoictinia isura</i>			
22.	48591 <i>Pandion cristatus</i> (Osprey, Eastern Osprey)		IA	
<b>Actinopodidae</b>				
23.	<i>Missulena granulosa</i>			
24.	<i>Missulena hoggi</i>			
25.	<i>Missulena occatoria</i>			
26.	<i>Missulena torbayensis</i>			
<b>Aegothelidae</b>				
27.	25544 <i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
<b>Aeshnidae</b>				
28.	<i>Aeshnidae</i> sp.			
<b>Agamidae</b>				
29.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
<b>Amphisopodidae</b>				
30.	<i>Amphisopodidae</i> sp.			
<b>Anapidae</b>				
31.	<i>Chasmocephalon flinders</i>			
<b>Anatidae</b>				
32.	24310 <i>Anas castanea</i> (Chestnut Teal)			
33.	24312 <i>Anas gracilis</i> (Grey Teal)			
34.	24313 <i>Anas platyrhynchos</i> (Mallard)			
35.	24315 <i>Anas rhynchotis</i> (Australasian Shoveler)			
36.	25550 <i>Anas rhynchotis</i> subsp. <i>rhynchotis</i> (Australasian Shoveler)			
37.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
38.	24318 <i>Aythya australis</i> (Hardhead)			
39.	24319 <i>Biziura lobata</i> (Musk Duck)			
40.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
41.	24322 <i>Cygnus atratus</i> (Black Swan)			
42.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
43.	24328 <i>Oxyura australis</i> (Blue-billed Duck)		P4	
44.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
<b>Ancylidae</b>				
45.	<i>Ancylidae</i> sp.			
<b>Anhingidae</b>				
46.	47414 <i>Anhinga novaehollandiae</i> (Australasian Darter)			
<b>Apodidae</b>				
47.	25554 <i>Apus pacificus</i> (Fork-tailed Swift, Pacific Swift)		IA	
<b>Aracnidae</b>				
48.	<i>Aracana aurita</i>			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
49.	<i>Caprichthys gymnura</i>			
50.	<i>Capropygia unistriata</i>			
<b>Araneidae</b>				
51.	<i>Arachnura higginsi</i>			
52.	<i>Araneus cyphoxis</i>			
53.	<i>Araneus senicaudatus</i>			
54.	<i>Austracantha minax</i>			
55.	<i>Backobourkia heroine</i>			
56.	<i>Nephila edulis</i>			
<b>Archaeidae</b>				
57.	42361 <i>Zephyrarchaea mainae</i> (Main's assassin spider)		T	
<b>Ardeidae</b>				
58.	25558 <i>Ardea ibis</i> (Cattle Egret)			
59.	41324 <i>Ardea modesta</i> (great egret, white egret)			
60.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			
61.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
62.	24345 <i>Botaurus poiciloptilus</i> (Australasian Bittern)		T	
63.	<i>Egretta novaehollandiae</i>			
64.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
<b>Argiolestidae</b>				
65.	<i>Megapodagrionidae</i> sp.			
<b>Arkyidae</b>				
66.	<i>Arkys alticephala</i>			
67.	<i>Arkys walckenaeri</i>			
<b>Artamidae</b>				
68.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
69.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
<b>Atherinidae</b>				
70.	<i>Atherinosoma</i> sp.			
71.	<i>Atherinosoma wallacei</i>			
<b>Atrichornithidae</b>				
72.	24358 <i>Atrichornis clamosus</i> (Noisy Scrub-bird, tjimiluk)		T	
<b>Baetidae</b>				
73.	<i>Baetidae</i> sp.			
<b>Balaenopteridae</b>				
74.	24048 <i>Balaenoptera musculus</i> subsp. <i>brevicauda</i> (Pygmy Blue Whale)		T	
<b>Bathysauridae</b>				
75.	<i>Saurida tumbil</i>			
<b>Belonidae</b>				
76.	??			
<b>Berycidae</b>				
77.	<i>Centroberyx gerrardi</i>			
<b>Boidae</b>				
78.	25240 <i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)			
<b>Bothriuridae</b>				
79.	<i>Cercophonius sulcatus</i>			
<b>Burramyidae</b>				
80.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
<b>Cacatuidae</b>				
81.	<i>Eolophus roseicapillus</i>			
<b>Caddidae</b>				
82.	<i>Hesperopilio mainae</i>			
<b>Caenidae</b>				
83.	<i>Caenidae</i> sp.			
<b>Callanthiidae</b>				
84.	<i>Callanthias australis</i>			
<b>Callionymidae</b>				
85.	<i>Foetorepus calauropomus</i>			
<b>Campephagidae</b>				

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
86.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
<b>Canidae</b>				
87.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		
<b>Caprimulgidae</b>				
88.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
<b>Carangidae</b>				
89.	<i>Naucrates ductor</i>			
90.	<i>Seriola lalandi</i>			
91.	<i>Trachurus declivis</i>			
<b>Carcharhinidae</b>				
92.	<i>Carcharhinus obscurus</i>			
93.	<i>Prionace glauca</i>			
<b>Casuariidae</b>				
94.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
<b>Ceinidae</b>				
95.	<i>Ceinidae</i> sp.			
<b>Ceratiidae</b>				
96.	<i>Ceratias tentaculatus</i>			
<b>Ceratopogonidae</b>				
97.	<i>Ceratopogonidae</i> sp.			
<b>Charadriidae</b>				
98.	25575 <i>Charadrius leschenaultii</i> (Greater Sand Plover)		IA	
99.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
100.	47937 <i>Eiseyornis melanops</i> (Black-fronted Dotterel)			
101.	24379 <i>Erythrogonys cinctus</i> (Red-kneed Dotterel)			
102.	24382 <i>Pluvialis fulva</i> (Pacific Golden Plover)		IA	
103.	24383 <i>Pluvialis squatarola</i> (Grey Plover)		IA	
104.	48135 <i>Thinornis rubricollis</i> (Hooded Plover, Hooded Dotterel)		P4	
105.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
<b>Cheilodactylidae</b>				
106.	<i>Nemadactylus macropterus</i>			
<b>Cheloniidae</b>				
107.	25335 <i>Caretta caretta</i> (Loggerhead Turtle)		T	
<b>Cheluidae</b>				
108.	43380 <i>Chelodina colliei</i> (South-western Snake-necked Turtle)			
<b>Chernetidae</b>				
109.	<i>Nesidiochernes slateri</i>			
<b>Chironemidae</b>				
110.	<i>Chironemus georgianus</i>			
111.	<i>Threpterus maculosus</i>			
<b>Chironomidae</b>				
112.	<i>Chironominae</i> sp.			
113.	<i>Orthoclaadiinae</i> sp.			
114.	<i>Tanypodinae</i> sp.			
<b>Clinidae</b>				
115.	<i>Cristiceps aurantiacus</i>			
116.	<i>Cristiceps australis</i>			
117.	<i>Heteroclinus roseus</i>			
<b>Clupeidae</b>				
118.	<i>Sardinella lemuru</i> ?			
119.	<i>Sardinops neopilchardus</i>			
<b>Coenagrionidae</b>				
120.	<i>Coenagrionidae</i> sp.			
<b>Columbidae</b>				
121.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
122.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
123.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
124.	25587 <i>Phaps elegans</i> (Brush Bronzewing)			
125.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
<b>Congiopodidae</b>				

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
126.	<i>Perryena leucometopon</i>			
<b>Congridae</b>				
127.	<i>Scalanago lateralis</i>			
<b>Corduliidae</b>				
128.	<i>Corduliidae sp.</i>			
<b>Corixidae</b>				
129.	<i>Corixidae sp.</i>			
<b>Corvidae</b>				
130.	25592 <i>Corvus coronoides</i> (Australian Raven)			
131.	24417 <i>Corvus coronoides subsp. perplexus</i> (Australian Raven)			
<b>Cracticidae</b>				
132.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
133.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
134.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
135.	24426 <i>Strepera versicolor subsp. plumbea</i> (Grey Currawong)			
<b>Cuculidae</b>				
136.	25598 <i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
137.	24427 <i>Cacomantis flabelliformis subsp. flabelliformis</i> (Fan-tailed Cuckoo)			
138.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
139.	24432 <i>Chrysococcyx lucidus subsp. plagosus</i> (Shining Bronze Cuckoo)			
<b>Culicidae</b>				
140.	<i>Culicidae sp.</i>			
<b>Cyprididae</b>				
141.	<i>Candonocypris novaezelandiae</i>			
142.	<i>Ilyodromus ellipticus</i>			
<b>Cypridopsidae</b>				
143.	<i>Sarscypridopsis aculeata</i>			
<b>Dasyatidae</b>				
144.	<i>Dasyatis brevicaudata</i>			
<b>Dasyornithidae</b>				
145.	24440 <i>Dasyornis longirostris</i> (Western Bristlebird)		T	
<b>Dasyuridae</b>				
146.	24088 <i>Antechinus flavipes subsp. leucogaster</i> (Yellow-footed Antechinus, Mardo)			
147.	24092 <i>Dasyurus geoffroii</i> (Chuditch, Western Quoll)		T	
148.	24111 <i>Sminthopsis gilberti</i> (Gilbert's Dunnart)			
149.	25515 <i>Sminthopsis griseoventer</i> (Grey-bellied Dunnart)			
150.	<i>Sminthopsis murina</i>			
<b>Delphinidae</b>				
151.	24052 <i>Delphinus delphis</i> (Common Dolphin)			
152.	30954 <i>Tursiops aduncus</i> (Indo-Pacific Bottlenose Dolphin)			
<b>Desidae</b>				
153.	<i>Badumna microps</i>			
154.	<i>Baiami torbayensis</i>			
155.	<i>Desis hartmeyerii</i>			Y
<b>Dicaeidae</b>				
156.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
<b>Dicruridae</b>				
157.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
158.	25610 <i>Myiagra inquieta</i> (Restless Flycatcher)			
159.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
160.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
<b>Dinolestidae</b>				
161.	<i>Dinolestes lewini</i>			
<b>Diodontidae</b>				
162.	<i>Allomycterus pilatus</i>			
163.	<i>Diodon nichthemerus</i>			
<b>Diomedaeidae</b>				
164.	30836 <i>Diomedea exulans subsp. exulans</i> (Snowy Albatross)		T	
165.	34007 <i>Thalassarche chlororhynchos</i> (Atlantic Yellow-nosed Albatross)		T	
<b>Dugesidae</b>				



Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
166.	<i>Dugesidae sp.</i>			
<b>Dytiscidae</b>				
167.	<i>Dytiscidae sp.</i>			
<b>Echeneidae</b>				
168.	<i>Remora remora</i>			
<b>Ecnomidae</b>				
169.	<i>Ecnomidae sp.</i>			
<b>Elapidae</b>				
170.	25251 <i>Echiopsis curta</i> (Bardick)			
171.	25250 <i>Elapognathus coronatus</i> (Crowned Snake)			
172.	43384 <i>Hydrophis platurus</i> (Yellow-bellied Seasnake)			
173.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
174.	25255 <i>Parasuta nigriceps</i>			
175.	25259 <i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
176.	30818 <i>Rhinoplocephalus bicolor</i> (Square-nosed Snake)			
<b>Elopidae</b>				
177.	<i>Elops hawaiiensis</i>			
<b>Empididae</b>				
178.	<i>Empididae sp.</i>			
<b>Engraulidae</b>				
179.	<i>Engraulis australis</i>			
<b>Ephydriidae</b>				
180.	<i>Ephydriidae sp.</i>			
<b>Estrilidae</b>				
181.	24645 <i>Stagonopleura oculata</i> (Red-eared Firetail)			
<b>Exocoetidae</b>				
182.	<i>Cypselurus sp.</i>			
<b>Falconidae</b>				
183.	25621 <i>Falco berigora</i> (Brown Falcon)			
184.	24471 <i>Falco berigora</i> subsp. <i>berigora</i> (Brown Falcon)			
185.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
186.	24472 <i>Falco cenchroides</i> subsp. <i>cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
187.	25623 <i>Falco longipennis</i> (Australian Hobby)			
188.	24474 <i>Falco longipennis</i> subsp. <i>longipennis</i> (Australian Hobby)			
189.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
190.	24475 <i>Falco peregrinus</i> subsp. <i>macropus</i> (Australian Peregrine Falcon)		S	
<b>Galaxiidae</b>				
191.	<i>Galaxias maculatus</i>			
192.	34028 <i>Galaxias occidentalis</i> (Western Minnow)			
193.	34026 <i>Galaxiella munda</i> (mud minnow, western dwarf galaxias)			T
194.	34027 <i>Galaxiella nigrostriata</i> (Black-stripe Minnow, black-striped dwarf galaxias)			T
<b>Garypidae</b>				
195.	<i>Synsphyronus magnus</i>			
<b>Garypinidae</b>				
196.	<i>Protogarypinus giganteus</i>			
<b>Gekkonidae</b>				
197.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
<b>Gelastocoridae</b>				
198.	<i>Gelastocoridae sp.</i>			
<b>Gempylidae</b>				
199.	<i>Thyrsites atun</i>			
<b>Geotriidae</b>				
200.	34030 <i>Geotria australis</i> (Pouched Lamprey)		P1	
<b>Gerreidae</b>				
201.	<i>Parequula melbournensis</i>			
<b>Girellidae</b>				
202.	<i>Girella zebra</i>			
<b>Glossiphoniidae</b>				
203.	<i>Glossiphoniidae sp.</i>			

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<b>Gnaphosidae</b>				
204.	<i>Megamyrmecon penicillatum</i>			Y
<b>Gnathanacanthidae</b>				
205.	<i>Gnathanacanthus goetzei</i>			
<b>Gobiidae</b>				
206.	<i>Callogobius mucosus</i>			
207.	<i>Favonigobius lateralis</i>			
208.	<i>Pseudogobius olorum</i>			
<b>Gomphidae</b>				
209.	<i>Gomphidae sp.</i>			
<b>Gordiidae</b>				
210.	<i>Gordiidae sp.</i>			
<b>Gripopterygidae</b>				
211.	<i>Gripopterygidae sp.</i>			
<b>Gyrinidae</b>				
212.	<i>Gyrinidae sp.</i>			
<b>Haematopodidae</b>				
213.	25627 <i>Haematopus fuliginosus</i> (Sooty Oystercatcher)			
214.	24487 <i>Haematopus longirostris</i> (Pied Oystercatcher)			
<b>Halcyonidae</b>				
215.	30901 <i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
216.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
217.	24309 <i>Todiramphus sanctus subsp. sanctus</i> (Sacred Kingfisher)			
<b>Hebridae</b>				
218.	<i>Hebridae sp.</i>			
<b>Hemicorduliidae</b>				
219.	<i>Hemicorduliidae sp.</i>			
<b>Heterodontidae</b>				
220.	<i>Heterodontus portusjacksoni</i>			
<b>Hirundinidae</b>				
221.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
222.	48060 <i>Petrochelidon ariel</i> (Fairy Martin)			
223.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
<b>Hydraenidae</b>				
224.	<i>Hydraenidae sp.</i>			
<b>Hydrobiosidae</b>				
225.	<i>Hydrobiosidae sp.</i>			
<b>Hydrometridae</b>				
226.	<i>Hydrometridae sp.</i>			
<b>Hydrophilidae</b>				
227.	<i>Hydrophilidae sp.</i>			
<b>Hydropsychidae</b>				
228.	<i>Hydropsychidae sp.</i>			
<b>Hydroptilidae</b>				
229.	<i>Hydroptilidae sp.</i>			
<b>Hylidae</b>				
230.	25378 <i>Litoria adelaidensis</i> (Slender Tree Frog)			
231.	25388 <i>Litoria moorei</i> (Motorbike Frog)			
<b>Hypnidae</b>				
232.	<i>Hypnos monopterygium</i>			
<b>Hyriidae</b>				
233.	<i>Hyriidae sp.</i>			
<b>Idiopidae</b>				
234.	<i>Aganippe raphiduca</i>			
<b>Istiophoridae</b>				
235.	<i>Makaira indica</i>			
<b>Iulomorphidae</b>				
236.	<i>Atelomastix mainae</i>			

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237.	<i>Samichus decoratus</i>			
<b>Ixodidae</b>				
238.	<i>Ixodes australiensis</i>			
<b>Kyphosidae</b>				
239.	<i>Kyphosus gladius MS</i>			
<b>Labridae</b>				
240.	<i>Achoerodus gouldii</i>			
241.	<i>Austrolabrus maculatus</i>			
242.	<i>Haletta semifasciata</i>			
243.	<i>Ophthalmolepis lineolatus</i>			
244.	<i>Siphonognathus argyrophanes</i>			
<b>Lamnidae</b>				
245.	34031 <i>Carcharodon carcharias</i> (Great White Shark)		T	
<b>Lamponidae</b>				
246.	<i>Lampona cylindrata</i>			
247.	<i>Lampona foliifera</i>			
248.	<i>Lampona punctigera</i>			
249.	<i>Lampona torbay</i>			Y
250.	<i>Prionosternum scutatum</i>			
<b>Laridae</b>				
251.	<i>Chroicocephalus novaehollandiae</i>			
252.	48587 <i>Hydroprogne caspia</i> (Caspian Tern)		IA	
253.	24511 <i>Larus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Silver Gull)			
254.	25638 <i>Larus pacificus</i> (Pacific Gull)			
255.	24522 <i>Sterna bergii</i> (Crested Tern)			
256.	48597 <i>Thalasseus bergii</i> (Crested Tern)		IA	
<b>Lepidogalaxiidae</b>				
257.	47983 <i>Lepidogalaxias salamandroides</i> (Salamanderfish)		T	
<b>Leporidae</b>				
258.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
<b>Leptoceridae</b>				
259.	<i>Leptoceridae</i> sp.			
<b>Leptophlebiidae</b>				
260.	<i>Leptophlebiidae</i> sp.			
<b>Libellulidae</b>				
261.	<i>Libellulidae</i> sp.			
<b>Limnodynastidae</b>				
262.	25410 <i>Heleioporus eyrei</i> (Moaning Frog)			
263.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
<b>Lophotidae</b>				
264.	<i>Eumecichthys fiski</i>			Y
<b>Lycosidae</b>				
265.	<i>Arctoria cingulipes</i>			
266.	<i>Arctoria flavimana</i>			
267.	<i>Arctoriopsis eccentrica</i>			
268.	<i>Tasmanicosa leuckartii</i>			
269.	<i>Venatrix pullastra</i>			
<b>Macropodidae</b>				
270.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
271.	48022 <i>Notamacropus irma</i> (Western Brush Wallaby)		P4	
272.	24145 <i>Setonix brachyurus</i> (Quokka)		T	
<b>Maluridae</b>				
273.	25650 <i>Malurus elegans</i> (Red-winged Fairy-wren)			
274.	24551 <i>Malurus pulcherrimus</i> (Blue-breasted Fairy-wren)			
275.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
276.	25655 <i>Stipiturus malachurus</i> (Southern Emu-wren)			
277.	24554 <i>Stipiturus malachurus</i> subsp. <i>westernensis</i> (Southern Emu-wren)			
<b>Melanostomiidae</b>				
278.	<i>Opostomias micripnus</i>			Y
<b>Meliphagidae</b>				
279.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
280.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
281.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
282.	24567 <i>Epthianura albiglans</i> (White-fronted Chat)			
283.	47962 <i>Glyciphila melanops</i> (Tawny-crowned Honeyeater)			
284.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
285.	24582 <i>Lichmera indistincta</i> subsp. <i>indistincta</i> (Brown Honeyeater)			
286.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
287.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
288.	24587 <i>Melithreptus chloropsis</i> (Western White-naped Honeyeater)			
289.	48071 <i>Phylidonyris niger</i> (White-cheeked Honeyeater)			
290.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
<b>Micropholcommatidae</b>				
291.	<i>Raveniella peckorum</i>			
292.	<i>Taphiassa robertsi</i>			
<b>Mimetidae</b>				
293.	<i>Australomimetes diabolicus</i>			
<b>Miturgidae</b>				
294.	<i>Mituliodon tarantulinus</i>			
<b>Molidae</b>				
295.	<i>Ranzania laevis</i>			
<b>Molossidae</b>				
296.	24183 <i>Mormopterus loriae</i> (Little Northern Freetail-bat)			
<b>Monacanthidae</b>				
297.	<i>Acanthaluteres brownii</i>			
298.	<i>Acanthaluteres vittiger</i>			
299.	<i>Anacanthus barbatus</i>			
300.	<i>Brachaluteres jacksonianus</i>			
301.	<i>Cantheschenia longipinnis</i>			
302.	<i>Eubalichthys caeruleoguttatus</i>			
303.	<i>Eubalichthys cyanoura</i>			
304.	<i>Eubalichthys mosaicus</i>			
305.	<i>Meuschenia freycineti</i>			
306.	<i>Meuschenia galii</i>			
307.	<i>Meuschenia hippocrepis</i>			
308.	<i>Parika scaber</i>			
309.	<i>Scobinichthys granulatus</i>			
<b>Monoscutidae</b>				
310.	<i>Hypomegalopsalis tanisphyros</i>			
<b>Moridae</b>				
311.	<i>Lotella</i> sp.			Y
312.	<i>Pseudophycis barbata</i>			
<b>Motacillidae</b>				
313.	24599 <i>Anthus australis</i> subsp. <i>australis</i> (Australian Pipit)			
314.	24600 <i>Anthus cervinus</i> (Red-throated Pipit)			
<b>Mugilidae</b>				
315.	<i>Liza vaigiensis</i>			
<b>Mullidae</b>				
316.	<i>Upeneus tragula</i>			
<b>Muraenidae</b>				
317.	<i>Gymnothorax prasinus</i>			
318.	<i>Gymnothorax richardsoni</i>			
<b>Muridae</b>				
319.	24215 <i>Hydromys chrysogaster</i> (Water-rat, Rakali)		P4	
320.	24223 <i>Mus musculus</i> (House Mouse)	Y		
321.	24230 <i>Pseudomys albocinereus</i> (Ash-grey Mouse)			
322.	24243 <i>Rattus fuscipes</i> (Western Bush Rat)			
323.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
<b>Myobatrachidae</b>				
324.	25398 <i>Crinia georgiana</i> (Quacking Frog)			
325.	25399 <i>Crinia glauerti</i> (Clicking Frog)			
326.	25401 <i>Crinia pseudinsignifera</i> (Bleating Froglet)			
327.	25402 <i>Crinia subinsignifera</i> (South Coast Froglet)			
328.	25404 <i>Geocrinia leai</i> (Ticking Frog)			

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329.	25433 <i>Pseudophryne guentheri</i> (Crawling Toadlet)			
<b>Nannopercidae</b>				
330.	<i>Edelia vittata</i>			
331.	34033 <i>Nannatherina balstoni</i> (Balston's Pygmy Perch)		T	
<b>Nemesiidae</b>				
332.	<i>Aname tepperi</i>			
<b>Neobalaenidae</b>				
333.	24072 <i>Caperea marginata</i> (Pygmy Right Whale)			
<b>Neosebastidae</b>				
334.	<i>Maxillcosta scabriceps</i>			
<b>Neosittidae</b>				
335.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
336.	24606 <i>Daphoenositta chrysoptera</i> subsp. <i>pileata</i> (Varied Sittella, Black-capped Sittella)			
<b>Nomeidae</b>				
337.	<i>Cubiceps cf. baxteri</i>			Y
<b>Notonectidae</b>				
338.	<i>Notonectidae</i> sp.			
<b>Odacidae</b>				
339.	<i>Odax acroptilus</i>			
340.	<i>Odax cyanomelas</i>			
<b>Odontaspidae</b>				
341.	34034 <i>Carcharias taurus</i> (Grey Nurse Shark)		T	
<b>Oligochaeta</b>				
342.	<i>Oligochaeta</i> sp.			
<b>Ophichthidae</b>				
343.	<i>Muraenichthys breviceps</i>			
344.	<i>Ophisurus serpens</i>			
<b>Oplegnathidae</b>				
345.	<i>Oplegnathus woodwardi</i>			
<b>Orectolobidae</b>				
346.	<i>Orectolobus hutchinsi</i>			
347.	<i>Sutorectus tentaculatus</i>			
<b>Orsolobidae</b>				
348.	<i>Australobus torbay</i>			
349.	<i>Tasmanoonops mainae</i>			
<b>Ostraciidae</b>				
350.	<i>Lactoria concatenatus</i>			
<b>Otariidae</b>				
351.	24208 <i>Arctocephalus forsteri</i> (New Zealand Fur Seal, long-nosed fur-seal)		S	
352.	24209 <i>Arctocephalus tropicalis</i> (Subantarctic fur-seal)		T	
353.	24210 <i>Neophoca cinerea</i> (Australian Sea-lion)		T	
<b>Otididae</b>				
354.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
<b>Pachycephalidae</b>				
355.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
356.	24613 <i>Colluricincla harmonica</i> subsp. <i>rufiventris</i> (Grey Shrike-thrush)			
357.	25677 <i>Falcunculus frontatus</i> (Crested Shrike-tit)			
358.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
359.	34011 <i>Oreoica gutturalis</i> subsp. <i>gutturalis</i> (Crested Bellbird (southern))			
360.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
361.	24624 <i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i> (Rufous Whistler)			
<b>Palaemonidae</b>				
362.	<i>Palaemonidae</i> sp.			
<b>Paradoxosomatidae</b>				
363.	<i>Akamptogonus novarae</i>			
<b>Pararchaeidae</b>				
364.	<i>Ozarchaea westraliensis</i>			
<b>Parascylliidae</b>				
365.	<i>Parascyllium variolatum</i>			

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<b>Parastacidae</b>				
366.	33939 <i>Cherax cainii</i> (Marron)			
367.	<i>Cherax destructor</i>			
368.	<i>Cherax preissii</i>			
369.	<i>Parastacidae</i> sp.			
<b>Pardalotidae</b>				
370.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
371.	24625 <i>Pardalotus punctatus</i> subsp. <i>punctatus</i> (Spotted Pardalote)			
372.	24626 <i>Pardalotus punctatus</i> subsp. <i>xanthopyge</i> (Yellow-rumped Pardalote)			
373.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
<b>Passeridae</b>				
374.	24642 <i>Passer montanus</i> (Eurasian Tree Sparrow)	Y		
<b>Pataecidae</b>				
375.	<i>Neopataecus waterhousii</i>			
<b>Pegasidae</b>				
376.	<i>Pegasus lancifer</i>			
<b>Pelecanidae</b>				
377.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
<b>Pelecanoididae</b>				
378.	24649 <i>Pelecanoides urinatrix</i> subsp. <i>exsul</i> (Common Diving Petrel)			
<b>Pempheridae</b>				
379.	<i>Pempheris multiradiata</i>			
<b>Pentacerotidae</b>				
380.	<i>Paristiopterus gallipavo</i>			
<b>Peramelidae</b>				
381.	48588 <i>Isoodon fusciventer</i> (Quenda, southwestern brown bandicoot)		P4	
<b>Percichthyidae</b>				
382.	<i>Bostockia porosa</i>			
383.	<i>Maccullochella peelii</i>			Y
384.	<i>Nannoperca vittata</i>			
385.	<i>Polyprion americanus</i>			Y
<b>Percidae</b>				
386.	<i>Perca fluviatilis</i>			
<b>Perthidae</b>				
387.	<i>Perthiidae</i> sp.			
<b>Petroicidae</b>				
388.	24651 <i>Eopsaltria australis</i> subsp. <i>griseogularis</i> (Western Yellow Robin)			
389.	24652 <i>Eopsaltria georgiana</i> (White-breasted Robin)			
390.	25693 <i>Microeca fascinans</i> (Jacky Winter)			
391.	48066 <i>Petroica boodang</i> (Scarlet Robin)			
392.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
<b>Phalacrocoracidae</b>				
393.	<i>Microcarbo melanoleucos</i>			
394.	25697 <i>Phalacrocorax carbo</i> (Great Cormorant)			
395.	24666 <i>Phalacrocorax melanoleucos</i> subsp. <i>melanoleucos</i> (Little Pied Cormorant)			
396.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
397.	25699 <i>Phalacrocorax varius</i> (Pied Cormorant)			
<b>Phalangeridae</b>				
398.	24158 <i>Trichosurus vulpecula</i> subsp. <i>vulpecula</i> (Common Brushtail Possum)			
<b>Phasianidae</b>				
399.	24671 <i>Coturnix pectoralis</i> (Stubble Quail)			
400.	25701 <i>Coturnix ypsilophora</i> (Brown Quail)			
401.	24673 <i>Coturnix ypsilophora</i> subsp. <i>australis</i> (Brown Quail)			
402.	24672 <i>Coturnix ypsilophora</i> subsp. <i>cervina</i> (Brown Quail)			
<b>Phreatoicidae</b>				
403.	<i>Phreatoicidae</i> sp.			
<b>Physeteridae</b>				
404.	24073 <i>Physeter macrocephalus</i> (Sperm Whale)		T	
<b>Physidae</b>				
405.	<i>Physidae</i> sp.			

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<b>Pinguipedidae</b>				
406.	<i>Parapercis haackei</i>			
<b>Planorbidae</b>				
407.	<i>Planorbidae</i> sp.			
<b>Platycephalidae</b>				
408.	<i>Neoplatycephalus conatus</i>			
<b>Plesiopidae</b>				
409.	<i>Paraplesiops meleagris</i>			
<b>Pleuronectidae</b>				
410.	<i>Ammotretis rostratus</i>			
<b>Plotosidae</b>				
411.	<i>Cnidoglanis macrocephalus</i>			
<b>Podargidae</b>				
412.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
413.	24679 <i>Podargus strigoides</i> subsp. <i>brachypterus</i> (Tawny Frogmouth)			
<b>Podicipedidae</b>				
414.	25704 <i>Podiceps cristatus</i> (Great Crested Grebe)			
415.	24680 <i>Podiceps cristatus</i> subsp. <i>australis</i> (Great Crested Grebe)			
416.	24681 <i>Poliiocephalus poliocephalus</i> (Hoary-headed Grebe)			
417.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
<b>Poeciliidae</b>				
418.	<i>Gambusia affinis</i>			
<b>Polycentropodidae</b>				
419.	<i>Polycentropodidae</i> sp.			
<b>Pomatostomidae</b>				
420.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
<b>Potoroidae</b>				
421.	24162 <i>Bettongia penicillata</i> subsp. <i>ogilbyi</i> (Woylie, Brush-tailed Bettong)			T
<b>Pristiophoridae</b>				
422.	<i>Pristiophorus cirratus</i>			
<b>Procellariidae</b>				
423.	41326 <i>Ardenna carneipes</i> (Flesh-footed Shearwater, Fleshy-footed Shearwater)			T
424.	24690 <i>Macronectes giganteus</i> (Southern Giant Petrel)			IA
425.	<i>Pterodroma macroptera</i> subsp. <i>macroptera</i>			
426.	24711 <i>Puffinus assimilis</i> subsp. <i>assimilis</i> (Little Shearwater)			
<b>Prodidomidae</b>				
427.	<i>Molycrria quadricauda</i>			
428.	<i>Nomindra leeuweni</i>			
<b>Pseudocheiridae</b>				
429.	24166 <i>Pseudocheirus occidentalis</i> (Western Ringtail Possum, ngwayir)			T
<b>Psittacidae</b>				
430.	<i>Barnardius zonarius</i>			
431.	25713 <i>Cacatua galerita</i> (Sulphur-crested Cockatoo)			
432.	24725 <i>Cacatua roseicapilla</i> subsp. <i>assimilis</i> (Galah)			
433.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
434.	24731 <i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black Cockatoo)			T
435.	24733 <i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)			T
436.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)			T
437.	48400 <i>Calyptorhynchus</i> sp. (white-tailed black cockatoo)			T
438.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
439.	24739 <i>Neophema petrophila</i> (Rock Parrot)			
440.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
441.	24745 <i>Platycercus icterotis</i> subsp. <i>icterotis</i> (Western Rosella)			
442.	24747 <i>Platycercus spurius</i> (Red-capped Parrot)			
443.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
444.	<i>Purpureicephalus spurius</i>			
<b>Psittaculidae</b>				
445.	48085 <i>Psittacula krameri</i> (Indian Ringnecked Parrot, Rose-ringed Parakeet)	Y		

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<b>Pygopodidae</b>				
446.	24994 <i>Aprasia striolata</i> (Lined Worm-lizard)			
447.	25008 <i>Pygopus lepidopodus</i> (Common Scaly Foot)			
<b>Pyralidae</b>				
448.	<i>Pyralidae</i> sp.			
<b>Rajidae</b>				
449.	<i>Raja</i> sp.			
<b>Rallidae</b>				
450.	25727 <i>Fulica atra</i> (Eurasian Coot)			
451.	24761 <i>Fulica atra</i> subsp. <i>australis</i> (Eurasian Coot)			
452.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
453.	25730 <i>Gallirallus philippensis</i> (Buff-banded Rail)			
454.	24765 <i>Gallirallus philippensis</i> subsp. <i>mellori</i> (Buff-banded Rail)			
455.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
456.	24767 <i>Porphyrio porphyrio</i> subsp. <i>bellus</i> (Purple Swamphen)			
457.	24769 <i>Porzana fluminea</i> (Australian Spotted Crake)			
458.	25732 <i>Porzana pusilla</i> (Baillon's Crake)			
459.	24771 <i>Porzana tabuensis</i> (Spotless Crake)			
460.	48141 <i>Tribonyx ventralis</i> (Black-tailed Native-hen)			
<b>Recurvirostridae</b>				
461.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
462.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
463.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
<b>Rhinobatidae</b>				
464.	<i>Trygonorrhina fasciata</i>			
<b>Scincidae</b>				
465.	25027 <i>Ctenotus australis</i>			
466.	25031 <i>Ctenotus catenifer</i>			
467.	25049 <i>Ctenotus labillardieri</i>			
468.	25096 <i>Egernia kingii</i> (King's Skink)			
469.	25100 <i>Egernia napoleonis</i>			
470.	30919 <i>Hemiergis gracilipes</i> (skink)			
471.	25117 <i>Hemiergis peronii</i> subsp. <i>peronii</i>			
472.	41416 <i>Liopholis pulchra</i> subsp. <i>pulchra</i> (South-western Rock Skink, Spectacled Rock Skink)			
473.	42413 <i>Lissolepis luctuosa</i> (Western Swamp Skink)			
474.	25203 <i>Tiliqua occipitalis</i> (Western Bluetongue)			
475.	25207 <i>Tiliqua rugosa</i> subsp. <i>rugosa</i>			
<b>Sciomyzidae</b>				
476.	<i>Sciomyzidae</i> sp.			
<b>Scolopacidae</b>				
477.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
478.	24780 <i>Calidris alba</i> (Sanderling)		IA	
479.	25738 <i>Calidris canutus</i> (Red Knot, knot)		IA	
480.	24784 <i>Calidris ferruginea</i> (Curlew Sandpiper)		T	
481.	24788 <i>Calidris ruficollis</i> (Red-necked Stint)		IA	
482.	24790 <i>Calidris tenuirostris</i> (Great Knot)		T	
483.	30932 <i>Limosa lapponica</i> (Bar-tailed Godwit)		IA	
484.	24802 <i>Philomachus pugnax</i> (Ruff, reeve)		IA	
485.	24806 <i>Tringa glareola</i> (Wood Sandpiper)		IA	
486.	24808 <i>Tringa nebularia</i> (Common Greenshank, greenshank)		IA	
<b>Scolopendridae</b>				
487.	<i>Cormocephalus aurantiipes</i>			
488.	<i>Cormocephalus michaelsoni</i>			
<b>Scomberesocidae</b>				
489.	<i>Scomberesox saurus</i>			
<b>Scombridae</b>				
490.	<i>Auxis thazard</i>			
491.	<i>Thunnus alalunga</i>			
492.	<i>Thunnus maccoyii</i>			
<b>Scorpididae</b>				
493.	<i>Tilodon sexfasciatum</i>			
<b>Scyliorhinidae</b>				
494.	<i>Aulohaelurus labiosus</i>			
495.	<i>Aulohaelurus labiosus?</i>			



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<b>Sebastidae</b>				
496.	<i>Helicolenus percoides</i>			
<b>Serranidae</b>				
497.	<i>Acanthistius serratus</i>			
498.	<i>Caesioperca rasor</i>			
499.	<i>Caesiocorpius theagenes</i>			
500.	<i>Epinephelides armatus</i>			
<b>Sillaginidae</b>				
501.	<i>Sillaginodes punctata</i>			
502.	<i>Sillago bassensis</i>			
<b>Simuliidae</b>				
503.	<i>Simuliidae sp.</i>			
<b>Siphonotidae</b>				
504.	<i>Siphonotus flavomarginatus</i>			
<b>Soleidae</b>				
505.	<i>Aseraggodes haackeanus</i>			
506.	<i>Synaptura hediste</i>			
507.	<i>Zebrias cancellatus</i>			
<b>Sparassidae</b>				
508.	<i>Isopeda leishmanni</i>			
509.	<i>Isopedella cana</i>			
<b>Sphaeriidae</b>				
510.	<i>Sphaeriidae sp.</i>			
<b>Spheniscidae</b>				
511.	24818 <i>Eudyptula minor subsp. novaehollandiae</i> (Little Penguin)			
<b>Sphyraenidae</b>				
512.	<i>Sphyraena barracuda</i>			
<b>Sphyrnidae</b>				
513.	<i>Sphyrna lewini</i>			
<b>Stratiomyidae</b>				
514.	<i>Stratiomyidae sp.</i>			
<b>Sturnidae</b>				
515.	25752 <i>Sturnus vulgaris</i> (Common Starling)	Y		
516.	24824 <i>Sturnus vulgaris subsp. vulgaris</i> (Common Starling)	Y		
<b>Sulidae</b>				
517.	48008 <i>Morus serrator</i> (Australasian Gannet)			
<b>Sylviidae</b>				
518.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
519.	24831 <i>Acrocephalus australis subsp. gouldi</i> (Australian Reed Warbler)			
520.	25758 <i>Megalurus gramineus</i> (Little Grassbird)			
521.	24838 <i>Megalurus gramineus subsp. gramineus</i> (Little Grassbird)			
<b>Syngnathidae</b>				
522.	<i>Leptoichthys fistularius</i>			
523.	34039 <i>Phycodurus eques</i> (Leafy Sea Dragon)		P2	
524.	<i>Phyllopteryx taeniolatus</i>			
525.	<i>Solegnathus lettiensis</i>			
526.	<i>Stigmatopora argus</i>			
527.	<i>Vanacampus phillipi</i>			
528.	<i>Vanacampus poecilolaemus</i>			
<b>Synodontidae</b>				
529.	<i>Saurida grandisquamis</i>			
530.	<i>Saurida undosquamis</i>			
<b>Synthemistidae</b>				
531.	<i>Synthemistidae sp.</i>			
<b>Talitridae</b>				
532.	<i>Talitridae sp.</i>			
<b>Tarsipedidae</b>				
533.	24167 <i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			
<b>Telephlebiidae</b>				
534.	<i>Telephlebiidae sp.</i>			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
<b>Tetragnathidae</b>				
535.	<i>Pinkfloydia harveii</i>			
536.	<i>Tetragnatha caudifera</i>			Y
<b>Tetraodontidae</b>				
537.	<i>Contusus brevicaudus</i>			
538.	<i>Omegophora armilla</i>			
539.	<i>Torquigener vicinus</i>			
<b>Tetrarogidae</b>				
540.	<i>Gymnapistes marmoratus</i>			
<b>Threskiornithidae</b>				
541.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
542.	24843 <i>Plegadis falcinellus</i> (Glossy Ibis)		IA	
543.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
<b>Thylacomyidae</b>				
544.	24168 <i>Macrotis lagotis</i> (Bilby, Dalgyte, Ninu)		T	
<b>Tipulidae</b>				
545.	<i>Tipulidae</i> sp.			
<b>Triakidae</b>				
546.	<i>Furgaleus macki</i>			
547.	<i>Galeorhinus galeus</i>			
548.	<i>Mustelus antarcticus</i>			
<b>Triglidae</b>				
549.	<i>Lepidotrigla papilio</i>			
550.	<i>Pterygotrigla polyommata</i>			
<b>Tripterygiidae</b>				
551.	<i>Lepidoblennius marmoratus</i>			
<b>Trombidiformes</b>				
552.	<i>Acariformes</i> sp.			
<b>Turnicidae</b>				
553.	48147 <i>Turnix varius</i> (Painted Button-quail)			
554.	24851 <i>Turnix velox</i> (Little Button-quail)			
<b>Tytonidae</b>				
555.	25762 <i>Tyto alba</i> (Barn Owl)			
556.	24852 <i>Tyto alba</i> subsp. <i>delicatula</i> (Barn Owl)			
557.	24855 <i>Tyto novaehollandiae</i> subsp. <i>novaehollandiae</i> (Masked Owl (southwest))		P3	
<b>Uranoscopidae</b>				
558.	<i>Kathetostoma laeve</i>			
559.	<i>Kathetostoma nigrofasciatum</i>			
<b>Urodacidae</b>				
560.	<i>Urodacus novaehollandiae</i>			
<b>Urolophidae</b>				
561.	<i>Trygonoptera mucosa</i>			
562.	<i>Urolophus gigas</i>			
563.	<i>Urolophus paucimaculatus</i>			
564.	<i>Urolophus</i> sp.			
<b>Varanidae</b>				
565.	25225 <i>Varanus rosenbergi</i> (Heath Monitor)			
<b>Veliferidae</b>				
566.	<i>Metavelifer multiradiatus</i>			
<b>Veliidae</b>				
567.	<i>Veliidae</i> sp.			
<b>Vespertilionidae</b>				
568.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
569.	24187 <i>Chalinolobus morio</i> (Chocolate Wattled Bat)			
570.	24189 <i>Falsistrellus mackenziei</i> (Western False Pipistrelle, Western Falsistrelle)		P4	
571.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
572.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
<b>Zeidae</b>				
573.	<i>Zeus faber</i>			

Name ID	Species Name	Naturalised	Conservation Code	<sup>1</sup> Endemic To Query Area
<b>Ziphiidae</b>				
574.	24080 <i>Mesoplodon layardii</i> (Strap-toothed Beaked Whale)			
<b>Zodariidae</b>				
575.	<i>Holasteron reinholdae</i>			Y
576.	<i>Storosa tetrica</i>			
<b>Zoridae</b>				
577.	<i>Argoctenus bidentatus</i>			
<b>Zosteropidae</b>				
578.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			

**Conservation Codes**  
T - Rare or likely to become extinct  
X - Presumed extinct  
IA - Protected under international agreement  
S - Other specially protected fauna  
1 - Priority 1  
2 - Priority 2  
3 - Priority 3  
4 - Priority 4  
5 - Priority 5

<sup>1</sup> For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 19/10/18 18:23:43

[Summary](#)

[Details](#)

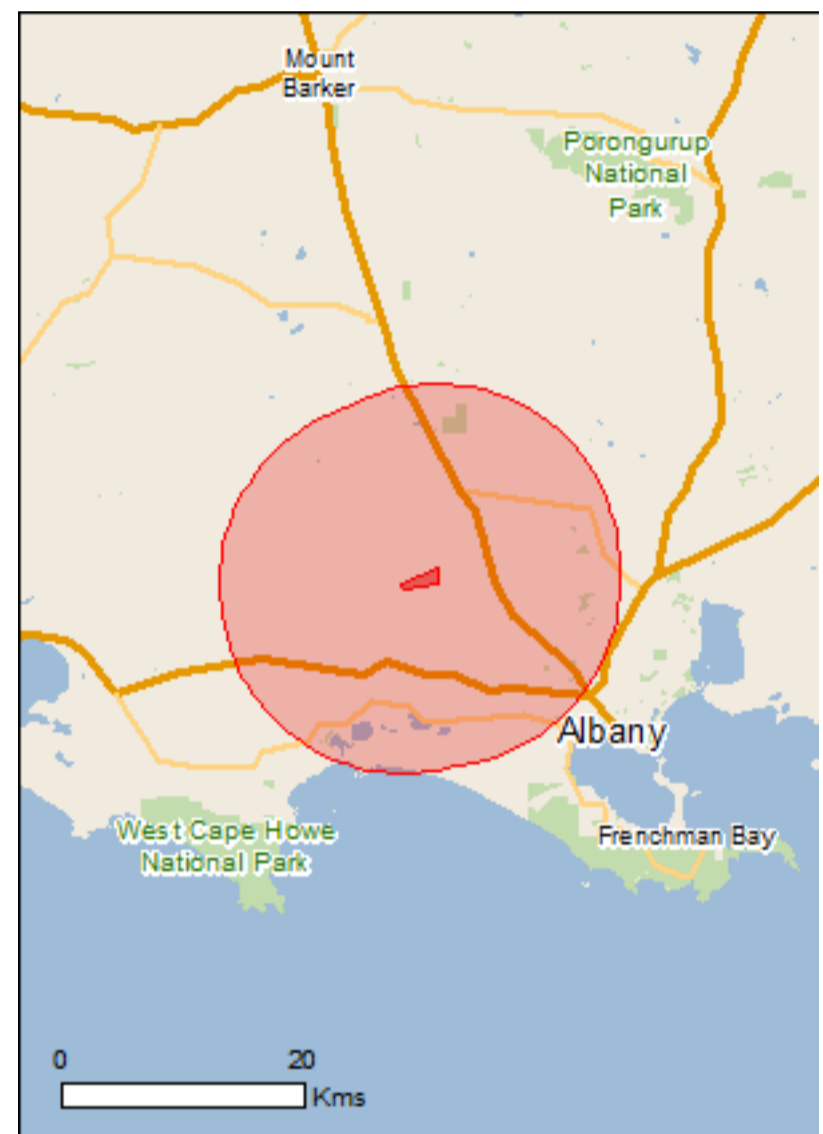
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

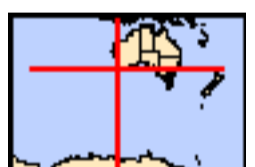
[Acknowledgements](#)



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[Coordinates](#)

[Buffer: 15.0Km](#)



# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	2
<a href="#">Listed Threatened Species:</a>	58
<a href="#">Listed Migratory Species:</a>	41

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	1
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	65
<a href="#">Whales and Other Cetaceans:</a>	12
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<a href="#">State and Territory Reserves:</a>	11
<a href="#">Regional Forest Agreements:</a>	1
<a href="#">Invasive Species:</a>	26
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

### Listed Threatened Ecological Communities [ [Resource Information](#) ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
<a href="#">Proteaceae Dominated Kwongan Shrublands of the Southeast Coastal Floristic Province of Western Australia</a>	Endangered	Community may occur within area
<a href="#">Subtropical and Temperate Coastal Saltmarsh</a>	Vulnerable	Community likely to occur within area

### Listed Threatened Species [ [Resource Information](#) ]

Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Calyptorhynchus banksii naso</a> Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Calyptorhynchus baudinii</a> Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Breeding known to occur within area
<a href="#">Calyptorhynchus latirostris</a> Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
<a href="#">Cereopsis novaehollandiae grisea</a> Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat may occur within area
<a href="#">Dasyornis longirostris</a> Western Bristlebird [515]	Endangered	Species or species habitat likely to occur within area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea dabbenena</a> Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Halobaena caerulea</a> Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
<a href="#">Limosa lapponica baueri</a> Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
<a href="#">Limosa lapponica menzbieri</a> Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pachyptila turtur subantarctica</a> Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Phoebastria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pterodroma mollis</a> Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
<a href="#">Sternula nereis nereis</a> Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
<a href="#">Thalassarche cauta cauta</a> Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche cauta steadi</a> White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Nannatherina balstoni</a> Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat likely to occur within area
<b>Mammals</b>		
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Dasyurus geoffroii</a> Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Breeding known to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Neophoca cinerea</a> Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat may occur within area
<a href="#">Parantechinus apicalis</a> Dibbler [313]	Endangered	Species or species habitat likely to occur within area
<a href="#">Pseudocheirus occidentalis</a> Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat known to occur within area
<b>Other</b>		
<a href="#">Westralunio carteri</a> Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat likely to occur within area
<b>Plants</b>		
<a href="#">Banksia brownii</a> Brown's Banksia, Feather-leaved Banksia [8277]	Endangered	Species or species habitat known to occur within area
<a href="#">Banksia goodii</a> Good's Banksia [16727]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Banksia verticillata</a> Granite Banksia, Albany Banksia, River Banksia [8333]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Caladenia granitora</a> [65292]	Endangered	Species or species habitat may occur within area
<a href="#">Caladenia harringtoniae</a> Harrington's Spider-orchid, Pink Spider-orchid [56786]	Vulnerable	Species or species habitat may occur within area
<a href="#">Calectasia cyanea</a> Blue Tinsel Lily [7669]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Chordifex abortivus</a> Manypeaks Rush [64868]	Endangered	Species or species habitat likely to occur within area
<a href="#">Conostylis misera</a> Grass Conostylis [21320]	Endangered	Species or species habitat known to occur within area
<a href="#">Diuris drummondii</a> Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur



Name	Status	Type of Presence
<a href="#">Drakaea micrantha</a> Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Isopogon uncinatus</a> Albany Cone Bush, Hook-leaf Isopogon [20871]	Endangered	Species or species habitat known to occur within area
<a href="#">Kennedia glabrata</a> Northcliffe Kennedia [16452]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Sphenotoma drummondii</a> Mountain Paper-heath [21160]	Endangered	Species or species habitat may occur within area
<a href="#">Verticordia apecta</a> Hay River Featherflower, Scruffy Verticordia [65545]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Verticordia fimbrilepis subsp. australis</a> Southern Shy Featherflower [24630]	Vulnerable	Species or species habitat known to occur within area

### Reptiles

<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

### Sharks

<a href="#">Carcharias taurus (west coast population)</a> Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

### Listed Migratory Species

[ [Resource Information](#) ]

\* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardenna carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea dabbenena</a> Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Hydroprogne caspia</a> Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
<a href="#">Phoebastria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
<a href="#">Thalassarche cauta</a> Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<b>Migratory Marine Species</b>		
<a href="#">Balaena glacialis australis</a> Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		Species or species habitat may occur within area
<a href="#">Carcharodon carcharias</a> White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

Name	Threatened	Type of Presence
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area
<a href="#">Lamna nasus</a> Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
<a href="#">Manta alfredi</a> Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
<a href="#">Manta birostris</a> Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

## Commonwealth Land

[\[ Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

## Name

Commonwealth Land -

## Listed Marine Species

[\[ Resource Information \]](#)

\* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
<b>Birds</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
<a href="#">Catharacta skua</a> Great Skua [59472]		Species or species habitat may occur within area
<a href="#">Cereopsis novaehollandiae grisea</a> Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat may occur within area
<a href="#">Chrysococcyx osculans</a> Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
<a href="#">Diomedea antipodensis</a> Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea dabbenena</a> Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
<a href="#">Diomedea epomophora</a> Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
<a href="#">Diomedea exulans</a> Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Diomedea sanfordi</a> Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Halobaena caerulea</a> Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
<a href="#">Larus pacificus</a> Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Macronectes giganteus</a> Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
<a href="#">Macronectes halli</a> Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Motacilla cinerea</a> Grey Wagtail [642]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pachyptila turtur</a> Fairy Prion [1066]		Species or species habitat likely to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Phoebastria fusca</a> Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pterodroma mollis</a> Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
<a href="#">Puffinus assimilis</a> Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
<a href="#">Puffinus carneipes</a> Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Breeding known to occur within area
<a href="#">Sterna caspia</a> Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
<a href="#">Thalassarche carteri</a> Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or

Name	Threatened	REPORT ITEM DIS245 REFERS	Type of Presence related behaviour may occur within area
<a href="#">Thalassarche cauta</a> Tasmanian Shy Albatross [89224]	Vulnerable*		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thalassarche impavida</a> Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable		Species or species habitat may occur within area
<a href="#">Thalassarche melanophris</a> Black-browed Albatross [66472]	Vulnerable		Species or species habitat may occur within area
<a href="#">Thalassarche steadi</a> White-capped Albatross [64462]	Vulnerable*		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Thinornis rubricollis</a> Hooded Plover [59510]			Species or species habitat known to occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]			Species or species habitat likely to occur within area
<b>Fish</b>			
<a href="#">Acentronura australe</a> Southern Pygmy Pipehorse [66185]			Species or species habitat may occur within area
<a href="#">Campichthys galei</a> Gale's Pipefish [66191]			Species or species habitat may occur within area
<a href="#">Heraldia nocturna</a> Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]			Species or species habitat may occur within area
<a href="#">Hippocampus breviceps</a> Short-head Seahorse, Short-snouted Seahorse [66235]			Species or species habitat may occur within area
<a href="#">Histiogamphelus cristatus</a> Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]			Species or species habitat may occur within area
<a href="#">Leptoichthys fistularius</a> Brushtail Pipefish [66248]			Species or species habitat may occur within area
<a href="#">Lissocampus caudalis</a> Australian Smooth Pipefish, Smooth Pipefish [66249]			Species or species habitat may occur within area
<a href="#">Lissocampus runa</a> Javelin Pipefish [66251]			Species or species habitat may occur within area
<a href="#">Maroubra perserrata</a> Sawtooth Pipefish [66252]			Species or species habitat may occur within area
<a href="#">Nannocampus subosseus</a> Bonyhead Pipefish, Bony-headed Pipefish [66264]			Species or species habitat may occur within area
<a href="#">Notiocampus ruber</a> Red Pipefish [66265]			Species or species habitat may occur within area
<a href="#">Phycodurus eques</a> Leafy Seadragon [66267]			Species or species

Name	Threatened	REPORT ITEM DIS245 REFERS	Type of Presence
<a href="#">Phyllopteryx taeniolatus</a> Common Seadragon, Weedy Seadragon [66268]			habitat may occur within area Species or species habitat may occur within area
<a href="#">Pugnaso curtirostris</a> Pugnose Pipefish, Pug-nosed Pipefish [66269]			Species or species habitat may occur within area
<a href="#">Solegnathus lettiensis</a> Gunther's Pipehorse, Indonesian Pipefish [66273]			Species or species habitat may occur within area
<a href="#">Stigmatopora argus</a> Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]			Species or species habitat may occur within area
<a href="#">Stigmatopora nigra</a> Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]			Species or species habitat may occur within area
<a href="#">Urocampus carinirostris</a> Hairy Pipefish [66282]			Species or species habitat may occur within area
<a href="#">Vanacampus margaritifer</a> Mother-of-pearl Pipefish [66283]			Species or species habitat may occur within area
<a href="#">Vanacampus phillipi</a> Port Phillip Pipefish [66284]			Species or species habitat may occur within area
<a href="#">Vanacampus poecilolaemus</a> Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]			Species or species habitat may occur within area
<b>Mammals</b>			
<a href="#">Arctocephalus forsteri</a> Long-nosed Fur-seal, New Zealand Fur-seal [20]			Species or species habitat likely to occur within area
<a href="#">Neophoca cinerea</a> Australian Sea-lion, Australian Sea Lion [22]	Vulnerable		Species or species habitat may occur within area
<b>Reptiles</b>			
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered		Breeding likely to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable		Breeding likely to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered		Breeding likely to occur within area
<b>Whales and other Cetaceans</b>			<b>[ Resource Information ]</b>
<b>Name</b>	<b>Status</b>		<b>Type of Presence</b>
<b>Mammals</b>			
<a href="#">Balaenoptera acutorostrata</a> Minke Whale [33]			Species or species habitat may occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]			Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered		Species or species habitat likely to occur

Name	Status	Type of Presence
<a href="#">Caperea marginata</a> Pygmy Right Whale [39]		REPORT ITEM DIS245 REFERS within area  Species or species habitat may occur within area
<a href="#">Delphinus delphis</a> Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
<a href="#">Eubalaena australis</a> Southern Right Whale [40]	Endangered	Breeding known to occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Lagenorhynchus obscurus</a> Dusky Dolphin [43]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus</a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
<a href="#">Tursiops truncatus s. str.</a> Bottlenose Dolphin [68417]		Species or species habitat may occur within area

## Extra Information

State and Territory Reserves	[ Resource Information ]
Name	State
Down Road	WA
Gledhow	WA
Lake Powell	WA
Marbelup	WA
Mill Brook	WA
Phillips Brook	WA
Shelter Island	WA
Sleeman Creek	WA
Unnamed WA01998	WA
Unnamed WA23088	WA
Unnamed WA23923	WA

## Regional Forest Agreements

[ Resource Information ]

Note that all areas with completed RFAs have been included.

Name	State
<a href="#">South West WA RFA</a>	Western Australia

## Invasive Species

[ Resource Information ]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.



Name	Status	Type of Presence
<b>Birds</b>		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
<b>Mammals</b>		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom,	359	Species or species

Name	Status	Type of Presence
Common Broom, French Broom, Soft Broom [20126]		REPORT ITEM DIS245 REFERS habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large- leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

# Coordinates

-34.929797 117.739282,-34.924801 117.752156,-34.934934 117.752242,-34.939296 117.727952,-34.93803 117.727008,-34.934512 117.726407,-34.929727 117.739282,-34.929797 117.739282

## Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
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- [-Ocean Biogeographic Information System](#)
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- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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# CONSERVATION CODES

## For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora<sup>1</sup> are species<sup>2</sup> which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

### **T**     Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

**Threatened fauna** is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

**Threatened flora** is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

### **CR**    **Critically endangered species**

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

### **EN**    **Endangered species**

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

### **VU**    **Vulnerable species**

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

## **Extinct species**

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

### **EX Extinct species**

Species where “*there is no reasonable doubt that the last member of the species has died*”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

### **EW Extinct in the wild species**

Species that “*is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

## **Specially protected species**

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

### **MI Migratory species**

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

### **CD Species of special conservation interest (conservation dependent fauna)**

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

### **OS Other specially protected species**

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

## **P** Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

### **1 Priority 1: Poorly-known species**

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

### **2 Priority 2: Poorly-known species**

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

### **3 Priority 3: Poorly-known species**

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

### **4 Priority 4: Rare, Near Threatened and other species in need of monitoring**

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

<sup>1</sup> The definition of flora includes algae, fungi and lichens

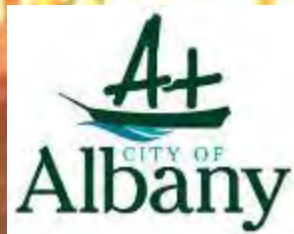
<sup>2</sup> Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

Appendix G – Bushfire Management Plan (May 2019)



**Albany Motorsport  
Park  
Lot 5780 Down Road  
Drome**

# Bushfire Management Plan



## DOCUMENT CONTROL

### TITLE

Title: Bushfire Management Plan Albany Motorsport Park – Lot 5780 Down Road, Drome

Author (s): Kathryn Kinnear, Daniel Panickar & Bruce Horkings

Reviewer (s): Bianca Theyer, Bruce Horkings

Job No.: COA0020

Client: City of Albany

### REVISION RECORD

Revision	Summary	Revised By	Date
Draft Id 12/03/2019	Internal QA Review	Bianca Theyer	12/03/2019
Draft Id 12/03/2019	Issued to ELA	K.Kinnear	12/03/2019
Draft Id 25/03/2019	Issued to BDS from ELA	D.Panickar	23/03/2019
Draft Id 27/03/2019	Issued to ELA for Peer review	K.Kinnear	27/03/2019
Draft Id 12/04/2019	Issued to client for draft review	K.Kinnear	12/04/2019
Final Id Version 1 07/05/2019	Issued to client as final	K.Kinnear	07/05/2019



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## 1. Executive Summary

The City of Albany commissioned Bio Diverse Solutions and Eco Logical Australia to prepare a Bushfire Management Plan (BMP) for the proposed Albany Motorsport Park (AMP) at Lot 5780 Down Road, Drome WA 6330. The City of Albany Local Planning Scheme (LPS) No.1 outlines the area zoned as 'Priority Agriculture' and is located within the Drome Industrial Buffer Area. It is proposed through the Scheme Amendment Process to rezone the area to 'Special use' under LPS1.

This BMP has been prepared to assess the subject site against the current and endorsed Guidelines for Planning in Bushfire Prone Areas Vers 1.3 (WAPC, 2017) and State Planning Policy 3.7 (SPP 3.7; WAPC, 2015). Such planning takes into consideration standards and requirements specified in various documents such as Australian Standard (AS) 3959-2009, Western Australian Planning Commission (WAPC) Guidelines for Planning in Bushfire Prone Areas Vers 1.3 (WAPC, 2017) and SPP 3.7 (WAPC, 2015). These policies, plans and guidelines have been developed by WAPC to ensure uniformity to planning in designated "Bushfire Prone Areas" and consideration of the relevant bushfire hazards when identifying or investigating land for future development.

The concept plan outlines a multi-use development, the details of this plan will be finalised as part of the future Development Application, the plan includes:

- Motocross track and clubrooms;
- A multi-use 3.5km bitumen race track for race events such as for motor car racing, motorcycle racing, drifting, driver training and cycling;
- A 1000 foot drag strip for drag racing;
- A 1300m<sup>2</sup> burnout area;
- A function building and club rooms;
- Spectator viewing areas;
- Pit marshalling areas and storage sheds;
- Site parking; and
- An off-road four-wheel drive and all-terrain vehicle training area.

The staging of the development of the AMP includes a 2 staged process:

**Stage 1:** Development of the motocross track in the north of the site, development of the multiuse track for state motor car, motorcycle and cycling events; and enabling works such as feasibility, planning, design works and access roads.

**Stage 2:** Contemplate the further development of the AMP site as patronage increases and the range of uses is broadened (e.g. lighted evening events, international events) and is dependent on further funding. (GHD, 2018)

The proposed Motorsport Park is located in a Bushfire Prone Area (SLIP, 2018) and as such triggers compliance with requirements of State Planning Policy 3.7 – Planning in Bushfire Prone Areas (SPP 3.7). The proposed scheme amendment is considered a 'Strategic Planning Proposal' under SPP 3.7 and must be accompanied by a Bushfire Hazard Level (BHL) Assessment and demonstrate compliance with bushfire protection criteria in the form of a BMP. The BMP is to provide sufficient evidence that the rezoning proposal has, or can be made to have a low to moderate Bushfire Hazard Level.

The external bushfire risks to the site are the continuous remnant vegetation and plantations located to the west and north west, east, north and south east. The creek central to the subject site drains to the south west and risks of bushfire in this direction is also evident. Remnant vegetation located internal to the subject site in the west was burnt in the recent May 2018 bushfires. The external remnant forest areas (including plantations) present Extreme Bushfire Hazard levels (as defined by WAPC) to the AMP development. To the south and east of the site is predominantly farmland areas grazed by cattle which present moderate BHL risks.

The subject site was assessed as having internal areas of Forest Type A, Woodland Type B, Grassland Type G, Shrubland Type C and Scrub Type D. Bushfire Hazard Level (BHL) Mapping has allocated extreme, moderate and low hazard level across the site with the post development BHL moderate or low in development areas of the AMP.

BAL contouring across the subject site has allocated BAL ratings of BAL-29 or less applies to buildings within the proposed concept plan. All internal woodland and grassland areas (previously grazed paddocks) will be managed and maintained in low fuel state (slashed/mowed to <100mm for grasses and trees to WAPC APZ standards) and documented through the Operational Management Plan (OMP) prior to the AMP operating.

To mitigate bushfire risks to the site the following parameters are to be employed:

- Fuel hazard reduction burning in the internal western remnant bushland (rotation 8-10 years and governed by CoA Emergency services priorities and resources). Refer to Section 9.2 of this report.
- Excluding bushfire from the central creek area to reduce the risk of peat fires on the subject site (no planned burning, mineral earth firebreaks, low fuel buffers).
- Reducing risks of ignition from the motorsport events (internal) as outlined in Section 7 of this report.
- Reducing risk of ignition from external sources through liaison with neighbours and consultation with the Local Bushfire Brigade (Highway Brigade located 5km away near Albany Airport).
- Modifying and maintaining the existing internal areas of Grassland Type G and Woodland Type B to a low fuel state at all times (as per WAPC Standards).
- Traffic control during events to ensure safe and timely evacuation of personnel from the site in event of bushfire.
- Consideration of purchase of fast attack light unit for the AMP site and to be placed adjacent to any practise areas (non-event days).
- Event days will have full fire safety crews, ambulance and safety personnel strategically located around the track.
- Documentation of control measures in the OMP as outlined in this BMP report for the site.
- Lease arrangements from the CoA to the AMP controlling body to define management controls of the development site as defined in the implementation table Section 10 of this report.

Consultation with Department of Fire and Emergency Services (DFES) and Department of Planning, Lands and Heritage (DPLH) confirmed that they deemed the AMP to be a “High risk” land use. SPP 3.7 outlines that certain land uses may potentially ignite a bushfire, prolong its duration or increase its intensity. Such land uses are defined as ‘High Risk’. The proposed Albany Motorsport Park (AMP) is defined a high-risk industry due to:

- Motorsport activities giving rise to risk of ignition and bushfire; and
- Exposure of the community, fire fighters and environment to dangerous substances from vehicles igniting.

A summary of recommendations from the brief risk assessment process includes:

- A detailed Operational Management Plan (OMP) to be developed by AMP which includes risk assessments (refer to example Appendix 5) as per Confederation of Australian Motor Sport (CAMS) policy and regulations to ensure there are actions to minimize risks of ignition from internal sources of the park.
- The OMP will be reviewed and endorsed by the CAMS prior to operation of the Albany Motorsport Park.
- Restricting public access through the site to spectator viewing areas and competitor areas, access around the whole of the site is restricted to emergency and safety services.
- Practice days and non-events are to be controlled and regulated by AMP and documented in the OMP for the site.

- Hazard reduction burning only occurs in the western remnant vegetation block, restrictions of fire in central creek area (peat fire risk) through 8m firebreak at edge of fencing of remnant vegetation (restrict grass fires passing into remnant vegetation).
- Controlled re-fueling of vehicles in designated areas, documented in OMP.
- Observing and complying with “Total fire ban days” and “Vehicle movement restrictions/bans” as set by LGA.
- No events held during Catastrophic Fire Danger Rating (FDR) days.

It is noted that although designated as a High-risk industry through the definition of SPP 3.7, the controls and management procedures implemented through the risk management process will reduce the risks of the AMP. The proposed uses associated with the AMP will be controlled and governed through:

- Designed to comply with CAMS’ Track Operator’s Safety Guide (CAMS 2012) and Motorcycling Australia (MA) Track Guidelines (MA 2011).
- To be licensed by CAMS for Fédération Internationalé de l’Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing).
- Motocross track designed and constructed in association with Motocross Australia guidelines.
- Drag strip designed and constructed in accordance with FIA specifications for drag strips and in association with Australian National Drag Racing Association (ANDRA).

Consideration of the High-risk nature of the AMP site is an ongoing process to be refined in future stages of the development approval process and to be addressed under a Bushfire Risk Management Plan (BRMP) if required or requested from the approving agency.

The proposal is defined as ‘Vulnerable Land Use’ (as per SPP 3.7) due to:

- Large numbers of people attending the AMP events (400-500 people club events, 10,000 people state events);
- Elderly demographic, children and mobility impaired people attending the AMP events;
- Presence of a function centre and clubrooms; and
- Site evacuation challenges associated with visitors and spectators on site.

Access internal the site will be provided in alternative directions to separate destinations to Down Road to the north and Down Road South. Multiple gates will also facilitate access/egress from the site on the north and eastern boundaries. Down Road is essentially a long cul-de-sac (dead end road terminating to the north west of the subject site), as is Down South Road (terminating to the south of the subject site). The surrounding public road network is a legacy to previous precinct planning and development approvals. During the preparation of this BMP report four access options were investigated to the north, west, and south.

The most favourable option for an Emergency Access Way (EAW) is to link Down Road South and Albany Highway. It is to be constructed to enable a secondary access/egress for the AMP site. Consultation undertaken by CoA during the preparation of this BMP has sought verbal in-principle agreement for the linking EAW by Main Roads Western Australia (MRWA), Water Corporation Western Australia (WCWA) (landowner), and Lindsay Black (landowner). This will be gazetted as an easement in gross to allow for emergency access/egress in a bushfire event. This will give the AMP an alternative access route, which presently does not exist. The alternative access for the whole of the precinct has not been investigated for the preparation of this report and the CoA have indicated this would be investigated during a future Structure Plan process for the whole of the precinct. The EAW will be an easement in gross to a minimum of 12m wide and measures 4.38km which does not meet the Acceptable Solutions (WAPC, 2017) and therefore has been assessed as non-compliant.

A Bushfire Emergency Evacuation Plan (BEEP) has been prepared to support this development and provides contingency actions in accordance with the requirements of the *Draft Position Statement: Tourism land uses within bushfire prone areas* (WAPC, 2018). These contingencies include early closure of the site, off-site evacuation and as a last resort, refuge on site in a suitable building / open space.

The aim of the BEEP is early, safe and timely evacuation of the site prior to bushfire events and no events held on site during Catastrophic Fire Danger Rating (FDR) days (i.e. consider evening events, “Total Fire Ban” days and “Restricted vehicle movement days” (harvest bans). Contingency planning for evacuation is via an on-site open-air refuge (located in an area subject to a radiant heat flux of  $\leq 2$  kW/m<sup>2</sup>) for large events and clubroom buildings built to the ABCB handbook (ABCB, 2014) and BAL-29 (located in an area subject to a radiant heat flux of  $\leq 10$  kW/m<sup>2</sup>). This is compliant with the WAPC *Draft Position Statement: Tourism land uses within bushfire prone areas* (WAPC, 2018). The BEEP will form part of the Emergency Management Plan for the site which will be developed by AMP prior to operations of the site.

An assessment to the WAPC Guidelines for Planning in Bushfire Prone Areas Vers 1.3, (WAPC,2017) bushfire protection criteria is summarised in Table 1 over the page.



**Table 1: Bushfire protection criteria applicable to the site**

Element	Acceptable Solution	Applicable or not Yes/No	Meets Acceptable Solution
Element 1 – Location	A1.1 Development Location	Yes	Compliant. BAL 29 or less applied to development footprint, Low to Moderate BHL post development.
Element 2 – Siting and Design	A2.1 Asset Protection Zone	Yes	Compliant. APZ applies to whole of development area to WAPC guidelines and contained within the subject site.
Element 3 – Vehicular Access	A3.1 Two Access Routes	Yes	Internal compliant, external non-compliant. Two access to 2 destinations addressed using BEEP as per WAPC <i>Draft Position Statement: Tourism land uses within bushfire prone areas</i> (WAPC, 2018).
	A3.2 Public Road	No	Not assessed existing public road network to be used.
	A3.3 Cul-de-sacs	No	N/A
	A3.4 Battle axes	No	N/A
	A3.5 Private driveways	Yes	Compliant, all internal access to 6m pavement with 12m horizontal clearance.
	A3.6 Emergency Access Ways	Yes	Non-compliant external alternative emergency access via easement in gross 4.38km from site to Albany Highway, via a performance-based assessment.
	A3.7 Fire Service Access Ways	Yes	All internal FSAs to 8m width and linking around the subject site.
	A3.8 Firebreaks	Yes	All firebreaks to CoA FMN or to 8m as defined in report.
Element 4 – Water	A4.1 Reticulated areas	No	N/A
	A4.2 Non-reticulated areas	Yes	Compliant, Bore and Tank supply internal to the site.
	A4.3 Individual lots in non-reticulated areas	No	N/A

The City of Albany is presently pursuing the purchase of Lot 5780 Down Road Drome. Once purchased, the property, tracks and all permanent facilities and infrastructure constructed on the property will be owned by the City of Albany. The Albany Motorsport Park (AMP) will then be leased to an operator-manager by the City of Albany, with all operational and maintenance activities to be conducted by the operator-manager. Responsibilities for implementation are documented in Section 10 of this report and outlines responsibilities for the AMP Developer (occupiers of the development area) and the City of Albany as land managers. Measures outlined in this report are to be implemented in subsequent stages of planning and development.

## 2. Introduction

The City of Albany commissioned Bio Diverse Solutions in consultation with Eco Logical Australia to prepare a Bushfire Management Plan (BMP) for the proposed Albany Motorsport Park at Lot 5780 Down Road, Drome WA 6330. This BMP has been prepared to assess the subject site against the current and endorsed Guidelines for Planning in Bushfire Prone Areas Vers 1.3 (WAPC, 2017) and State Planning Policy 3.7 (SPP 3.7; WAPC, 2015). Such planning takes into consideration standards and requirements specified in various documents such as Australian Standard (AS) 3959-2009, Western Australian Planning Commission (WAPC) Guidelines for Planning in Bushfire Prone Areas Vers 1.3 (WAPC, 2017) and SPP 3.7 (WAPC, 2015). These policies, plans and guidelines have been developed by WAPC to ensure uniformity to planning in designated “Bushfire Prone Areas” and consideration of the relevant bushfire hazards when identifying or investigating land for future development.

Consultation with Department of Fire and Emergency Services (DFES) and Department of Planning, Lands and Heritage (DPLH) confirmed that they deemed the AMP to be a “High risk”. SPP 3.7 outlines that certain land uses may potentially ignite a bushfire, prolong its duration or increase its intensity. Such land uses are defined as ‘High Risk’.

The proposed Albany Motorsport Park (AMP) is defined a high-risk industry as per SPP 3.7 due to:

- Motorsport activities giving rise to risk of ignition and bushfire; and
- Exposure of the community, fire fighters and environment to dangerous substances from vehicles igniting.

Consideration of the High-risk nature of the AMP site is an ongoing process to be refined in future stages of the development approval process and to be addressed under a Bushfire Risk Management Plan (BRMP) if required

The proposal is defined as ‘Vulnerable Land Use’ (as per SPP 3.7) due to:

- Large numbers of people attending the AMP events (400-500 people club events, 10,000 people state events);
- Elderly demographic, children and mobility impaired people attending the AMP events;
- Presence of a function centre and clubrooms; and
- Site evacuation challenges associated with visitors and spectators on site.

The BEEP prepared to support this development provides contingency actions in accordance with the requirements of the *Draft Position Statement: Tourism land uses within bushfire prone areas* (WAPC, 2018). These contingencies include early closure of the site, off-site evacuation and as a last resort, refuge on site in a suitable building / open space. Eco Logical Australia has been engaged to provide Level 3 BPAD practitioners input into the BMP and prepare the Bushfire Emergency Evacuation Plan (BEEP) for the site.

### 2.1. Location

The “Subject Site” is defined as Lot 5780 Down Road, in the locality of Drome, refer to Figure 1. The development location of the proposed Albany Motorsport Park is the open paddock areas of Lot 5780, refer to current “Concept Plan’ Figure 2. The subject site is located 31 km from the Albany CBD in the Drome Industrial zone and is approximately 192.20ha in size. The site is currently used for agricultural pursuits (grazing of cattle).



**Figure 1: Location Plan**

## 2.2. Development Proposal

Lot 5780 Down Road, Drome is the proposed Albany Motorsport Park site. The concept plan covers approximately 142.8ha of the site as shown in Figure 2 and outlines a multi-use development. The details of this plan will be finalised as part of the future Development Application, the plan includes:

- Motocross track and clubrooms;
- A multi-use 3.5km bitumen race track for race events such as for motor car racing, motorcycle racing, drifting, driver training and cycling;
- A 1000 foot drag strip for drag racing;
- A 1300m<sup>2</sup> burnout area;
- A function building and club rooms;
- Spectator viewing areas;
- Pit marshalling areas and storage sheds;
- Site parking; and
- An off-road four wheel drive and all-terrain vehicle training area.

The staging of the development of the AMP includes a 2 staged process:

**Stage 1:** Development of the motocross track development in the north of the site, development of the multiuse track for state motor car, motorcycle and cycling events; and enabling works such as feasibility, planning, design works and access roads.

**Stage 2:** Contemplate the further development of the AMP site as patronage increases and the range of uses in broadened (e.g. lighted evening events, international events) and is dependent on further funding. (GHD, 2018).

The City of Albany Local Planning Scheme (LPS) No.1 outlines the area zoned as 'Priority Agriculture' and is located within the Drome Industrial Buffer Area. It is proposed through the Scheme Amendment Process to rezone the area to 'Special use' under LPS1. The proposed Motorsport Park is located in a Bushfire Prone Area (SLIP, 2018) and as such is required to comply with requirements of State Planning Policy 3.7 – Planning in Bushfire Prone Areas (SPP 3.7). The proposed scheme amendment is considered a 'Strategic Planning Proposal' under SPP 3.7 and must be accompanied by a Bushfire Hazard Level (BHL) Assessment, demonstrate compliance with bushfire protection criteria in the form of a BMP. The BMP is to provide sufficient evidence that the rezoning proposal has, or can be made to have a low to moderate Bushfire Hazard Level.

The proposed Motorsport Park is also classified according to SPP 3.7 as 'High Risk' and 'Vulnerable Land Use' and therefore in accordance with SPP 3.7 requires the consultation of a Level 3 BPAD Accredited Bushfire Practitioner. Eco Logical Australia has been engaged to provide Level 3 BPAD practitioner input into the BMP and prepare a Bushfire Emergency Evacuation Plan (BEEP).

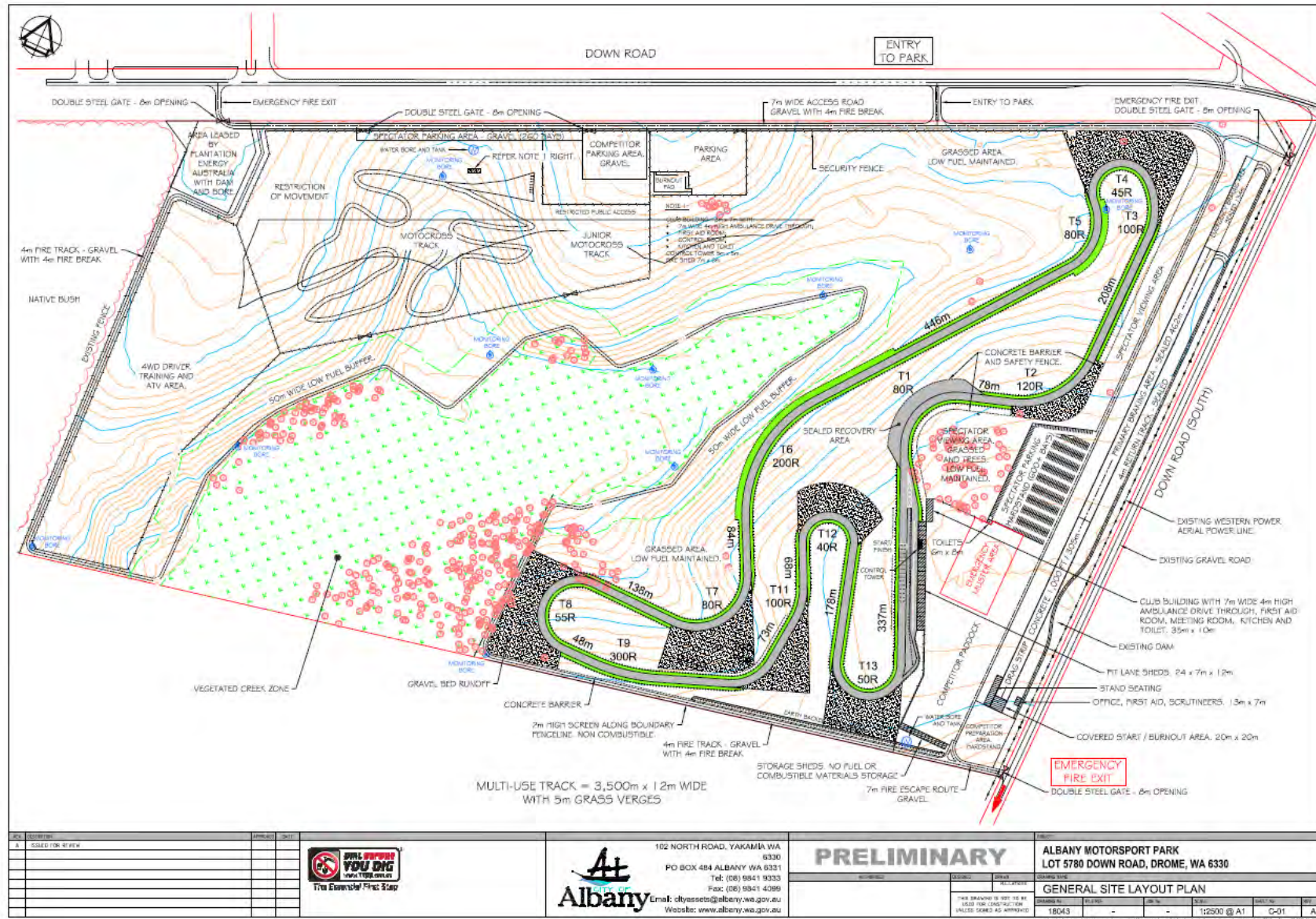


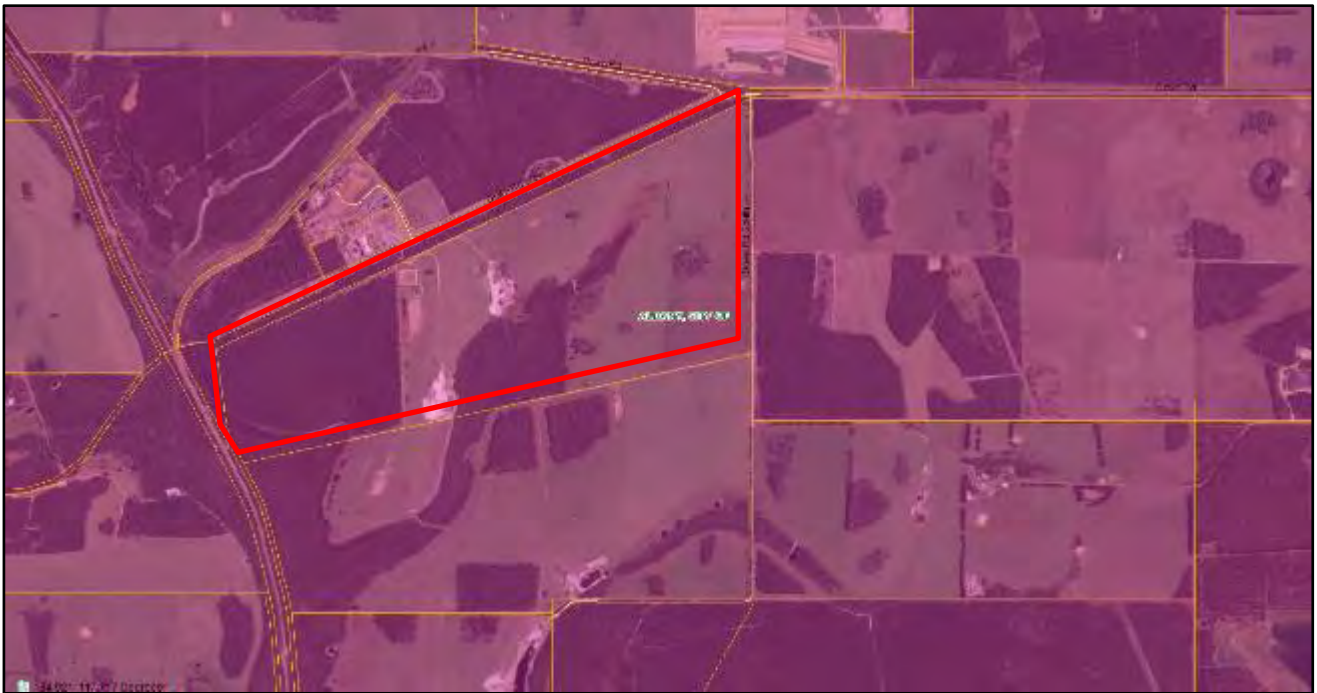
Figure 2: AMP General Site Layout Plan (Concept Plan)

### 2.3. Statutory Framework

This document and the recommendations contained within are aligned to the following policy and guidelines:

- *Planning and Development Act 2005;*
- *Planning and Development Regulations 2009;*
- *Planning and Development (Local Planning Scheme) Regulations 2015;*
- State Planning Policy 3.7 Planning in Bushfire Prone Areas;
- Guidelines for Planning in Bushfire Prone Areas;
- *Fire and Emergency Services Act 1998.*
- AS 3959-2009 “Construction of Buildings in Bushfire Prone Areas” current and endorsed standards;
- *Bushfires Act 1954;*
- *Draft Position Statement: Tourism land uses within bushfire prone areas* (WAPC, 2018); and
- City of Albany Annual Fire Management Notice.

The publicly released Bushfire Prone Area Mapping (SLIP, 2018) shows that the Subject Site is located within a Bushfire Prone Area (situated within 100m of >1 ha of bushfire prone vegetation). The WA Bushfire Prone Area Mapping is shown on Figure 3.



**Figure 3: Bushfire Prone Area Mapping (SLIP, 2018)**

## 2.4. Suitably Qualified Bushfire Consultant

This BMP has been prepared by Kathryn Kinnear (nee White), who has 10 years operational fire experience with the (formerly) DEC (1995-2005) and has the following accreditation in bushfire management:

- Incident Control Systems;
- Operations Officer;
- Prescribed Burning Operations;
- Fire and Incident Operations;
- Wildfire Suppression 1, 2 & 3;
- Structural Modules – Hydrants and hoses, Introduction to Structural Fires, and Fire extinguishers; and
- Ground Controller.

Kathryn Kinnear currently has the following tertiary Qualifications:

- BAS Technology Studies & Environmental Management;
- Diploma Business Studies; and
- Graduate Diploma in Environmental Management.

Kathryn Kinnear is an accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD30794). Bio Diverse Solutions are Bronze Corporate Members of the Fire Protection Australia Association and Kathryn is a suitably qualified Bushfire Practitioner to prepare this Bushfire Management Plan.

Level 3 Bushfire Practitioner Bruce Horkings (Eco Logical Australia, FPAA BPAD 29962-L3) and Daniel Panickar (Eco Logical Australia, FPAA BPAD 37802-L2) were commissioned to assist in the preparation of this report specifically in relation to the “High Risk Industry” (as defined by SPP3.7) nature of the proposal, prepare the performance based assessment for “Vulnerable Land use”, to prepare the Bushfire Emergency Evacuation Plan (BEEP), and undertake a technical peer review of the BMP report.

### 3. Objectives

The objectives of this BMP are to assess the bushfire risks associated with the proposed Concept Plan to reduce the occurrence of, and minimise the impact of bushfires, thereby reducing the threat to life, property and the environment. It also aims to guide the design by assessing the proposed Concept Plan against the Bushfire Protection Criteria as outlined in the Guidelines.

The BMP aims to:

- Achieve consistency with objectives and policy measures of SPP 3.7 (WAPC, 2015);
- Assess any building requirements to AS3959-2009 (current and endorsed standards) and BAL Construction;
- Assess the proposal as a “High Risk Industry” and Vulnerable Land use” as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017);
- Assess the proposal against the Bushfire Protection Criteria Acceptable Solutions as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017);
- Understand and document the extent of the bushfire risk to the subject site;
- Prepare bushfire risk management measures for bushfire management of all land within the subject site with due regard to people, property, infrastructure and the environment;
- Nominate individuals and organisations responsible for implementation of fire management and associated works within the subject site; and
- Ensure alignment to the recommended assessment procedure which evaluates the effectiveness and impact of proposed, as well as existing, bushfire risk management measures and strategies.



## 4. Spatial consideration of bushfire threat

### 4.1. Climate

The Albany area is characterised by a Mediterranean climate with mild wet winters and mild to hot dry summers. The average annual temperature in Albany ranges from 11.8 – 19.5°C. The average summer temperature range between 14-22.9°C, whilst average winter temperatures range between 8.2-15.8°C. The annual mean rainfall for Albany is 927.1mm (BOM, 2019).

### 4.2. Topography

The subject site has an undulating topography within the existing agricultural areas, sloping from a high point of 75m AHD along the eastern boundary to 40m AHD within the creek line (east - west). It then ascends to 70m AHD in a north westerly direction towards Down Road. The remnant vegetation block to the west slopes in a north-south / north-south westerly direction from 70m AHD from the northern boundary to 30m AHD to the southern boundary. Topographic contours (5 metre contours) are shown on Figure 4.

The effective slopes (measured as per AS3959-2009) for the subject site are generally low in the central (creek line), eastern and some northern (grassland) areas ranging from 0.4 to 4.6 degrees downslope. The effective slope in the western grassland areas ranges from 5.1 to 6.5 degrees downslope. The effective slopes in the remnant vegetation in the west range from upslope in the south eastern and north eastern corners to downslope from 2 degrees to 14.3 degrees downslope. The effective slopes for the Subject Site and surrounding areas are shown on Figure 4.

### 4.3. Environmental consideration

A reconnaissance flora, vegetation and Level 1 fauna survey was undertaken in spring 2018 by Bio Diverse Solutions (Bio Diverse Solutions, 2018) and identified six vegetation types across the subject site; Jarrah/Marri/Sheoak Laterite Forest, Jarrah/Sheoak/*Eucalyptus staeri* Sandy Woodland, *Homalospermum firmum*/*Callistemon glaucus* Peat Thicket, *Melaleuca preissiana* Low Woodland, Miscellaneous Drainage Woodland/Shrubland and Open paddock / agricultural land including bare and sand extraction areas. Of the 141 flora species recorded within the survey area, 19 (12.7%) are introduced (weeds).

The vegetation types described above align with vegetation units described in the Albany Regional Vegetation Survey (ARVS) report by Sandiford and Barret (2010). The vegetation types / wildlife habitat present within the survey area are well represented locally and in nearby reserves. The Jarrah / Marri dominated woodland and forest present are one of the most abundant habitat types present within the ARVS survey area, providing a significant proportion of wildlife habitat. The *Homalospermum* and *Callistemon* dominated thickets present within the survey area are not as common at a regional level based on ARVS mapping. However, these habitat types are well represented in surrounding remnant vegetation and nearby reserves such as the Down Road Nature Reserve. A copy of the vegetation complex mapping and vegetation condition mapping is provided in Appendix 2.

Potential habitat for threatened species within the survey area includes all remnant vegetation within the site, the creek system and the larger stands of paddock trees throughout the paddock areas. There is a high level of fauna activity in vegetation surrounding the creek line from both threatened and non-threatened fauna species as well as the highest occurrence of significant trees that contain hollows. This indicates that the area contains highly attractive habitat for fauna.

The southern pocket of Jarrah / Marri remnant vegetation had the highest occurrences of *Calyptorhynchus banksii subsp. naso* (Red Tailed Black Cockatoo) and *Calyptorhynchus baudinii* (Baudin's Black Cockatoo), feeding signs. The majority of feeding evidence consisted of *Corymbia calophylla* nuts. As the number of significant Black Cockatoo feeding sites across the survey area was relatively low this indicates that although the site contains potential high value foraging habitat for the three species it is currently not a favoured feeding area. The presence of significant feeding signs in the remnant vegetation in the south appears to indicate this area is anecdotally more attractive for food than the other vegetated areas.

Assessment of the proposal by governing environmental agencies will occur through the Scheme Amendment process with referral under the WA *Environmental Protection Act (EPA Act)*.

## 4.4. Bushfire fuels – Vegetation

Site assessment occurred on the 14<sup>th</sup> February 2019 by Kathryn Kinnear (BPAD 30794). All vegetation within 150m of the site / proposed development was classified in accordance with Clause 2.2.3 of AS 3959-2009. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified in Appendix 3 and shown on the Vegetation Classes Map Figure 4. A summary of the vegetation classifications and plot data is provided in Table 2.

**Table 2: Classified Vegetation to AS3959**

Plot Number	Vegetation Classification Table 2.3 AS3959	Effective Slope AS3959	Location on Vegetation Classes Mapping
1	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)	N/A	North of subject site in APEC and Plantation Energy site, roads and buildings
2	Low fuel or non-vegetated areas Exc 2.2.3.2 (f)	N/A	Firebreaks internal t the site, adjacent private property areas maintained in a low fuel state.
3	Forest Type A (04)	Upslope	Internal to the site in north west, external to the north, east and south
4	Forest Type A (04)	Downslope >0-5 degrees	Internal to the site to the west and central creek area. External to the south and south east.
5	Forest Type A (04)	Downslope >10-15 degrees	External to the site to the west and north west. Internal along western ridgeline.
6	Grassland Type G (26)	Downslope >5-10 degrees	Internal to the site in the west.
7	Grassland Type G (26)	Downslope >0-5 degrees	Internal to the site in the north, east and north east. External to the south east.
8	Grassland Type G (26)	Upslope	Internal to the site in the north and south east. External to the north, north east and
9	Woodland Type B (06)	Upslope	Internal to the site in the east in grazed paddock areas, external to the north.
10	Woodland Type B (06)	Downslope >0 to 5 degrees	Internal to the site adjacent in the east in grazed paddock areas.
11	Woodland Type B (06)	Downslope >5 to 10 degrees	Internal adjacent to central creek area (central to the site). External to the south east.
12	Shrubland Type C (12)	Downslope >0 to 5 degrees	Central creek areas in the north east.
13	Scrub Type D (13)	Downslope >0 to 5 degrees	Central creek areas in the subject site and in the south west internal and external to the site in wet areas.
14	Scrub Type D (13)	Upslope	External to the site near Down Road and Down South Road, east in property.

Plot 1 and 2 is allocated exclusion Clauses 2.2.3.2 of AS3959 and therefore does not have an effective slope allocation.

6133100 6133200 6133300 6133400 6133500 6133600 6133700 6133800 6133900 6134000 6134100 6134200 6134300 6134400 6134500 6134600 6134700 6134800 6134900 6135000 6135100 6135200 6135300 6135400 6135500 6135600 6135700

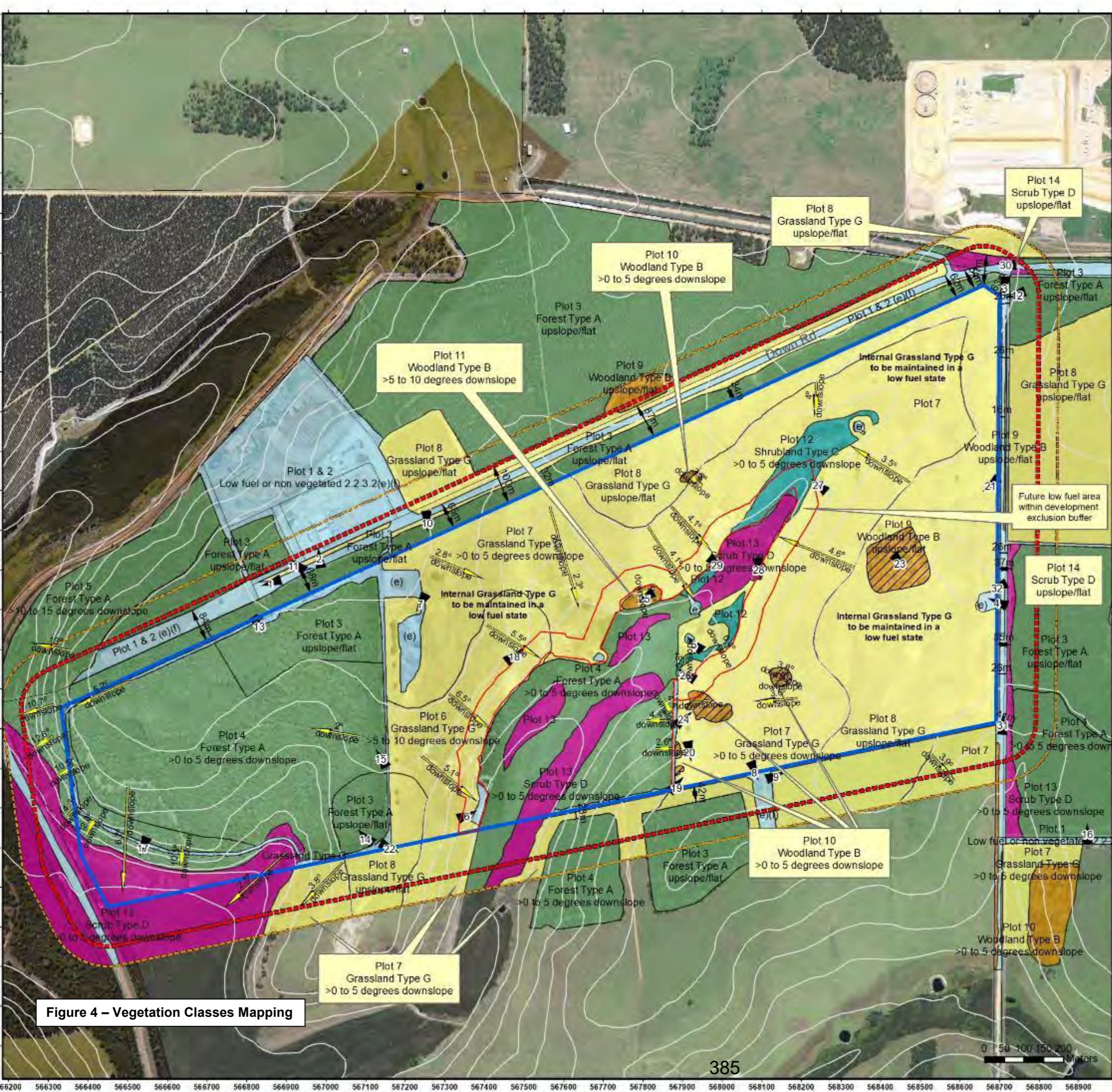


Figure 4 – Vegetation Classes Mapping

REPORT ITEM DIS245 REFERS

This Report was prepared by  
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 Accreditation No: SPAD30794  
 Jurisdiction: Level 2 - WA



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Legend

- Subject Site
  - 100m Assessment Boundary
  - Cadastre
  - 5m Contours
  - Future Low Fuel
  - Separation Distance
  - Slope Degrees
- Vegetation**
- Forest Type A
  - Woodland Type B
  - Shrubland Type C
  - Scrub Type D
  - Grassland Type G
  - Low fuel or non vegetated 2.2.3.2



Scale  
 1:9,500 @ A3  
 GDA MGA 94 Zone 50

**Data Sources**  
 Aerial Imagery: WA Now, Landgate Subscription Imagery  
 Cadastre, Relief Contours and Roads: Landgate 2017  
 RIS Road Network: Main Roads Western Australia 2017  
 Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
 City of Albany  
 Lot 5780 Down Road  
 Drome, WA 6330

Vegetation Classes

BAL Assessor	QA Check	Drawn by
KK	KK	BT
STATUS	FILE	DATE
FINAL	COA0020	27/03/2019

## 5. Bushfire Assessment Outputs

### 5.1. Bushfire Hazard Level Mapping

The BHL process provides an indication of the likely impact of a bushfire event as it interacts with the bushfire hazards within and adjacent to the site. The BHL is a measure of the likely intensity of a bushfire and the likely level of bushfire attack on a site by categorizing the hazard (WAPC, 2017). The allocation of category of the bushfire hazard is determined as per Table 3 of the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017). Refer to Figure 5 below.

Table 3: BHL and classified vegetation (as per AS-3959)

HAZARD LEVEL	CHARACTERISTICS
<b>Extreme</b>	<ul style="list-style-type: none"> <li>Class A: Forest</li> <li>Class B: Woodland (05)</li> <li>Class D: Scrub</li> <li>Any classified vegetation with a greater than 10 degree slope</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>Class B: Open woodland (06), Low woodland (07), Low open woodland (08), Open shrubland (09)*</li> <li>Class C: Shrubland</li> <li>Class E: Mallee/Mulga</li> <li>Class G: Grassland, including sown pasture and crops</li> <li>Vegetation that has a low hazard level but is within 100 metres of vegetation classified as a moderate or extreme hazard, is to adopt a moderate hazard level.</li> </ul>
<b>Low</b>	<ul style="list-style-type: none"> <li>Low threat vegetation may include areas of maintained lawns, golf courses, public recreation reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks.</li> <li>Managed grassland in a minimal fuel condition (insufficient fuel is available to significantly increase the severity of the bushfire attack). For example, short-cropped grass to a nominal height of 100 millimetres.</li> <li>Non-vegetated areas including waterways, roads, footpaths, buildings and rock outcrops.</li> </ul>

Figure 5: BHL Assessment allocation of category (WAPC, 2017).

### 5.2. Potential Bushfire Impacts

The potential bushfire impact to the site / proposed development from each of the identified vegetation plots are identified below and shown on the Bushfire Hazard Assessment Mapping Figure 6 Pre-Development BHL, and Figure 7 Post Development BHL.

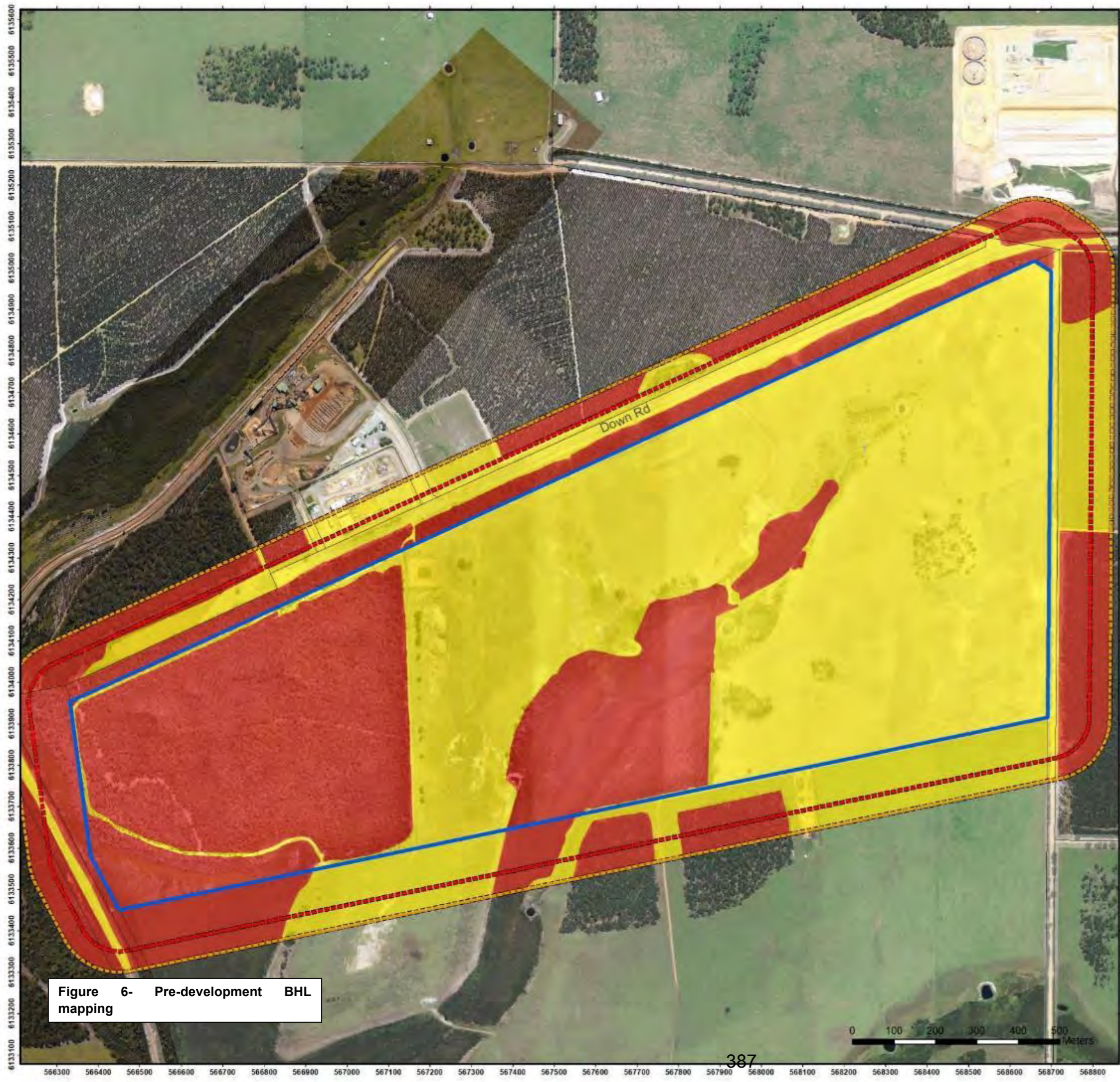


Figure 6- Pre-development BHL mapping

**REPORT ITEM DIS245 REFERS**

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Overview Map Scale 1:250,000

**Legend**

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- Bushfire Hazard Level**
- Extreme
- Moderate
- Low



Scale  
 1:9,000 @ A3  
 GDA MGA 94 Zone 50

**Data Sources**  
 Aerial Imagery: WA Now, Landgate Subscription Imagery  
 Cadastre, Relief Contours and Roads: Landgate 2017  
 IRIS Road Network: Main Roads Western Australia 2017  
 Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
 City of Albany  
 Lot 5780 Down Road  
 Drome, WA 6330

**BHL - Pre Development**

BAL Assessor <b>KK</b>	QA Check <b>KK</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>COA0020</b>	DATE <b>19/03/2019</b>



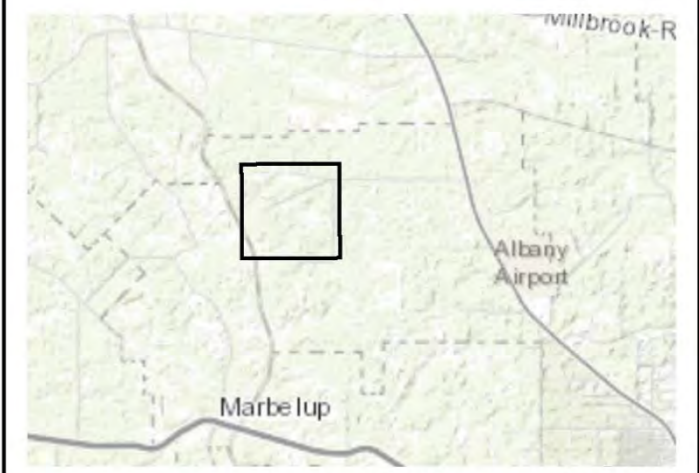
Figure 7- Post development BHL mapping

**REPORT ITEM DIS245 REFERS**

This BAP Plan was prepared by:  
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 Jurisdiction: Level 2 - WA



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Overview Map Scale 1:250,000

**Legend**

- Subject Site
  - 100m Assessment Boundary
  - 150m Assessment Boundary
  - Cadastre
  - Low Fuel Buffer
- Bushfire Hazard Level**
- Extreme
  - Moderate
  - Low



Scale  
 1:9,000 @ A3  
 GDA MGA 94 Zone 50

**Data Sources**  
 Aerial Imagery: WA Now, Landgate Subscription Imagery  
 Cadastre, Relief Contours and Roads: Landgate 2017  
 IRIS Road Network: Main Roads Western Australia 2017  
 Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
 City of Albany  
 Lot 5780 Down Road  
 Drome, WA 6330

**BHL - Post Development**

BAL Assessor <b>KK</b>	QA Check <b>KK</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>COA0020</b>	DATE <b>8/04/2019</b>

**Table 3: Potential bushfire impacts (BHL)**

Plot number	Vegetation Type (Table 2.3)	Effective Slope (Table 2.4.3)	BHL Pre Development	BHL Post Development
1	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)	N/A	Moderate	Moderate
2	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)	N/A	Moderate	Moderate
3	Forest Type A	Upslope	Extreme	Extreme
4	Forest Type A	Downslope >0 to 5 degrees	Extreme	Extreme
5	Forest Type A	Downslope >15 to 20 degrees	Extreme	Extreme
6	Grassland Type G	Downslope >5 to 10 degrees	Moderate	Moderate / Low
7	Grassland Type G	Downslope >0 to 5 degrees	Moderate	Moderate / Low
8	Grassland Type G	Upslope	Moderate	Moderate / Low
9	Woodland Type B (06)	Upslope	Moderate	Moderate / Low
10	Woodland Type B (06)	Downslope >0 to 5 degrees	Moderate	Moderate / Low
11	Woodland Type B (06)	Downslope >5 to 10 degrees	Moderate	Moderate
12	Shrubland Type C	Downslope >0 to 5 degrees	Moderate	Moderate
13	Scrub Type D	Downslope >0 to 5 degrees	Extreme	Extreme
14	Scrub Type D	Upslope	Extreme	Extreme

**Notes on BHL Assessment:**

- The BHL assessment was prepared by an Accredited Level 2 Bushfire Planning Practitioner (BPAD30794);
- The BHL Assessment and BHL Map has been prepared in accordance with Department of Planning (WAPC) Guidelines for Planning in Bushfire Prone Areas Version 1.3 (WAPC, 2017) Appendix 2; and
- Subject Site is located in a Bushfire Prone Area (SLIP, 2018).

**5.3. Method 1 BAL Calculation**

A Method 1 BAL calculation (in the form of BAL contours) has been completed for the proposed development in accordance with AS 3959-2009 methodology. The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed buildings and subsequently informs the standard of building construction required to increase building tolerance to potentially withstand such impacts in line with the assessed BAL. The Bushfire Attack Level (BAL) has been calculated using the Method 1 procedure as outlined in AS3959-2009. This incorporates the following factors:

- WA adopted Fire Danger Index (FDI);
- Vegetation Classes;
- Slope under classified vegetation; and
- Distance between proposed development site and classified vegetation.

The outcomes of the above inputs then allocate a specified BAL construction/setback for proposed buildings.

## 5.4. Fire Danger Index

The Western Australian adopted FDI is 80 as outlined in AS3959-2009 and endorsed by Australasian Fire and Emergency Services Authorities Council. The FDI input for this project is also therefore 80.

## 5.5. Slope under Classified Vegetation

Slope under classifiable vegetation (Effective Slope) was assessed in accordance with Section 2.2.5 of AS3959-2009. Table 2 summarises the slopes assigned to each plot of classifiable vegetation for the BAL calculation.

## 5.6. AS 3959 BAL Allocation

The assessed BAL ratings for the development are depicted as BAL contours, BAL ratings for the subject site are presented in Table 3 with BAL Contours shown on Figures 8 and 9. All proposed buildings will be located in areas subject to a BAL rating of BAL-29 or lower.

**Table 4: BAL ratings**

Plot number	Vegetation Type	Effective Slope	Applicable BAL Rating to AMP Concept Plan
1	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)	N/A	BAL-LOW
2	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)	N/A	BAL-LOW
3	Forest Type A	Upslope	BAL-29 or less can apply.
4	Forest Type A	Downslope >0 to 5 degrees	BAL-29 or less can apply.
5	Forest Type A	Downslope >15 to 20 degrees	BAL-29 or less can apply.
6	Grassland Type G	Downslope >5 to 10 degrees	N/A all internal grasslands will be maintained in a low fuel condition at all times.
7	Grassland Type G	Downslope >0 to 5 degrees	N/A all internal grasslands will be maintained in a low fuel condition at all times.
8	Grassland Type G	Upslope	N/A all internal grasslands will be maintained in a low fuel condition at all times.
9	Woodland Type B (06)	Upslope	All internal woodland areas to be modified and maintained in a low fuel condition at all times. External Woodland areas BAL-29 or less can apply.
10	Woodland Type B (06)	Downslope >0 to 5 degrees	All internal woodland areas to be modified and maintained in a low fuel condition at all times. External Woodland areas BAL-29 or less can apply.
11	Woodland Type B (06)	Downslope >5 to 10 degrees	BAL-29 or less can apply.
12	Shrubland Type C	Downslope >0 to 5 degrees	BAL-29 or less can apply.
13	Scrub Type D	Downslope >0 to 5 degrees	BAL-29 or less can apply.
14	Scrub Type D	Upslope	BAL 29 or less can apply.



**Assumptions made in BAL Contour Mapping:**

- The subject site will be developed according to the guiding principles in the Concept Plan; and
- The Albany Motorsport Park will modify and maintain grasslands and woodland areas (east) internal to the site in a low fuel state at all times (i.e. slashed to <100mm).

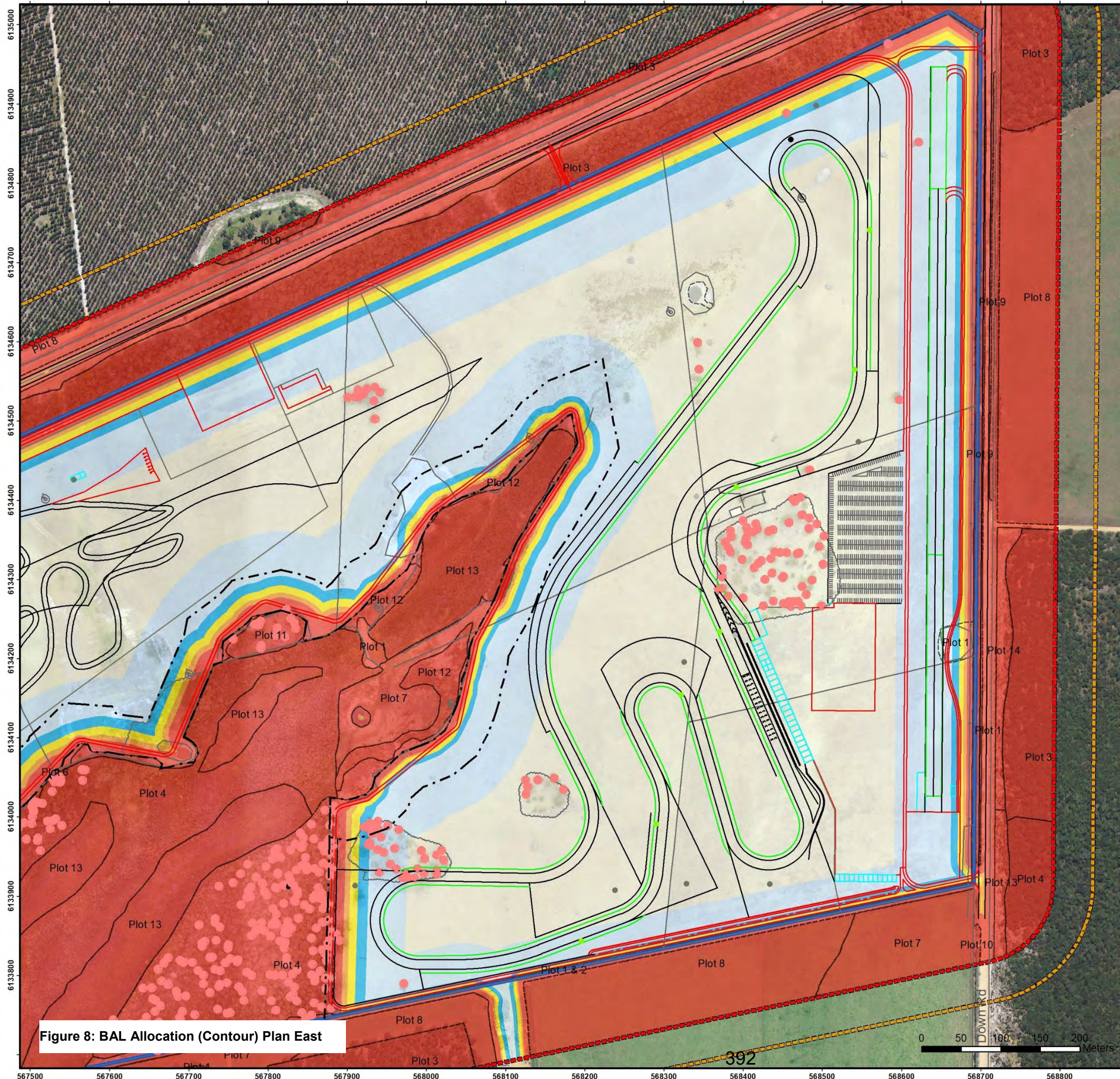
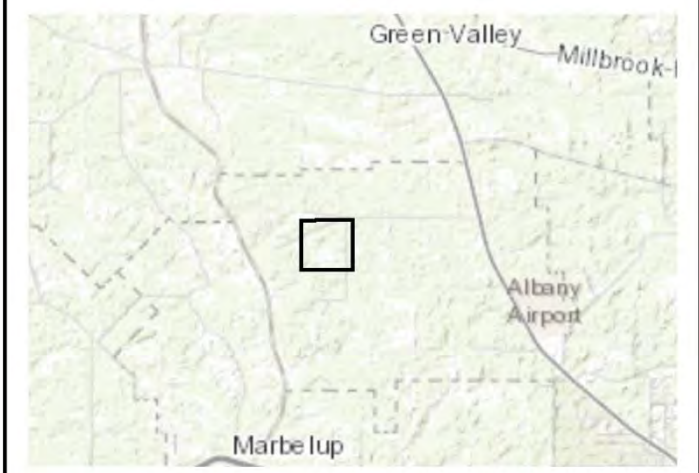


Figure 8: BAL Allocation (Contour) Plan East

**REPORT ITEM DIS245 REFERS**

This BAL Plan was prepared by:  
 Kathryn Kinnear, Bio Diverse Solutions  
 Accreditation No: BPAD30794  
 Jurisdiction: Level 2 - WA



Overview Map Scale 1:100,000

**Legend**

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- Low Fuel Buffer
- BAL Contours**
- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW



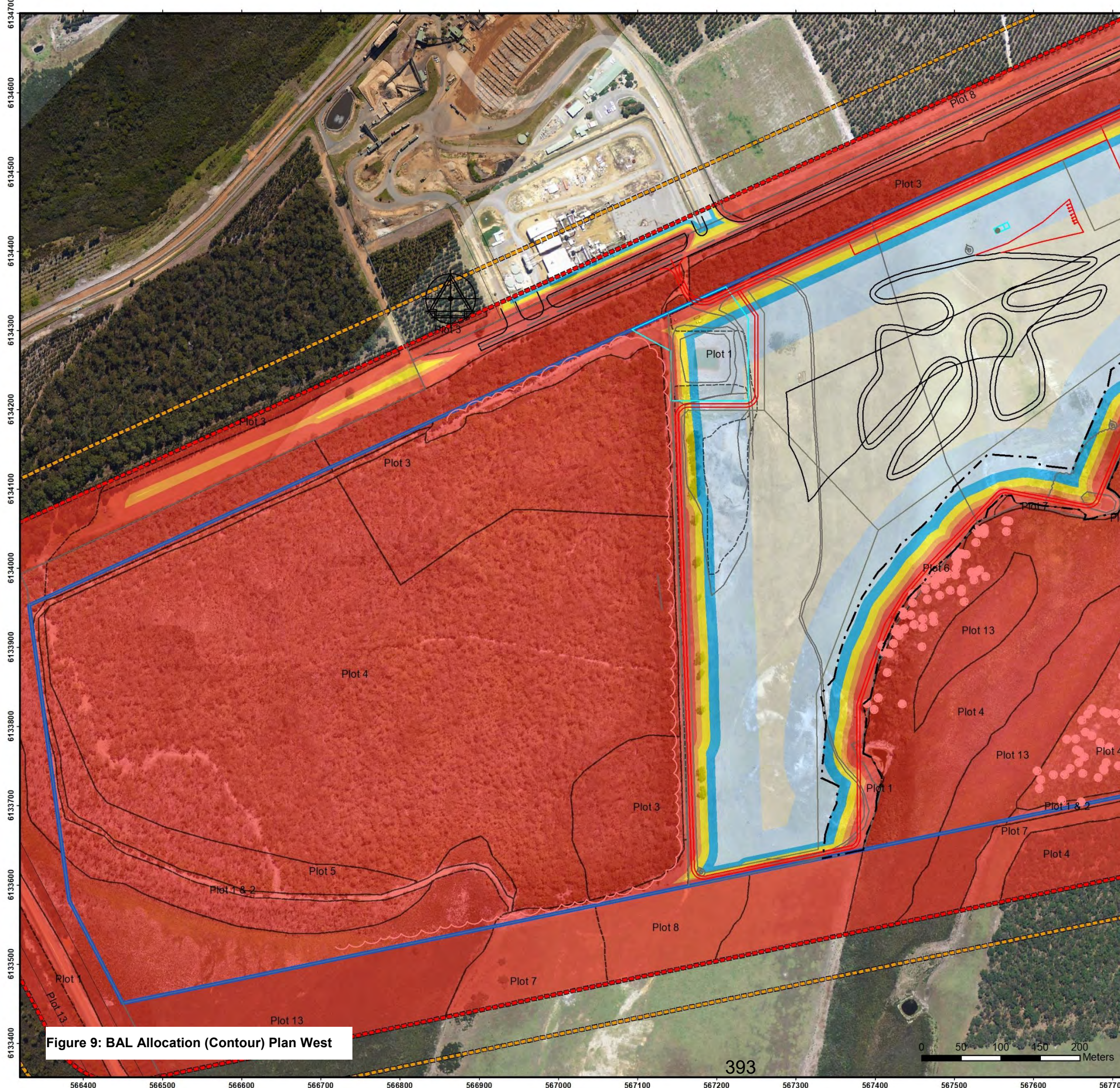
Scale  
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 GDA MGA 94 Zone 50

**Data Sources**  
 Aerial Imagery: WA Now, Landgate Subscription Imagery  
 Cadastre, Relief Contours and Roads: Landgate 2017  
 IRIS Road Network: Main Roads Western Australia 2017  
 Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
 City of Albany  
 Lot 5780 Down Road  
 Drome, WA 6330

**BAL Contour - East**

BAL Assessor	QA Check	Drawn by
KK	KK	BT
STATUS	FILE	DATE
FINAL	COA0020	8/04/2019



**Figure 9: BAL Allocation (Contour) Plan West**

**REPORT ITEM DIS245 REFERS**

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Overview Map Scale 1:100,000

**Legend**

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- Low Fuel Buffer
- BAL Contours**
- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW



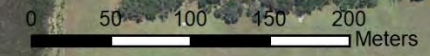
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 GDA MGA 94 Zone 50

**Data Sources**  
 Aerial Imagery: WA Now, Landgate Subscription Imagery  
 Cadastre, Relief Contours and Roads: Landgate 2017  
 IRIS Road Network: Main Roads Western Australia 2017  
 Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
 City of Albany  
 Lot 5780 Down Road  
 Drome, WA 6330

**BAL Contour - West**

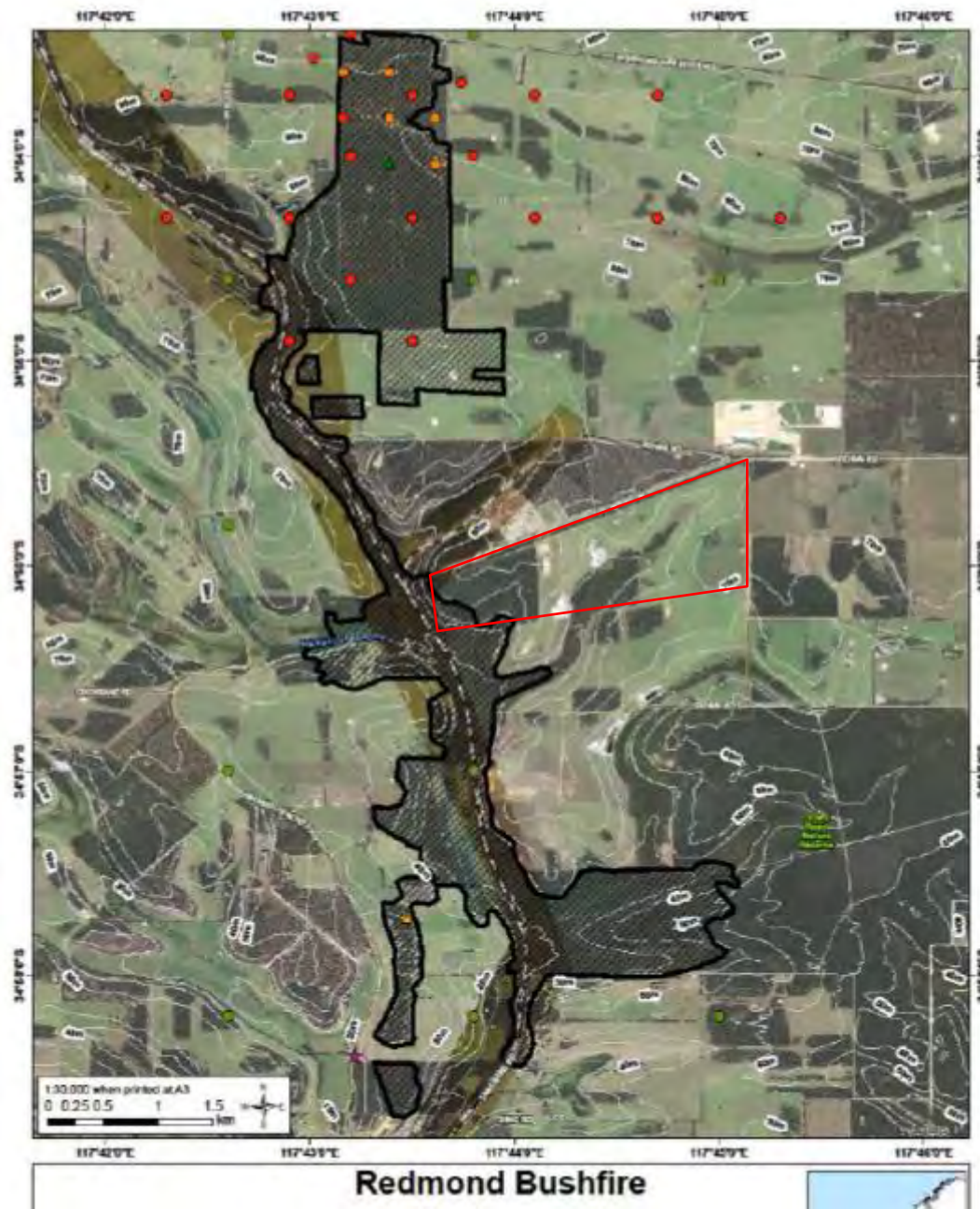
BAL Assessor <b>KK</b>	QA Check <b>KK</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>COA0020</b>	DATE <b>8/04/2019</b>



**6. Identification of bushfire issues pertinent to the AMP site**

**6.1. Bushfire risks**

The external bushfire risks to the site are the continuous remnant vegetation and plantations located to the west and north west, east, north and south east. The creek central to the subject site drains to the south west and risks of bushfire this direction are also evident. Remnant vegetation located internal to the subject site in the west was burnt in the recent May 2018 fires (refer to Redmond fire scar as Figure 10 below, courtesy of CoA, Emergency Services).



**Figure 10 – May 2018 Redmond Fire Scar and the subject site (CoA, 2019)**

The external remnant forest areas (including plantations) present Extreme Bushfire Hazard Levels (as per the definition of bushfire hazards in the Guidelines) to the AMP development. To the south and

east of the site is predominantly farmland areas grazed by cattle which present Low BHL risks. Under hot, dry and unstable conditions (Severe to Catastrophic bushfire weather) the subject site is most at risk from bushfire from the north, north east, north west and west. Risk of ignition of bushfire events is detailed in Section 7 of this report.

To mitigate bushfire risks to the site the following parameters are to be employed:

- Fuel hazard reduction burning in the internal western remnant bushland (rotation 8-10 years and governed by CoA Emergency services priorities and resources). Refer to Section 9.1.2 of this report.
- Excluding bushfire from the central creek area to reduce the risk of peat fires on the subject site (no planned burning, mineral earth firebreaks, low fuel buffers).
- Reducing risks of ignition from the motorsport events (internal) as outlined in Section 7 of this report.
- Reducing risk of ignition from external sources of through liaison with neighbours and consultation with the Local Bushfire Brigade (Highway Brigade located 5km away near Albany Airport).
- Modifying and maintaining the existing internal areas of Grassland Type G and Woodland Type B to a low fuel state at all times (as per WAPC Standards).
- Traffic control during events to ensure safe and timely evacuation of personnel from the site in event of bushfire. This will ensure all gates are accessible for emergency access/egress.
- Consideration of purchase of fast attack light unit for the AMP site and to be placed adjacent to any practise areas (non-event days).
- Event days will have full fire safety crews, ambulance and safety personnel strategically located around the track.
- Documentation of control measures in the OMP as outlined in this BMP report for the site.
- Lease arrangements from the CoA to the AMP controlling body to define management controls of the development site as defined in the implementation table Section 10 of this report.

## **6.2. Water Sources for bushfire**

Water supply will be through on-site resources via bore extraction. A copy of a monitoring bore testing for water sources in the northern area of the precinct is provided in Appendix 4. Storage of water for fire fighting will be located in the north and the eastern precincts and tanks are to be a minimum of 110,000L (DFES to confirm). Water tanks are shown conceptually at the northern motocross precinct and at the southern boundary. A test water supply bore was drilled in April 2019, refer to bore test log in Appendix 4. This indicates that water is available for supply at a suitable depth and rate of supply. A suitably qualified Fire Engineer will need to be engaged by the AMP prior to DA to ensure hydrants and supply pressure are to the required standards, to be approved by the CoA at Development Approval Stages.

## **6.3. Internal fire service access and firebreak network**

A network of Fire Service Access (FSA) and Firebreaks are to be developed during construction phases and prior to operations of the AMP. Details of management of the maintenance of the internal FSA, Firebreak networks and internal service roads is to be documented in the OMP in the AMP lease area. FSA's outside of the lease area are to be maintained by CoA and documented in their reserve's management plan for the area.

To facilitate in access and evacuation of the site there are additional gates along northern and eastern boundaries. Refer to the Internal Access Plan Figure 11.



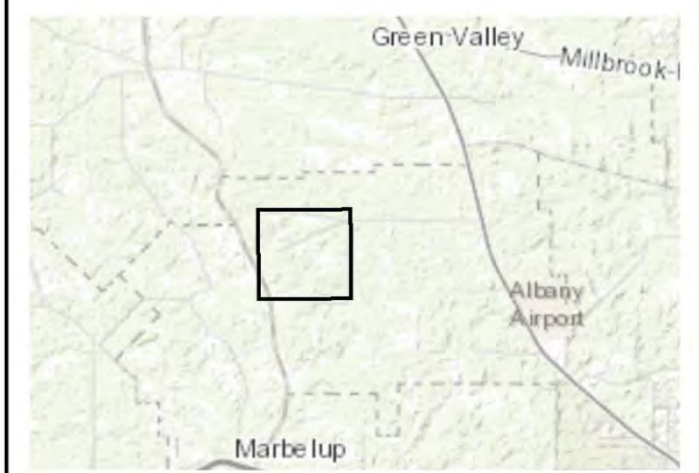
Figure 11: Internal Access Plan

**REPORT ITEM DIS245 REFERS**

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 Kathryn Kinnear, Bio Diverse Solutions  
 Accreditation No: BPAD30794  
 Jurisdiction: Level 2 - WA



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Overview Map Scale 1:250,000

**Legend**

- Cadastre
- Turnaround Point
- Access Points
- Gate
- Low Fuel Buffer
- Internal Access Road
- Fire Service Access & 4m wide firebreaks



Scale  
 1:8,500 @ A3  
 GDA MGA 94 Zone 50

**Data Sources**  
 Aerial Imagery: WA Now, Landgate Subscription Imagery  
 Cadastre, Relief Contours and Roads: Landgate 2017  
 IRIS Road Network: Main Roads Western Australia 2017  
 Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
 City of Albany  
 Lot 5780 Down Road  
 Drome, WA 6330

**Internal Access & Fuel Management Plan**

BAL Assessor <b>KK</b>	QA Check <b>KK</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>COA0020</b>	DATE <b>8/04/2019</b>

## 7. Bushfire risk assessment – high risk land use

Consultation with Department of Fire and Emergency Services (DFES) and Department of Planning, Lands and Heritage (DPLH) confirmed that they deemed the AMP to be a “High risk”. SPP 3.7 outlines that certain land uses may potentially ignite a bushfire, prolong its duration or increase its intensity. Such land uses are defined as ‘High Risk’. The proposed Albany Motorsport Park (AMP) is defined a high-risk industry due to:

- Motorsport activities giving rise to risk of ignition and bushfire; and
- Exposure of the community, fire fighters and environment to dangerous substances from vehicles igniting.

A risk assessment has been prepared by Bio Diverse Solutions and is detailed in Appendix 5 of this report. A summary of the risk assessment is provided below in Table 5.

Data has been gathered from following sources for the risk assessment:

- 20km radius of the subject site on originating fire causes (sources CoA Emergency Services, Parks and Wildlife & DFES);
- Consultation with CoA Emergency Services, DFES land use planning unit, DFES Regional Services Albany and Parks and Wildlife Albany office;
- CAMS risk register; and
- Great Southern Motorsport Group Inc (cross section of sporting codes).

**Table 5: Summary of Risk Assessment AMP**

Risk No.	Hazard -Bushfire originating/causing fire	Risk rating
1	Ignition Vehicles/Bikes combusting on track due to crashes including fuel or oil line leaks on track	Substantial/high risk
2	Grinding sparks in pits or near fuel sources (hot works)	Low risk
3	Smoking public viewing areas or in pits near fuels	Low risk
4	Vehicles (exhausts) near dry vegetation or slashing/mowing rocky ground (maintenance)	Low risk
5	Electrical faults building faults	Moderate risk
6	Electrical faults from extension cords/cables (pits/trailers)	Moderate risk
7	Re-fueling area (designated and controlled)	Very high risk
8	Substandard race vehicles using the facility	Low risk
9	Re-ignition of previously controlled fires (peat Central creek area)	Substantial risk
10	Water pump failure causing spark/ignition	Substantial risk
11	Gas Barbecues and camp fires causing ignition (unattended, faulty)	High risk
12	Tyre barriers igniting from crash from vehicle	High risk
13	Re-ignition of previously controlled fires (May and November non-prohibited periods)	Moderate risk
14	External: Ignition from trains under heavy loads sparks associated with braking	Low risk
15	External: Aircraft Crash	Low risk
16	External: Western powerlines transmission	High risk
17	External: Ignition from stockpiled woodchips north of site at Plantation Energy site.	High risk
18	External: Ignition from Blue gum slash burning (cause of May 2018 fire)	High risk
19	External and Internal: Lightning strikes	High risk
20	Illegally lit fires (deliberate)	Moderate risk

A summary of recommendations from the risk assessment process includes:

- A detailed Operational Management Plan (OMP) is to be developed by AMP which includes risk assessments (refer to example from Confederation of Australian Motor Sport (CAMS) prior Appendix 6) as per CAMS policy and regulations to ensure there are actions to minimize risks of ignition from internal sources of the park.
- The operational plan will be reviewed and endorsed by the CAMS prior to operation of the Albany Motorsport Park.
- Restricting public access through the site to spectator viewing areas and competitor areas, access around the whole of the site is restricted to emergency and safety services.
- Practice days and non-events are to be controlled and regulated by AMP and documented in the Operational Management Plan for the site.
- Hazard reduction burning only occurs in the western remnant vegetation block, restrictions of fire in central creek area (peat fire risk) through 8m Fire Service Access (4m pavement and 4m mineral earth firebreak) at edge of fencing of remnant vegetation (restrict grass fires into remnant vegetation).
- Controlled re-fueling in designated areas, documented in Operational Procedures Manual.
- No fuel storage on site, only fuel will be in vehicles during race events.
- Observing and complying with "Total fire ban days" and "vehicle movement bans" as set by LGA.
- No events held during catastrophic Fire Danger Rating (FDR) days.

The proposed uses associated with the AMP will be controlled and governed through:

- Designed to comply with CAMS' Track Operator's Safety Guide (CAMS 2012) and Motorcycling Australia (MA) Track Guidelines (MA 2011).
- To be licensed by CAMS for Fédération Internationalé de l'Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing).
- Motocross track designed and constructed in association with Motocross Australia guidelines.
- Drag strip designed and constructed in accordance with FIA specifications for drag strips and in association with Australian National Drag Racing Association (ANDRA).

Consideration of the High-risk nature of the AMP site is an ongoing process to be refined in future stages of the development approval process and to be addressed under a Bushfire Risk Management Plan (BRMP) if required.



## 8. Vulnerable Land Use and Access

### 8.1. Access

Access will be provided in alternative directions from the site to separate destinations to Down Road to the north and Down Road South in the south. Down Road is essentially a long cul-de-sac (dead end road terminating to the north west of the subject site), as is Down Road South (terminating to the south of the subject site). The public road network is a legacy issue associated with previous precinct planning and development approvals.

During the preparation of this BMP report, four access options were investigated to the north, west, and south. A summary of the Access Options and mapping is provided in Appendix 7. The alternative access for the whole of the precinct in Drome has not been investigated for the preparation of this report and the CoA have indicated this would be investigated during a future Structure Plan process. An Emergency Access Way (EAW) (outlined as Option 4 in Appendix 7) is to be constructed to enable safe access/egress to Albany Highway. This will give the AMP an alternative access route, which presently does not exist. The EAW will be an easement in gross to a minimum of 12m wide and measures 4.38km from the site (south east corner) to Albany Highway which does not meet the Acceptable Solutions (WAPC, 2017) and therefore has been assessed as non-compliant.

The BEEP prepared to support this development provides contingency actions in accordance with the requirements of the *Draft Position Statement: Tourism land uses within bushfire prone areas* (WAPC, 2018). These contingencies include early closure of the site, off-site evacuation and as a last resort, refuge on site in a suitable building / open space.

It is noted the following will apply for the proposed EAW:

- Traffic control for evacuation, contracted and documented in Operational Management Plan.
- Consultation during the preparation of this plan occurred with Main Roads Western Australia (MRWA), Water Corporation Western Australia (WCWA), & Lindsay Black (landowner) in principle agreement for the EAW is currently being sought by the CoA as stated in email from J Van Der Mescht Appendix 7. Legal agreements/ documentation will be sought in following stages (i.e. Development approval stages).
- The conditions of Scheme Amendment to document land owner agreements in subsequent DA documentation.
- It is 5km to Highway Volunteer Bushfire Brigade (located near Albany Airport).
- Water bombers and air attack facilities are located at Albany Airport.
- A public road is presently deemed not viable by CoA, it may be investigated in the future for wider precinct in the future through a Structure Planning process.
- Regular inspections along EAW (condition, gates etc) by AMP representatives prior to events occurring, documented in the OMP.

### 8.2. Bushfire Emergency Evacuation Plan

The aim of the BEEP is early, safe and timely evacuation of the site prior to bushfire events and no events are to be held on site during Catastrophic Fire Danger Rating (FDR) days. The BEEP has been prepared to support the proposed development will address on-site and off-site refuges, triggers for evacuation and roles and responsibilities for staff and stakeholders. Refer to Appendix 8. As the proposed development progresses beyond the rezoning phase, the BEEP will be updated for each stage including further specific details.

As previously identified, the design of the site does not allow for alternative access and is a legacy issue. As a result of legacy issues of the surrounding public road network, these constraints are addressed by the BEEP providing contingency measures to address identified risks including:

- Clear triggers for off and onsite evacuation (to be updated to support future planning applications);
- Clear triggers & guidelines for scheduling events or cancelling based on such factors as Fire Danger Rating (FDR), evening events during certain times of the year, 'Total Fire Ban' days and "Restricted vehicle movement days" (harvest bans);
- An on-site refuge for use in an emergency (i.e. a building constructed to the requirements of a 'community refuge' as per the Australian Building Codes Board 'Design and Construction of Community Bushfire Refuges' that can accommodate the number of people using that part of the facility (i.e. 200-500 for a club event);
- The proposed building located within the site and position to limit radiant heat exposure to <10 kW/m<sup>2</sup> and constructed to BAL-29; and
- Open air refuge with the capacity for a large event (upto 10,000 approx.) located in area where radiant heat exposure is limited to <2 kW/m<sup>2</sup>.and preferably shaded with non-combustible material.

This is compliant with the WAPC *Draft Position Statement: Tourism land uses within bushfire prone areas* (WAPC 2018). The BEEP will form part of the Emergency Management Plan for the site which will be developed by AMP prior to operations of the site.

The current locations of the proposed building and open air refuge locations are indicative only and may change as development design progresses.

### 8.3. Bushfire Emergency Evacuation Plan inputs

The BEEP will be updated to support future planning applications and could consider the following inputs underpinning the drivers for evacuation:

- Off site / On site evacuation time for different event sizes and locations within overall site;
- Potential fire scenarios under different Fire Danger Ratings (FDR);
- Bushfire modelling to determine the 10 kW/m<sup>2</sup> and 2 kW/m<sup>2</sup> line used an FFDI value of 80 and a flame temperature of 1200K;
- In determining the required capacity for any refuge building and open space dimensions an area of 0.75 m<sup>2</sup> to 1m<sup>2</sup> per person has been used; and
- Address potential numbers for people onsite ranging from 200-500 for club events up to 10,000 for state events.

ELA has identified suitable on-site refuge locations (see Figure 12) in the event of a bushfire. Early evacuation is always preferable however, in the event that this cannot occur, a building located within the 10 kW/m<sup>2</sup> zone (and constructed to specified standards) will provide a 'safer-place' option for onsite users. For larger events, open space areas that provide radiant heat exposure limited to <2 kW/m<sup>2</sup>.is also identified. These areas (10kW/m<sup>2</sup> and 2 kW/m<sup>2</sup>) have been determined using a Method 2 BAL assessment (refer to Appendix 9). A designated outdoor emergency assembly area and refuge building have been incorporated into the master plan design as indicated in Figure 12.

Triggers for evacuation will be identified in the BEEP and will be updated to support future planning applications in accordance with SPP 3.7. This will include: potential closures of the site under certain Fire Danger Ratings (FDR), triggers for off-site evacuation and procedures for staff and visitors in the event of an emergency etc.

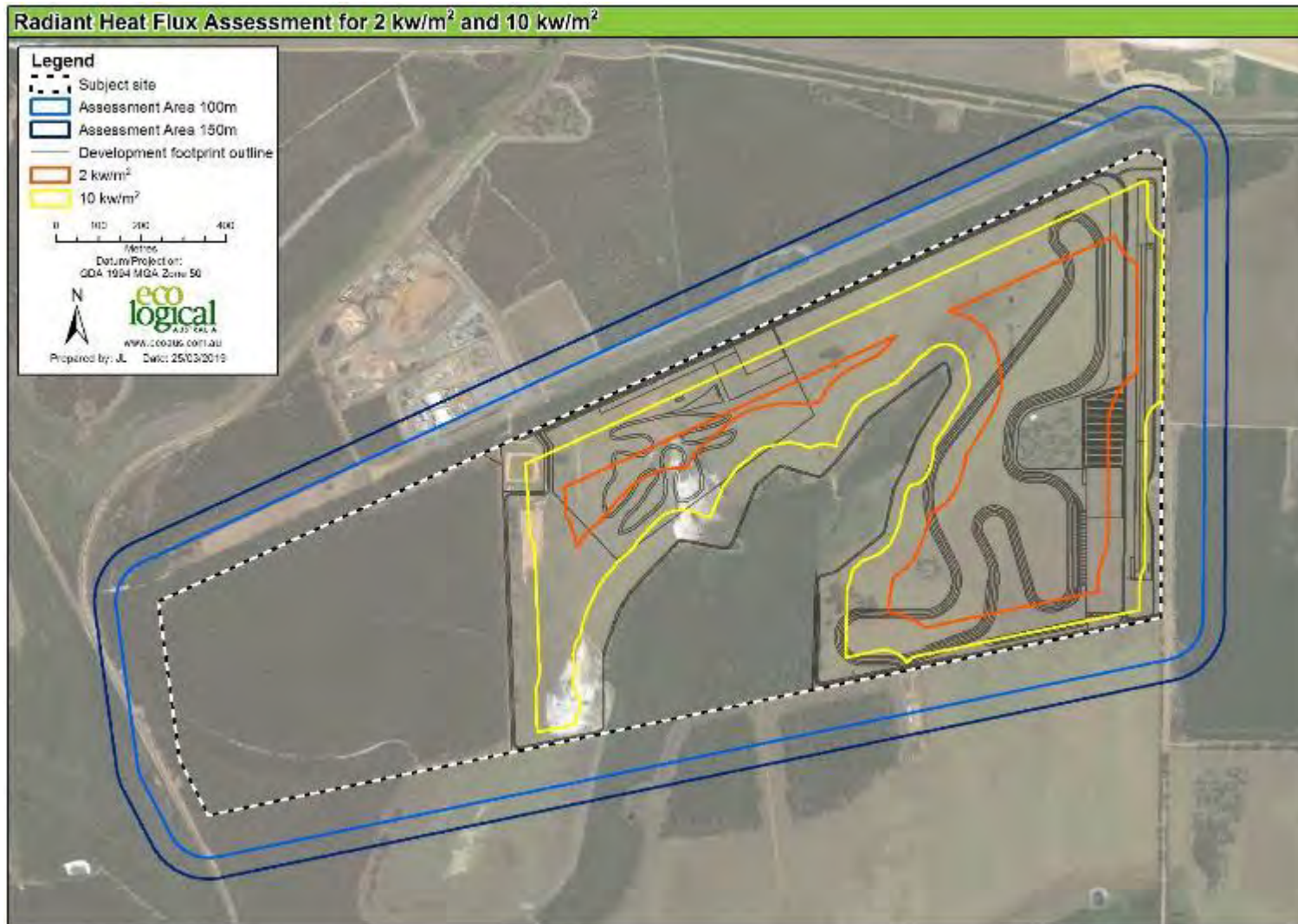


Figure 12: 10 kW/m<sup>2</sup> and 2 kW/m<sup>2</sup> locations

It is to be noted by the AMP governing body:

- Emergency Management Plan for the site which will be developed by AMP prior to operations of the site and will include the BEEP which will be finalised in consultation with CoA Emergency Management Services, DFES Albany Region and LEMC at Development Approval Stages; and
- CoA Emergency Management Services to ensure the BEEP and Emergency Management Plan for the AMP site is referred and registered through the Local Emergency Management Committee (LEMC).

## **9. Assessment to the bushfire protection criteria**

The Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017) outlines bushfire protection criteria which subdivision and development proposals are assessed for compliance. The bushfire protection criteria (Appendix 4, WAPC, 2017) are a performance-based criteria utilised to assess bushfire risk management measures and they outline four elements, being:

- Element 1: Location
- Element 2: Siting and Design of Development;
- Element 3: Vehicle Access; and
- Element 4: Water.

(WAPC, 2017)

The development is required to meet the “Acceptable Solutions” of each Element of the bushfire protection criteria (WAPC, 2017). The proposal has been assessed against the bushfire protection criteria Acceptable Solutions for Elements A1, A2, A3 and A4. As stated in Section 7 of this report the subject site has one way in and one-way out due to the legacy of the surrounding road network. A performance-based assessment has been detailed in Section 9.2 and a summary of the Performance Principle and Acceptable Solutions assessment is provided in Table 6.

**Table 6: Bushfire protection criteria applicable to the site**

Element	Acceptable Solution	Applicable or not Yes/No	Meets Acceptable Solution
Element 1 – Location	A1.1 Development Location	Yes	<p>Compliant.</p> <p>The proposed AMP concept plan is located in an area (post development) which all infrastructure will be in either Moderate or Low BHL. BAL Contour mapping indicates that all infrastructure and development can be located in BAL 29 or less with no BAL 40 prevailing over the development. Refer to Figure 8 and 9.</p> <p>Proposal meets acceptable solution A1.1.</p>
Element 2 – Siting and Design	A2.1 Asset Protection Zone	Yes	<p>Compliant.</p> <p>APZ standards will apply to the development footprint and the buffer (50m) areas. Low fuel standards are to be to WAPC APZ standards (refer to Appendix 10) at all times. Maintenance and management of the site is to be documented in the Operational Management Plan for the site.</p> <p>Proposal meets acceptable solution A2.1.</p>
Element 3 – Vehicular Access	A3.1 Two Access Routes	Yes	<p>Non-compliant.</p> <p>Access internal the site will be provided in alternative directions to separate destinations to Down Road to the north and Down Road South (south east). Multiple gates will also facilitate access/egress from the site in the north and eastern boundaries. Refer to internal Access Plan Figure 11. Down Road is essentially a long cul-de-sac (dead end road terminating to the north west of the subject site), as is Down South Road (terminating to the south of the subject site). The surrounding public road network is a legacy to previous precinct planning and development approvals. During the preparation of this BMP report, four access options were investigated to the north, west, and south. A summary of the Access Options and mapping is provided in Appendix 7. A 12m wide Emergency Access Way (Option 4) is to be constructed to enable a secondary access/egress to Albany Highway. This will be gazetted as an easement in gross to allow for emergency access/egress in a bushfire event.</p> <p>The BEEP prepared to support this development provides contingency actions in accordance with the requirements of the <i>Draft Position Statement: Tourism land uses within bushfire prone areas</i> (WAPC, 2018). These contingencies include early closure of the site, off-site evacuation and as a last resort, refuge on site in a suitable building / open space.</p>

**Table 6 cont.**

Element	Acceptable Solution	Applicable or not Yes/No	Meets Acceptable Solution
Element 3 – Vehicular Access cont.	A3.2 Public Road	No	No public roads are proposed. Not assessed to A3.2.
	A3.3 Cul-de-sacs	No	No cul-de-sacs are proposed. Not assessed to A3.3.
	A3.4 Battle axes	No	No cul-de-sacs are proposed. Not assessed to A3.4.
	A3.5 Private driveways	Yes	<p>Compliant.</p> <p>Internal driveways and access ways in and around the site are to confirm to public road standards and will be a minimum of 12m wide horizontal clearance with a 6m trafficable surface. Standards for the internal driveways/public access roads meet the minimum requirements as set by the guidelines as shown in Table 7 Vehicle Access Technical Requirements. Detail on the internal access driveways will be documented in the detailed civil engineering drawings to be approved by CoA at Development Approval Stages.</p> <p>Proposal is deemed compliant to A3.5.</p>
	A3.6 Emergency Access Ways	Yes	<p>Non-compliant.</p> <p>An Emergency Access Way is to be constructed to enable a secondary access/egress to Albany Highway. This will be gazetted as an easement in gross to allow for emergency access/egress in a bushfire event. This will give the AMP an alternative access route, which presently does not exist. The alternative access for the whole of the precinct has not been investigated for the preparation of this report and the CoA have indicated this would be investigated during a future Structure Plan process for the whole of the precinct. The EAW to Albany Highway from Down Road South (Option 4) will be an easement in gross to a minimum of 12m wide and measures 4.38km in length (from the site to Albany Highway) which does not meet the Acceptable Solutions (WAPC, 2017) and therefore has been assessed as non-compliant. Standards for the EAW are to meet Table 7 Vehicle Access Technical Requirements and documented in the detailed civil engineering drawings to be approved by CoA at Development Approval Stages.</p> <p>The BEEP prepared to support this development provides contingency actions in accordance with the requirements of the <i>Draft Position Statement: Tourism land uses within bushfire prone areas</i> (WAPC, 2018). These contingencies include early closure of the site, off-site evacuation and as a last resort, refuge on site in a suitable building / open space.</p>

**Table 6 cont.**

Element	Acceptable Solution	Applicable or not Yes/No	Meets Acceptable Solution
Element 3 – Vehicular Access cont.	A3.7 Fire Service Access Ways	Yes	<p>Compliant</p> <p>Fire Service Access Ways (FSA's) will be located internal to the site to enable fire appliances to easily access the site during motorsport events and non-event days. Refer to the Access Plan Figure 11. FSA's are to be 8m wide horizontal clearance with a 4m wide trafficable surface (noting 1m wide stabilised shoulders can apply as per Table 7). Standards for the internal FSA's are to meet table 7 Vehicle Access Technical Requirements and documented in the detailed civil engineering drawings to be approved by CoA at Development Approval Stages.</p> <p>Proposal is deemed compliant to A3.7.</p>
	A3.8 Firebreaks	Yes	<p>Compliant.</p> <p>A network of strategic fire breaks and FSA access to 8m is proposed for the site and has been prepared in consultation with CoA Emergency Management Services and AMP representatives. Refer to the Access Plan Figure 11. Existing firebreaks are evident across the site and are to be maintained by the leasees until AMP and CoA are managers of Lot 5780 Down Road. CoA to ensure this is documented in any temporary lease agreements once in ownership of the land.</p> <p>Proposal is deemed compliant to A3.8.</p>
Element 4 – Water	A4.1 Reticulated areas	No	N/A not assessed to A 4.1.
	A4.2 Non-reticulated areas	Yes	<p>Compliant</p> <p>Water supply will be through on-site resources via bore extraction to tank storage and pumped to facilities around the site. Bore water supply is known to the area, a copy of a monitoring bore testing for water sources in the northern area of the precinct is provided in Appendix 4. Storage of water dedicated for fire fighting will be located in the north and the eastern precincts and tanks are to be a minimum of 110,000L. A suitably qualified Fire Engineer will be engaged by the AMP prior to DA to ensure hydrants and supply pressure are to the required standards, to be approved by the CoA at Development Approval Stages.</p> <p>Proposal is deemed compliant to A4.2.</p>
	A4.3 Individual lots in non-reticulated areas	No	N/A not assessed to A4.3.



**Table 7: Vehicular Access Technical Requirements (WAPC, 2017)**

Technical requirements	Private Driveways	Emergency Access Ways (EAW)	Fire Service Access Ways (FSA)
Minimum trafficable surface (m)	4	*6	*6
Horizontal clearance (m)	6	6	6
Vertical clearance (m)	4.5	4.5	4.5
Maximum grades	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5

\*Denotes the width can include a 4m wide paving with one metre wide constructed road shoulders

## 9.1. Barrier Fencing

In November 2010 the Australian Bushfire CRC issued a "Fire Note" (Bushfire CRC, 2010) which outlined the potential for residential fencing systems to act as a barrier against radiant heat, burning debris and flame impingement during bushfire. The research aimed to observe, record, measure and compare the performance of commercial fencing of Colourbond steel and timber (treated softwood and hardwood).

The findings of the research found that:

*".. Colourbond steel fencing panels do not ignite and contribute significant heat release during cone calorimeter exposure" (exposure to heat)*

*.."Colourbond steel (fencing) had the best performance as a non-combustible material. It maintained structural integrity as a heat barrier under all experimental exposure conditions, and it did not spread flame laterally and contribute to fire intensity during exposure"*

It is also noted that non-combustible fences are recommended by WAPC (APZ standards: Fences and sheds within the APZ are constructed using non-combustible materials e.g. colourbond iron, brick, limestone, metal post and wire). The AMP will be required to build non-combustible fences through-out the site and will be documented through the OMP.

## 9.2. Fuel Reduction Strategy

The following parameters/strategies are recommended for the property. Sampling and fuel calculation should be as per the recommended methodology as outlined by DFES:

- Forest fuels are maintained to maximum of 15 t/ha in Forest (Type A) vegetation types;
- Woodland fuels are maintained to maximum of 8 t/ha in Woodland (Type B) vegetation types;
- Fuel reduction can be achieved through slashing or hazard reduction burning;
- Hazard reduction burning in the western remnant native vegetation area should be carried out in consultation with DFES and the CoA in accordance with the *Bushfires Act 1954*. This will be the responsibility of the landowner (CoA) and documented through their reserve's management plan;
- Hazard reduction burning in the western remnant native vegetation (Jarrah/Marri vegetation) is generally recommended to be a rotation 8-10 years over a series of cells;
- Slashing/mowing all internal grassland and woodland areas to maintain in a low fuel status;
- Observing no vehicle movement bans and total fire bans during slashing operations; and
- Hazard reduction burning only occurs in the western remnant vegetation block, restrictions of fire in central creek area (to reduce risk of peat fires) through an 8m firebreak/FSA at edge of fencing of remnant vegetation (restrict grass fires into remnant vegetation).

## 10. Implementation of the BMP

Implementation of this BMP will be the responsibility of the AMP and City of Albany. A draft governance document is provided in Appendix 1, which will be further refined through the development process. Table 8 and 9 outline responsibilities for implementation of this BMP report, noting there are further standards requirements documented throughout this BMP report.

### 10.1. Developer Responsibility

It is recommended the AMP governing body be responsible for the following:

**Table 8: Implementation actions AMP**

Developer – Prior to issue of titles			
No	Implementation Action	Prior to D/A	Prior to operations
1	A detailed Operational Management Plan (OMP) to be developed by AMP which includes risk assessments (refer to example Appendix 5) as per Confederation of Australian Motor Sport (CAMS) OSH policy and governing regulations to ensure there are actions to minimize risks of ignition and potential bushfire from internal sources of the park.	✓	
2	OMP to outline maintenance requirements across the lease area especially in regards to management and maintenance of Fire Service Access, fire breaks, low fuel areas, inspections of the secondary Emergency Access Ways from Down Road South to Albany Highway	✓	
3	OMP to outline arrangement in place for communication to local brigades and neighbours in relation to external bushfire risks.	✓	
4	The OMP will be reviewed and endorsed by the CAMS prior to operation of the AMP.	✓	
5	AMP governing body to ensure that events are not held on Catastrophic FDR days, Total fire ban days and vehicle movement restrictions as regulated by CoA or DFES.	✓	
6	Consideration of purchase of fast attack light unit for the AMP site and to be placed adjacent to any practise areas (non-event days).		✓
7	Practice days and non-events are to be controlled and regulated by AMP and documented in the OMP for the site.	✓	
8	Event days will have full fire safety crews, ambulance and safety personnel strategically located around the track and documented through the OMP.	✓	
9	Restricting public access through the site to spectator viewing areas and competitor areas, access around the whole of the site is restricted to emergency and safety services.		✓
10	Controlled re-fueling in designated areas for all motorsport park precincts and documented in OMP.	✓	
11	Traffic control for evacuation, contracted and documented in Operational Management Plan.	✓	✓
12	Site construction activities are to confirm to the BMP report and detailed in contractual arrangements with any contractors.		✓
13	Refuge buildings for (club days) 200-500 people built to AS 3959 BAL-29 and conform to the ABCB handbook.		✓
14	Emergency Management Plan for the site which will be developed by AMP prior to operations of the site and will include the BEEP which will be finalised in consultation with CoA Emergency management Services, DFES Albany region and LEMC at Development Approval Stages.		✓

**Table 8 cont.**

No	Implementation Action	Prior to D/A	Prior to operations
15	Standards for the internal driveways/public access roads, EAW and FSA's are to meet Table 7 Vehicle Access Technical Requirements and documented in the detailed civil engineering drawings to be approved by CoA at Development Approval Stages.	✓	
16	Existing firebreaks are evident across the site and are to be maintained to the CoA FMN standards by the AMP and maintenance documented in the OMP. Once operational the firebreaks are to confirm to the standards as outlined in the Access mapping Figure 11.	✓	✓
17	Fire Engineer will be engaged by the AMP prior to DA to ensure hydrants and supply pressure are to the required standards.	✓	✓
18	Update and review the BMP and BEEP as any changes occur, prior to Development Approval or every 5 years.	✓	✓

## 10.2. Local Government Responsibility

It is recommended the City of Albany shall be responsible for the following:

**Table 9: Implementation actions City of Albany**

LGA– Clearance of conditions			
No	Implementation Action	Lease arrangements	Land manager
1	Restricting public access through the site to spectator viewing areas and competitor areas, access around the whole of the site is restricted to emergency and safety services.	✓	
2	A Management Plan be developed for the remnant vegetation (future CoA managed land) outside of AMP lease area, particularly in relation to maintenance of Fire Service Access (outside of the AMP lease area), fire control and hazard reduction protocols as outlined in this document.		✓
3	Ensure the secondary access for the AMP is gazetted as an easement in gross (min of 12m horizontal clearance and 6m trafficable surface) prior to any operations or construction of the AMP site.	✓	
4	CoA Emergency Management Services to ensure the BEEP and Emergency management Plan for the AMP site is referred and registered through the Local Emergency Management Committee (LEMC).		
5	Existing firebreaks are evident across the site and are to be maintained to the CoA FMN by the leasees until AMP and CoA are managers of Lot 5780 Down Road. CoA to ensure this is documented in any temporary lease agreements once in ownership of the land.		
6	Developing and maintaining District Fire Fighting Facilities and related infrastructure.	N/A, ongoing	
7	Provide advice on standards and methods to achieve community fire protection to owners/occupiers of land through issue and enforcement of the current Fire Management Notice (yearly advice brochure updated annually).	N/A, ongoing	
8	CoA, through their Bush Fire Brigade Organisation is the Controlling Authority for fire suppression and prescribed burning operations on the area.	N/A, ongoing	



## 11. Disclaimer

*The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959-2009 – Building in Bushfire Prone Areas, WAPC State Planning Policy 3.7 (WAPC, 2015), WAPC Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017), and CSIRO’s research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling and occupants with the aesthetic and environmental conditions required by local, state and federal government authorities. They DO NOT guarantee that a building will not be destroyed or damaged by a bushfire. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling are made in good faith on the basis of the information available to the fire protection consultant at the time of assessment. The achievement of the level of implementation of fire precautions will depend amongst other things on actions of the landowner or occupiers of the land, over which the fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.*

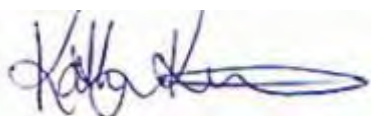
**AS3959-2009 disclaimer:** It should be borne in mind that the measures contained within this Standard (AS3959-2009) cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions.

Building to AS3959-2009 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself.

(AS3959, 2009)

## 12. Certification

I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level stated above in accordance with the requirements of AS 3959-2009 (Incorporating Amendment Nos 1, 2 and 3) and the Guidelines for Planning in Bushfire Prone Areas Ver 1.3 (WAPC, 2017).



SIGNED, ASSESSOR: ..... DATE: 07/05/2019

Kathryn Kinnear, Bio Diverse Solutions  
Accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD30794)



**Please refer to Appendix 11 for the certification of this BMP report from Level 3 BPAD practitioners, Eco Logical Australia.**

### 13. References

AS 3959-2009 Australian Standard, Construction of buildings in bushfire-prone areas, Building Code of Australia, Primary Referenced Standard, Australian Building Codes Board and Standards Australia.

Australian Building Codes Board (ABCB) (2014) Design and Construction of Community Bushfire Refuges. Australian Government and States and Territories of Australia. ABCB, GPO 9839, Canberra ACT 2601

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Motorcycling Australia (MA) (2011) Track Guidelines. Accessed March 2019 retrieved from: [www.ma.org.au/](http://www.ma.org.au/)

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Western Australian Planning Commission (WAPC) (2017) Guidelines for Planning in Bushfire Prone Areas. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC, 2015) State Planning Policy 3.2 Planning in Bushfire Prone Areas. Department of Planning WA and Western Australian Planning Commission.

Western Australian Planning Commission (WAPC, 2018) *Draft Position Statement: Tourism land uses within bushfire prone areas*

State Land Information Portal (SLIP) (2018) Map of Bushfire Prone Areas. Office of Bushfire Risk Management (OBRM) data retrieved from:  
<https://maps.slip.wa.gov.au/landgate/bushfireprone/>



**Appendices**

Appendix 1: Draft Governance Model for AMP

Appendix 2: Flora survey vegetation complex mapping and vegetation condition mapping  
(BDS, 2018)

Appendix 3: Vegetation classifications to AS3959

Appendix 4: Bore Test Certificate

Appendix 5: BDS Risk Assessment AMP

Appendix 6: CAMS OSH policy and risk assessment template

Appendix 7: Access options

Appendix 8: Bushfire Emergency Evacuation Plan

Appendix 9: ELA Method 2 BAL Calculations ELA

Appendix 10: WAPC APZ standards

Appendix 11: ELA peer review

**Appendix 1**

**Draft governance model AMP**

# ALBANY MOTORSPORT PARK

## 1 DRAFT GOVERNANCE MODEL

Once purchased, the property, tracks and all permanent facilities and infrastructure constructed on the property will be owned by the City of Albany. The Albany Motorsport Park (AMP) will then be leased to an operator-manager by the City of Albany, with all operational and maintenance activities to be conducted by the operator-manager.

The operator-manager of the AMP is to be a “not-for-profit” company consisting of a Board of Management and no other shareholders. Although the name has yet to be firmly defined, the current title for reporting purposes is Albany Motoring Venues Inc. (AMV). A Chairman of the Board of Directors will be elected by the directors.

1. AMV to have 6 Directors and no general members:
  - 2 representing the City of Albany;
  - 1 representing Department of Local Government, Sport and Cultural Industries;
  - 1 representing Great Southern Street Machine Association;
  - 1 representing Albany Motorcycle Club;
  - 1 representing Albany Cycling Club.
2. Directors to be nominated by the City of Albany CEO to a two year term and to have appropriate business management skills.
3. AMV to employ a full-time venue manager.
4. AMV leases the AMP from CoA on agreed terms.
5. AMV to be responsible for:
  - management and maintenance of the infrastructure;
  - operation of the venue to the various user groups;
  - marketing the venue;
  - establish an ongoing maintenance fund;
  - ensure the venue is profitable;
  - reporting to CoA.
6. AMV to produce and administer a “Venue Procedures Manual”.
7. AMV to produce and administer a “Code of Conduct Manual”.
8. AMV to ensure users of the venue have the appropriate training and qualifications.
9. AMV to ensure the tracks are certified by CAMS, MA and ANDRA.
10. AMV to purchase and have available the required maintenance equipment.
11. Grounds maintenance to be carried out by trained volunteers.

This model is in line with and has been developed to adhere to Government of Western Australia Public Sector Commission guidelines and framework for good governance for WA boards and committees. The model is also based heavily on the success of the Collie Motorplex, which has demonstrated ability for ongoing sustainability and avoids key issues associated with similar facilities run by clubs, such as poor scheduling of events, conflicts of interest and event bias. In particular, the model avoids well known critical conflicts and poor asset management and operations capacity demonstrated by the WA Sporting Car Club, responsible for the operations of Barbagallo Raceway in Neerabup.

**GREAT SOUTHERN MOTORPLEX GROUP Inc.**

**14 MARCH 2019**

(comments have been extracted from Keston Technologies "Business Plan for the Management and Operation of the Proposed Albany Motorsport Park, Down Road, Drome, WA" dated February 2019)

**Appendix 2**

**Flora Vegetation Complexes and Vegetation Condition Mapping**



REPORT ITEM DIS245 REFERS



29 Hercules Crescent  
Albany, WA 6330  
Australia  
Tel: 08 9842 1575  
Fax: 08 9842 1575



Overview Map Scale 1:100,000

Legend

- Subject Site
  - Cadastre
  - 5m Contours
  - ▲ Vegetation Relevés
- Vegetation Complexes**
- Jarrah/Sheoak/Eucalyptus staeri Sandy Woodland
  - Jarrah/Marri/Sheoak Laterite Forest
  - Homalospermum firmum/Callistemon glaucus Peat Thicket
  - Melaleuca preissiana Low Woodland
  - Open paddock / agricultural land
  - Miscellaneous Drainage Woodland/Shrubland



Scale  
1:8,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
City of Albany  
PO Box 484  
Albany, WA 6331

**Vegetation Complexes Mapping**

Assessor <b>EH</b>	QA Check <b>KK</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>MSC0137-002</b>	DATE <b>06/02/2019</b>



REPORT ITEM DIS245 REFERS



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Albany, WA 6330  
Australia  
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Fax: 08 9842 1575



Overview Map Scale 1:100,000

Legend

- Subject Site
- Cadastre
- 5m Contours
- Completely Degraded
- Very Good
- Excellent
- Pristine



Scale  
1:8,500 @ A3  
GDA MGA 94 Zone 50

Data Sources  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

CLIENT  
City of Albany  
PO Box 484  
Albany, WA 6331

**Vegetation Condition Mapping**

Assessor <b>EH</b>	QA Check <b>KK</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>MSC0137-002</b>	DATE <b>13/12/2018</b>

**Appendix 3**

**Vegetation Classifications to AS3959**



# Vegetation classification to AS3959

Site Details			
<b>Address:</b>	Lot 5780 Down Road		
<b>Suburb:</b>	Drome	<b>State:</b>	W.A.
<b>Local Government Area:</b>	City of Albany		
<b>Stage of WAPC Planning</b>	Scheme Amendment and Rezoning		
<b>Report use:</b>	Preparation of the BMP for AMP		

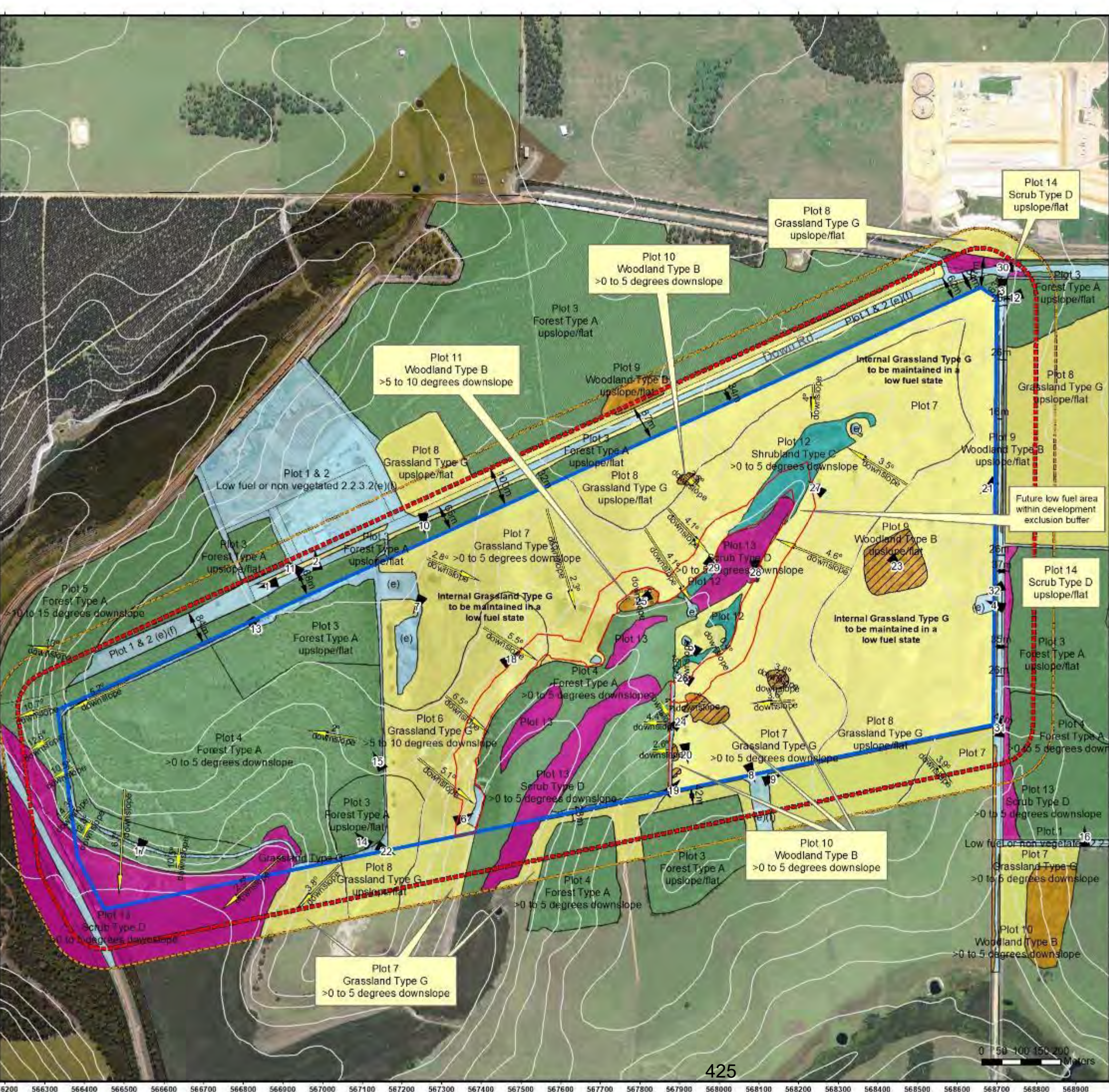
BMP Plan Details			
<b>Report / Job Number:</b>	COA0020	<b>Report Version:</b>	FINAL
<b>Assessment Date:</b>	14/02/2019	<b>Report Date:</b>	25/02/2019
<b>BPAD Practitioner</b>	Kathryn Kinnear	<b>Accreditation No.</b>	BPAD 30794



**Vegetation Classification**

Site assessment occurred on the 14<sup>th</sup> February 2019 by Kathryn Kinnear (BPAD 30794). All vegetation within 150m of the site / proposed development was classified in accordance with Clause 2.2.3 of AS 3959-2009. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified in the following pages and shown on the Vegetation Classes Map Page 2.

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6133100



**REPORT ITEM DIS245 REFERS**

This BAP Plan was prepared by:  
Kathryn Kinnear, Bio Diverse Solutions  
Accreditation No: BPAD30794  
Jurisdiction: Level 2 - WA

**BPAD**  
Bushfire  
Planning & Design  
Accredited Practitioner  
Level 2

**BIO DIVERSE SOLUTIONS**  
29 Hercules Crescent  
Albany, WA 6330  
Australia  
Tel: 08 9842 1575  
Fax: 08 9842 1575



**Legend**

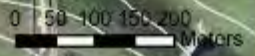
- Subject Site
  - 100m Assessment Boundary
  - Cadastre
  - 5m Contours
  - Future Low Fuel
  - Separation Distance
  - Slope Degrees
- Vegetation**
- Forest Type A
  - Woodland Type B
  - Shrubland Type C
  - Scrub Type D
  - Grassland Type G
  - Low fuel or non vegetated 2.2.3.2

Scale  
1:9,500 @ A3  
GDA MGA 94 Zone 50



**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
RIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
City of Albany  
Lot 5780 Down Road  
Drome, WA 6330

Vegetation Classes		
BAL Assessor	QA Check	Drawn by
KK	KK	BT
STATUS	FILE	DATE
FINAL	COA0020	27/03/2019



REPORT ITEM DIS245 REFERS

Plot	1	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			<p><b>Location:</b> Internal and external to the site.</p> <p><b>Description:</b> Hardstand areas, roads, driveways, dams, and buildings. Excluded as per AS3959 exclusion clause 2.2.3.2 (e).</p>
<p><i>Photo Id 1: View of Down Road to the west where it terminates west of Plantation Energy site.</i></p>			
Plot	1 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			<p><b>Additional Photo of Plot 1.</b></p>
<p><i>Photo Id 2: View to the north of the Plantation Energy site.</i></p>			

Plot	1 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			<p>Additional Photo of Plot 1.</p>

Photo Id 3: View to the south along Down Road South.

Plot	1 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			<p>Additional Photo of Plot 1.</p>

Photo Id 4: View of existing internal dam located along eastern boundary.



Lot 5780 Down Road, Drome WA – Vegetation Classification to AS3959

Plot	1 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			<p>Additional Photo of Plot 1.</p>

Photo Id 5: View of existing internal dam/soak located in the central creek area.

Plot	1 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			<p>Additional Photo of Plot 1.</p>

Photo Id 6: View of existing internal dam/soak located along the southern boundary.

Plot	1 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			<p><b>Additional Photo of Plot 1.</b></p>
<p><i>Photo Id 7: View of hardstand area in the north west of the site.</i></p>			

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p><b>Location:</b> Located around existing buildings to the south and north of the subject site. Along established firebreaks.</p> <p><b>Description:</b> Maintained vegetation &amp; low fuel areas associated with existing surrounding farms and development sites. Includes low fuel firebreaks.</p> <p>As per exclusion clause 2.2.3.2 (f) of AS3959-2009.</p> <p>Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p>
<p><i>Photo Id 8: View to the south/south east of adjacent farm/shed area.</i></p>			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p><b>Additional Photo of Plot 2.</b></p>
<p><i>Photo Id 9: View along the southern boundary showing low fuel fire break and adjacent driveways access maintained in a low fuel condition.</i></p>			
Plot	3	Classification or Exclusion Clause	Forest Type A
			<p><b>Location:</b> Located internal to the subject site in the north and south east corners of the western remnant vegetation block. External to the site in the north, and north east.</p> <p><b>Separation Distance:</b> Nil internal,</p> <p><b>Description:</b> Jarrah, Marri and Sheoak low forest. Midstorey dominated by <i>Banksia</i>, <i>Agonis</i>, <i>Hakea</i> and <i>Leucopogon</i>. Understorey of native shrubs, sedges and grasses. Multilayered. Includes Blue gum plantations external to the site.</p> <p><b>Average vegetation height:</b> 8 -13m.</p> <p><b>Vegetation Coverage:</b> 30-70%.</p> <p><b>Available fuel loading:</b> 25-35t/ha.</p> <p><b>Effective slope:</b> Upslope.</p>
<p><i>Photo Id 10: View to the south of fringing vegetation along Down Road.</i></p>			




Plot	3 cont.	Classification or Exclusion Clause	Forest Type A
			<p>Additional Photo of Plot 3.</p>

Photo Id 11: View to the north west of Blue Gum Plantations located north of Down Road.

Plot	3 cont.	Classification or Exclusion Clause	Forest Type A
			<p>Additional Photo of Plot 3.</p>

Photo Id 12: View to the west of Forest Type A along Down Road South.



Lot 5780 Down Road, Drome WA – Vegetation Classification to AS3959

Plot	3 cont.	Classification or Exclusion Clause	Forest Type A
			<p>Additional Photo of Plot 3.</p>

Photo Id 13: View to the south east of internal Forest located in the north west of the site.


Plot	3 cont.	Classification or Exclusion Clause	Forest Type A
			<p>Additional Photo of Plot 3.</p>

Photo Id 14: View to the north west of Forest Type A located in the south west (internal) of the site.


Plot	4	Classification or Exclusion Clause	Forest Type A
			<p><b>Location:</b> Internal in remnant vegetation along creekline and in the remnant to the west. External to the east and south east.</p> <p><b>Separation distance:</b> Nil internal and 35-41m to the east.</p> <p><b>Dominant species &amp; description:</b> Jarrah, Marri and Sheoak low forest. Midstorey dominated by <i>Banksia</i>, <i>Agonis</i>, <i>Hakea</i> and <i>Leucopogon</i>. Understorey of native shrubs, sedges and grasses. Multilayered. In creekline dominated by <i>Taxandria linearifolia</i> and Native Willow</p> <p><b>Average vegetation height:</b> 8-13m.</p> <p><b>Vegetation Coverage:</b> 30-70%.</p> <p><b>Available fuel loading:</b> 25-35t/ha.</p> <p><b>Effective slope:</b> Downslope &gt;0 to 5 degrees.</p>

Photo Id 15: View to the north west of Forest Type A.

Plot	4 cont.	Classification or Exclusion Clause	Forest Type A
			<p><b>Additional Photo of Plot 4.</b></p>

Photo Id 16: View to the north of Forest Type A located to the east/south east of the site in private property.

Plot	5	Classification or Exclusion Clause	Forest Type A
			<p><b>Location:</b> Internal to the subject site along a ridge in the western remnant vegetation block. Extends to the north of the subject site. Recently burnt (May 2018 bushfires).</p> <p><b>Separation distance:</b> Nil.</p> <p><b>Dominant species &amp; description:</b> Jarrah, Marri and Sheoak low forest. Midstorey dominated by <i>Banksia</i>, <i>Agonis</i>, <i>Hakea</i> and <i>Leucopogon</i>. Understorey of native shrubs, sedges and grasses. Multilayered.</p> <p><b>Average vegetation height:</b> 8-13m.</p> <p><b>Vegetation Coverage:</b> 30-70%.</p> <p><b>Available fuel loading:</b> 28-35t/ha.</p> <p><b>Effective slope:</b> Downslope &gt; 10 to 15 degrees.</p>
<p>Photo Id 17: View to the south of Forest Type A recently burnt (May 2018).</p>			
Plot	6	Classification or Exclusion Clause	Grassland Type G
			<p><b>Location:</b> Internal to the west of the creekline area.</p> <p><b>Separation distance:</b> Nil.</p> <p><b>Dominant species &amp; description:</b> Kikuyu, Cape Weed, Clovers, <i>Hypochaeris</i> sp., and patches of Fiddle Dock, Inkweed and Burr (mainly in rehabilitated areas).</p> <p><b>Average vegetation height:</b> 50-500mm.</p> <p><b>Vegetation Coverage:</b> &lt;10% trees.</p> <p><b>Available fuel loading:</b> 4.5t/ha.</p> <p><b>Effective slope:</b> Downslope &gt;5 to 10 degrees.</p>
<p>Photo Id 18: View to the north east of internal paddock areas in the west of the subject site.</p>			

# REPORT ITEM DIS245 REFERS



Lot 5780 Down Road, Drome WA – Vegetation Classification to AS3959

Plot	7	Classification or Exclusion Clause	Grassland Type G
			<p><b>Location:</b> Internal to the site in the east, north and west, also located to the south in adjacent property.</p> <p><b>Separation distance:</b> Nil internal, 0-6m to the south.</p> <p><b>Dominant species &amp; description:</b> Kikuyu, Cape Weed, Clovers, <i>Hypochaeris sp.</i>, and patches of Fiddle Dock, Inkweed and Burr (mainly in rehabilitated areas).</p> <p><b>Average vegetation height:</b> 50-500mm.</p> <p><b>Vegetation Coverage:</b> &lt;10% trees.</p> <p><b>Available fuel loading:</b> 4.5t/ha.</p> <p><b>Effective slope:</b> Downslope &gt;0 to 5 degrees.</p>

Photo Id 19: View to the north east of internal paddock areas from the southern boundary.

Plot	7	Classification or Exclusion Clause	Grassland Type G
			<p><b>Additional Photo of Plot 7.</b></p>

Photo Id 20: View of Plot 7 on the eastern side of the remnant vegetation (Plot 4), note rocky ground.

# REPORT ITEM DIS245 REFERS



Lot 5780 Down Road, Drome WA – Vegetation Classification to AS3959

Plot	8	Classification or Exclusion Clause	Grassland Type G
			<p><b>Location:</b> Internal to the site to the east. To the north, south and east of the subject site in adjacent properties and road reserves.</p> <p><b>Separation distance:</b> Nil internal, 26m to the east, 0-6m to the south and 32-71m to the north.</p> <p><b>Dominant species &amp; description:</b> Kikuyu, Cape Weed, Clovers, <i>Hypochaeris sp.</i>, and patches of Fiddle Dock, Inkweed and Burr (mainly in rehabilitated areas).</p> <p><b>Average vegetation height:</b> 50-500mm.</p> <p><b>Vegetation Coverage:</b> &lt;10% trees.</p> <p><b>Available fuel loading:</b> 4.5t/ha.</p> <p><b>Effective slope:</b> Upslope.</p>

Photo Id 21: View along internal fenceline in the east (central) area of internal paddocks.

Plot	8	Classification or Exclusion Clause	Grassland Type G
			<p><b>Additional Photo of Plot 8.</b></p>

Photo Id 22: View to the south east along ridgeline located south/south west of the subject site.

Plot	9	Classification or Exclusion Clause	Woodland Type B (06)
			<p><b>Location:</b> Internal to the site in small isolated patches. North in adjacent property and east along Down Road South.</p> <p><b>Separation distance:</b> Nil internal and Down Road South, 87m to the north.</p> <p><b>Dominant species &amp; description:</b> Stands of Marri and Jarrah trees in open paddock areas. Grazed and disturbed understorey. Not multilayered.</p> <p><b>Average vegetation height:</b> 12-15m.</p> <p><b>Vegetation Coverage:</b> 10-30%.</p> <p><b>Available fuel loading:</b> 15-25t/ha.</p> <p><b>Effective slope:</b> Upslope.</p> <p>Note: Central paddock areas will be maintained as low fuel near track and facilities.</p>
<p><i>Photo Id 23: View to the south east through open woodland areas (central paddock areas in the east).</i></p>			
Plot	9 cont.	Classification or Exclusion Clause	Woodland Type B (06)
			<p><b>Additional Photo of Plot 9.</b></p>
<p><i>Photo Id 32: View along Down Road South.</i></p>			

Plot	10	Classification or Exclusion Clause	Woodland Type B (06)
			<p><b>Location:</b> Internal to the site in small isolated patches.</p> <p><b>Separation distance:</b> Nil.</p> <p><b>Dominant species &amp; description:</b> Stands of Marri and Jarrah trees in open paddock areas. Grazed and disturbed understorey. Not multilayered. Noted as future low fuel.</p> <p><b>Average vegetation height:</b> 12-15m.</p> <p><b>Vegetation Coverage:</b> 10-30%.</p> <p><b>Available fuel loading:</b> 15-25t/ha.</p> <p><b>Effective slope:</b> Downslope &gt;0 to 5 degrees.</p>

Photo Id 24: View to the north east through Plot 10.

Plot	11	Classification or Exclusion Clause	Woodland Type B (06)
			<p><b>Location:</b> Internal to the subject site situated the north of the creek.</p> <p><b>Separation distance:</b> Nil.</p> <p><b>Dominant species &amp; description:</b> Stands of Marri and Jarrah trees in open paddock areas. Grazed and disturbed understorey. Not multilayered. Noted as future low fuel.</p> <p><b>Average vegetation height:</b> 12-15m.</p> <p><b>Vegetation Coverage:</b> 10-30%.</p> <p><b>Available fuel loading:</b> 15-25t/ha.</p> <p><b>Effective slope:</b> Downslope &gt;5 to 10 degrees.</p>

Photo Id 25: View to the south west through Plot 11 located on the north of the central creek area.



# REPORT ITEM DIS245 REFERS



Lot 5780 Down Road, Drome WA – Vegetation Classification to AS3959

Plot	12	Classification or Exclusion Clause	Shrubland Type C
			<p><b>Location:</b> Internal to the site situated along creek line area.</p> <p><b>Separation distance:</b> Nil.</p> <p><b>Dominant species &amp; description:</b> Taxandria, Homalospermum, Callistemon, native sedges and introduced grasses.</p> <p><b>Average vegetation height:</b> 1-1.5m.</p> <p><b>Vegetation Coverage:</b> 30% foliage cover.</p> <p><b>Available fuel loading:</b> 15t/ha.</p> <p><b>Effective slope:</b> Downslope &gt;0 to 5 degrees.</p>
<p><i>Photo Id 26: View through Shrubland Type C located around central creek area (southern edge).</i></p>			

Plot	12 cont.	Classification or Exclusion Clause	Shrubland Type C
			<p><b>Additional Photo of Plot 12.</b></p>
<p><i>Photo Id 27: View through Shrubland Type C located around central creek area (eastern edge).</i></p>			


Plot	13	Classification or Exclusion Clause	Scrub Type D
			<p><b>Location:</b> Internal in creek area.</p> <p><b>Separation distance:</b> Nil.</p> <p><b>Dominant species &amp; description:</b> <i>Melaleuca</i>, <i>Callistemon</i>, <i>Homalospermum</i>, <i>Banksia</i>, <i>Taxandria</i>, <i>Acacia</i> and native sedges.</p> <p><b>Average vegetation height:</b> 3-4m.</p> <p><b>Vegetation Coverage:</b> &gt;30% foliage cover.</p> <p><b>Available fuel loading:</b> 25t/ha.</p> <p><b>Effective slope:</b> Downslope &gt;0 to 5 degrees.</p>

Photo Id 28: View of Scrub Type D located along central creek area (southern edge). Note 4m height staff.


Plot	13 cont.	Classification or Exclusion Clause	Scrub Type D
			<p><b>Additional Photo of Plot 13.</b></p>

Photo Id 29: View through Plot 13 on the northern side of the central creek area. Note 4m height staff.


Plot	14	Classification or Exclusion Clause	Scrub Type D
			<p><b>Location:</b> External to the east along Down South Road and to the North at the Down Road and Down Road South intersection.</p> <p><b>Separation distance:</b> 26m to the east 54-63m to the north.</p> <p><b>Dominant species &amp; description:</b> Predominately Taxandria (Tea tree) and Taylorina, some native sedges and introduced grasses.</p> <p><b>Average vegetation height:</b> 2-4m.</p> <p><b>Vegetation Coverage:</b> &gt;30% foliage cover.</p> <p><b>Available fuel loading:</b> 25t/ha.</p> <p><b>Effective slope:</b> Upslope.</p>

Photo Id 30: View along Down Road at the intersection of Down Road South (note 1.5m high sign).


Plot	14 cont.	Classification or Exclusion Clause	Scrub Type D
			<p><b>Additional Photo of Plot 14..</b></p>

Photo Id 31: View along Down Road of adjacent property, low fuel firebreak in foreground, regrowth Tea Tree Scrub in background.

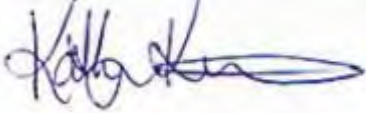


**Comments on Vegetation Classifications:**

- Distances from vegetation were made based on surface fuels to edge of lot (subject site) boundary;
- Effective slopes were measured in the field using a Nikon Forestry Pro and represented on the respective plots;
- Method 1 (AS3959-2009) Simplified procedure was used for vegetation classification Assessment process;
- All vegetation was classified within the subject site and within 150m of the lot boundaries to AS3959 Table 2.3; and
- The perimeter of the vegetation was measured using field GPS and notations on field GIS maps.

**CERTIFICATION**

I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level stated above in accordance with the requirements of AS 3959-2009 (Incorporating Amendment Nos 1, 2 and 3).

SIGNED, ASSESSOR: .....  ... DATE:

Kathryn Kinnear, Bio Diverse Solutions  
Accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD30794)



**Appendix 4**

**Bore water supply test certificate**

**BDS to supply after 9<sup>th</sup> May**

**Appendix 5**

**Risk Assessment AMP**

**Albany Motorsport Park Risk Assessment**

Risk No.	Hazard -Bushfire originating/causing fire	Probability of event occurring	Exposure of Visitors	Possible consequences if event occurs	Risk rating	Control measure
Internal to the site						
1	Ignition Vehicles/Bikes combusting on track due to crashes Inc fuel or oil line leaks on track	Almost Certain	Occasional	Very serious	Substantial/high	<ul style="list-style-type: none"> <li>• Low fuel grass areas</li> <li>• Buffer areas low fuel to vegetation</li> <li>• Requirements outlined in Operators safety manual (CAMS)</li> <li>• Fire extinguishers located around the track and pit areas.</li> <li>• Safety crews on site every meeting and fire unit for unsupervised non track days during summer.</li> <li>• Spark arrestors on Motocross bikes.</li> <li>• No events on Total fire ban periods and Catastrophic &amp; Extreme FDI. Consider twilight events.</li> <li>• Restrict public access and vehicle movement near the central creek area (safety and fire crews only).</li> </ul>
2	Grinding sparks in pits or near fuel sources (hot works)	Very unlikely (designated re-fuelling areas)	Rare	Disaster	Low risk	<ul style="list-style-type: none"> <li>• Operators safety manual (CAMS).</li> <li>• No storage of fuels on site.</li> <li>• Designated re-fueling areas (controlled zone).</li> <li>• Fire extinguishers strategically located.</li> <li>• Fire extinguishers each event participant.</li> <li>• Requirements outlined in Operators safety manual (CAMS).</li> <li>• Ensure control measures instigated during unsupervised non track days during summer.</li> </ul>
3	Smoking public viewing areas or in pits near fuels	Unlikely (smoke free site)	Rare	Disaster	Low risk	<ul style="list-style-type: none"> <li>• No smoking on site</li> <li>• Fire extinguishers strategically located.</li> <li>• Security enforcement to general public.</li> </ul>
4	Vehicles (exhausts) near dry vegetation or slashing/mowing rocky ground (maintenance)	Likely	Rare	Very serious	Low risk	<ul style="list-style-type: none"> <li>• Operations manual to define slashing procedures</li> <li>• Fast attack unit on site.</li> <li>• No slashing on high winds and hot days, Total fire ban periods and Catastrophic &amp; Extreme FDI.</li> <li>• Observe no vehicle movement bans and total fire bans in Operators safety manual (CAMS).</li> </ul>

REPORT ITEM DIS245 REFERS

Risk No.	Hazard -Bushfire originating/causing fire	Probability of event occurring	Exposure of Visitors	Possible consequences if event occurs	Risk rating	Control measure
Internal cont.						
5	Electrical faults building faults	Possible	Occasional	Very serious	Moderate	<ul style="list-style-type: none"> <li>• New buildings to be constructed, less risk of faults.</li> <li>• Regular building inspections.</li> <li>• Compliance in new building, safety certification on electrical elements. (regulated)</li> <li>• All buildings built to BAL 29 on site.</li> </ul>
6	Electrical faults from extension cords/cables (pits/trailers)	Possible	Occasional	Very serious	Moderate	<ul style="list-style-type: none"> <li>• Worksafe procedures in place - Tagged and tested extension cords only from all event participants.</li> <li>• Fire extinguishers strategically located in pit area and with each event participant.</li> <li>• RCD protection on all power supply on site. (regulated).</li> <li>• Pit inspections &amp; participant gear inspections for compliance during events.</li> </ul>
7	Re-fuelling area (designated and controlled)	Likely	Occasional	Very serious	Very high risk	<ul style="list-style-type: none"> <li>• Designated area for each site.</li> <li>• Low fuel non-combustible area.</li> <li>• Requirements outlined in Operators safety manual (CAMS)</li> <li>• Safety crews on site every meeting.</li> <li>• Fire unit for unsupervised non-track days during summer.</li> <li>• No events on Total fire ban periods and Catastrophic &amp; Extreme FDI.</li> <li>• Restrict public access and vehicle movement near refuelling area.</li> </ul>
8	Substandard race vehicles using the facility	Remotely possible	Very rare	Serious	Low risk	<ul style="list-style-type: none"> <li>• Race scrutineering controls</li> <li>• Designated practice area</li> <li>• Requirements outlined in Operators safety manual (CAMS)</li> <li>•</li> </ul>



REPORT ITEM DIS245 REFERS

Risk No.	Hazard -Bushfire originating/causing fire	Probability of event occurring	Exposure of Visitors	Possible consequences if event occurs	Risk rating	Control measure
Internal cont.						
9	Re-ignition of previously controlled fires (peat Central creek area)	Possible	Infrequent	Very serious/Disaster	Substantial	<ul style="list-style-type: none"> <li>No controlled burning in creek area.</li> <li>Restrict public access and vehicle movement near the central creek area (safety and fire crews only).</li> <li>Barriers non combustible material to central creek area.</li> <li>Access (FSA) to creek/remnant vegetation area from fire crews, turnarounds and 6-8m wide horizontal clearance, 4m trafficable surface.</li> <li>Gates for fire access.</li> <li>Low fuel buffer areas (50m) from vegetated areas.</li> <li>No hazard reduction burning in central creek/remnant vegetation area.</li> <li>8m firebreak around central remnant vegetation area to restrict grass fires from entering the area.</li> </ul>
10	Water pump failure causing spark/ignition	Possible	Infrequent	Very serious/Disaster	Substantial	<ul style="list-style-type: none"> <li>Ensure pumps adjacent bores are regularly maintained and inspected.</li> <li>Located in low fuel area, non-combustible materials</li> <li>No fuel storage near.</li> <li>Not located near buildings.</li> </ul>
11	Gas Barbecues and camp fires causing ignition (unattended, faulty)	Very likely	Occasional	Very serious/Disaster	High risk	<ul style="list-style-type: none"> <li>No camping on site</li> <li>No barbecues, unless in organized near kitchen (register) facility.</li> <li>Condition on lease</li> <li>No informal BBQ's from participants</li> <li>Inspections in pit areas.</li> <li>Requirements outlined in Operators safety manual (CAMS)</li> <li>CoA licensed vendors for food catering</li> </ul>
12	Tire barriers igniting from crash from vehicle	Very likely	Occasional	Very serious/Disaster	High risk	<ul style="list-style-type: none"> <li>Tires to be placed in accordance with DFES practice note</li> <li>Use concrete barriers and sand traps instead of tire barriers</li> <li>No storage of tyres on site.</li> <li>Refer to DFES guideline of storage of tires.</li> </ul>

REPORT ITEM DIS245 REFERS

Risk No.	Hazard -Bushfire originating/causing fire	Probability of event occurring	Exposure of Visitors	Possible consequences if event occurs	Risk rating	Control measure
External						
13	Re-ignition of previously controlled fires (May and November non-prohibited periods)	Very likely	Occasional	Serious injury	Moderate	<ul style="list-style-type: none"> <li>• Monitor and liaison with brigade fire control officer.</li> <li>• Restrictions of burning within 20m of site?</li> <li>• Monitor weather conditions prior to event, documented in operations manual and fire warden for site.</li> <li>• Liaison with neighbours during summer periods.</li> <li>• Scheduling of events - No events on Total fire ban periods and Catastrophic &amp; Extreme FDI. Consider twilight events.</li> </ul>
14	External: Ignition from trains under heavy loads sparks associated with braking	Conceivable but very unlikely	Rare	Serious	Low risk	<ul style="list-style-type: none"> <li>• Train movements low</li> <li>• Low fuel areas adjacent to railway</li> <li>• Monitor weather conditions prior to event, documented in operations manual and fire warden for site.</li> <li>• Liaison with neighbours during summer periods.</li> </ul>
15	External: Aircraft Crash	Conceivable but very unlikely	Rare	Serious	Low risk	<ul style="list-style-type: none"> <li>• Flight path 1km west</li> <li>• Plane movements mostly through weekdays</li> <li>• Monitor weather conditions prior to event, documented in operations manual and fire warden for site.</li> </ul>
16	External: Western powerlines transmission	Very likely	Occasional	Very serious	High risk	<ul style="list-style-type: none"> <li>• Underground power supply to site?</li> <li>• Major transmission lines to the east</li> <li>• Monitor weather conditions and fires in area</li> <li>• Liaison with Chief Fire Control Officer</li> <li>• Radio for Warden?</li> </ul>
						<ul style="list-style-type: none"> <li>•</li> </ul>

REPORT ITEM DIS245 REFERS

Risk No.	Hazard -Bushfire originating/causing fire	Probability of event occurring	Exposure of Visitors	Possible consequences if event occurs	Risk rating	Control measure
External						
17	External: Ignition from stockpiled woodchips north of site	Very likely	Occasional	Very serious	High risk	<ul style="list-style-type: none"> <li>• Plantation energy stockpiles of woodchips</li> <li>• Safety measures and fire control procedures in place.</li> <li>• Low fuel environment north of subject site.</li> <li>• Water supply in lease area of subject site for sprinkler system</li> <li>• Storage controls for woodchips, monitors and wardens in place.</li> <li>• No woodchips stored on Motorsport park site.</li> <li>• Copy of emergency response procedure to Albany motorsport park</li> <li>• Liaison with APEC and plantation energy.</li> </ul>
18	External: Ignition from Blue gum slash burning (cause of May 2018 fire)	Very likely	Occasional	Very serious	High risk	<ul style="list-style-type: none"> <li>• Monitor and liaison with brigade fire control officer.</li> <li>• Restrictions of burning within 20m of site?</li> <li>• Monitor weather conditions prior to event, documented in operations manual and fire warden for site.</li> <li>• Liaison with neighbours during summer periods.</li> <li>• Scheduling of events - No events on Total fire ban periods and Catastrophic &amp; Extreme FDI. Consider twilight events.</li> </ul>
19	External and Internal: Lightning strikes	Very likely	Occasional	Very serious	High risk	<ul style="list-style-type: none"> <li>• Monitor and liaison with brigade fire control officer.</li> <li>• Monitor weather conditions prior to event, documented in operations manual and fire warden for site.</li> <li>• Liaison with neighbours during summer periods.</li> <li>• Scheduling of events - No events on Total fire ban periods and Catastrophic &amp; Extreme FDI. Consider twilight events.</li> </ul>

## REPORT ITEM DIS245 REFERS

Risk No.	Hazard -Bushfire originating/causing fire	Probability of event occurring	Exposure of Visitors	Possible consequences if event occurs	Risk rating	• Control measure
20	Illegally lit fires (deliberate)	Unusual but possible	Occasional	Very serious	Moderate risk	<ul style="list-style-type: none"> <li>• Monitor and liaison with brigade fire control officer.</li> <li>• Monitor weather conditions prior to event, documented in operations manual and fire warden for site.</li> <li>• Liaison with neighbours during summer periods.</li> <li>• Scheduling of events - No events on Total fire ban periods and Catastrophic &amp; Extreme FDI. Consider twilight events.</li> </ul>

**Probability** – Almost Certain, Likely, Possible Unlikely

**Exposure** – Very rare, infrequent, occasional, frequent, continuous

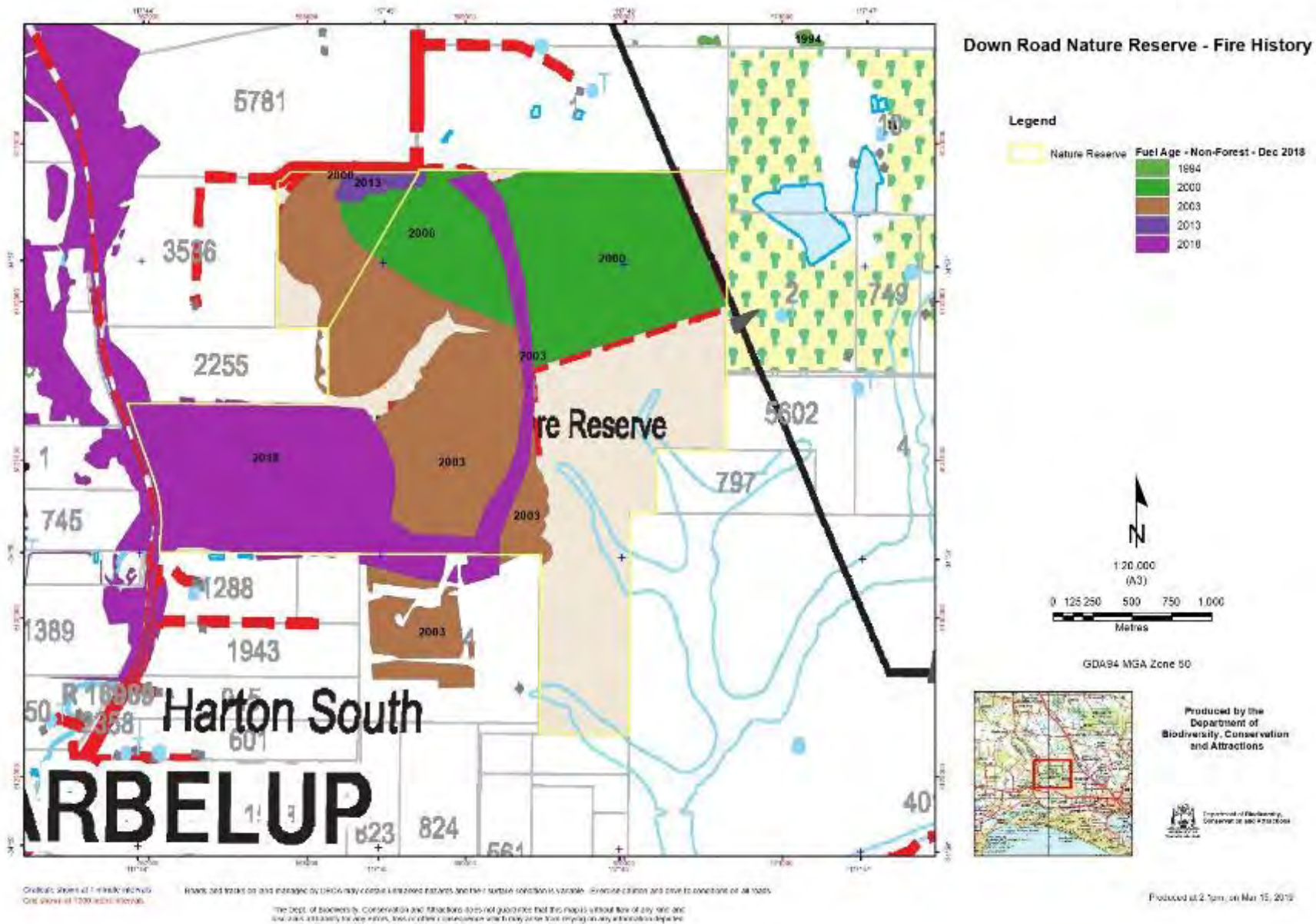
**Consequence**- Catastrophe, Disaster, Very Serious, Serious, Important, Noticeable

**Risk** – Very High, High, Substantial, Moderate and Low

Data has been gathered from following sources:

- 20km radius of the subject site on originating fire causes (DBCA, CoA & DFES)
- CAMS risk register
- Great Southern Motorsport Group Inc (cross section of sporting codes)

Kindly provided by Department of Biodiversity Conservation and Attractions (2019)



**Appendix 6**

**CAMS Occupational health and safety policy**

**Example of CAMS risk assessment forms**

# REPORT ITEM DIS245 REFERS

## Occupational Health & Safety Policy

### Scope

This policy applies to all CAMS Staff and Volunteers working for CAMS.



### Policy Objective

This Policy shows CAMS' commitment to ensuring the health and safety of staff, contractors and volunteers who work for CAMS, and for minimising the risk to competitors, participants, officials, contractors, and visitors at CAMS Events, to the extent reasonably practicable.

### Policy Statement

#### 1. The Working Environment

CAMS will use its best endeavours to achieve a working environment that, to the extent reasonably practicable, eliminates or reduces risks to health and safety by:

- conducting risk assessments on hazards and risks relating to the work of Staff and Volunteers;
- monitoring the health and safety of Staff and Volunteers;
- seeking advice on safety matters when required;
- promoting safety and welfare to Staff and Volunteers;
- working with Staff who are returning to work after illness or injury to assist their rehabilitation;
- providing training to Staff on work health and safety on induction and then as required;
- providing training and instruction to Volunteers as to the safe performance of their work as required;
- ensuring contractors comply with their health and safety obligations by requiring them in CAMS contracts to address risks and have in place control measures to eliminate or reduce risks arising from their work;

- ensuring those conducting Permitted Events adopt any work health and safety policies required by CAMS and address risks and have in place control measures to eliminate or reduce risks arising from their Permitted Event/s;
- consulting with Staff and Volunteers on work health and safety matters;
- reporting to the Board Members on work health and safety.

#### 2. The Motor Sport Environment

CAMS recognises that motor sport may present risks to the health and safety of competitors, officials, contractors, and visitors at CAMS Events. CAMS seeks to reduce those potential risks by:

- having a health and safety program ('the program'), which will protect and enhance the health and safety of all relevant CAMS stakeholders;
- having CAMS Board Members, Staff, Volunteers and CAMS-associated and affiliated organisations working together to develop and implement the program;
- providing training to Volunteers as required;
- applying the program at all CAMS Events and, to the extent possible, Permitted Events;
- reviewing the program annually or more frequently if required;
- reporting on compliance and implementation to the Board Members.

#### 3. Procedures

##### 3.1 Best Practice

CAMS aims to be recognised as the motor sport leader in safety as it relates to its Staff and Volunteers.

##### 3.2 Leadership

All CAMS managers and those in leadership positions, including senior volunteers, will provide the leadership needed to reach these goals.

### 3.3 Managers and Senior Volunteers

CAMS Managers and Senior Volunteers are committed to the provision and maintenance of a healthy and safe workplace, and to the extent reasonably practicable and as appropriate, will:

- consult and participate with CAMS Staff, Volunteers and associated stakeholders in the health and safety program;
- use risk identification, assessment and control principles to reach CAMS health and safety objectives;
- inform and train CAMS Staff and Volunteers and associated stakeholders in relevant policies, procedures and health and safety obligations;
- participate in CAMS induction and implement all safety procedures;
- allocate appropriate resources for the program.

### 3.4 Staff and Volunteers

CAMS Staff and Volunteers will:

- participate and support CAMS in its efforts to reach its health, safety and where relevant, rehabilitation objectives;
- follow reasonable health and safety instructions from managers, supervisors or senior volunteers;
- report any serious incidents, accidents, injuries or hazards in the workplace to supervisors or designated representatives;
- aim to work in a way that does not endanger the safety of themselves and/or others;
- properly use and maintain safety equipment;
- make sure other CAMS Staff and Volunteers and visitors follow safety rules in the workplace;
- participate in all CAMS induction programs when required, and follow all safety procedures.

### 3.5 CAMS Staff and CAMS Appointed Officials at Permitted Events

- CAMS Staff and CAMS Appointed Officials will conduct themselves in a safe manner and in line with local safety policies and procedures when attending Permitted Events on behalf of CAMS. In the absence of these, CAMS' organisational procedures will apply;
- CAMS Staff and CAMS Appointed Officials have the right to cease work at any Permitted Event if the staff member or CAMS Appointed Official has concerns that risks to health and safety have not been appropriately eliminated or reduced.

### 3.6 Consultation

CAMS consults on work health and safety with its Staff, Volunteers and stakeholders in a number of different ways and in accordance with any Consultation Policy.

### 3.7 Dispute Resolution

Any disputes as to work health and safety matters that are not addressed by other CAMS policies or procedures will be at the first instance addressed through informal mediation between the parties. If this is unsuccessful the CAMS CEO will refer the matter to formal mediation, and may then arbitrate the dispute if required.

## Definitions

The following definitions apply to this policy:

### Staff

A paid employee of CAMS who conducts work for CAMS including at CAMS Events and Permitted Events.

### CAMS Appointed Officials

Officials appointed by CAMS to work at a CAMS Event or a Permitted Event, namely Stewards of Meetings, Race Directors, Technical Commissioners and any other official expressly appointed by CAMS.



# REPORT ITEM DIS245 REFERS

## Contractor

A contractor or subcontractor engaged by CAMS.

## Senior Volunteers

A volunteer who is a Board Member of CAMS, or a Chair of any CAMS Commission, Committee, State Executive, Working Group, Panel or is otherwise appointed by CAMS to a senior voluntary position.

## Volunteers

Unpaid/Honorary representatives working for CAMS on authorised and approved CAMS business, including senior volunteers, Commission and Committee members and CAMS Appointed Officials.

## Board Members (The Board)

Directors of the CAMS Board, which also includes the President and FIA delegate.

## CAMS Events

Motor sport events conducted by CAMS excluding Permitted Events.

## Permitted Events

Motor sport events that are not conducted by CAMS but are conducted pursuant to a licence, permit or authority issued by CAMS.

## Note: OH&S Policies on specific issues

*Policies, procedures, operational safety requirements and safe work methods on specific occupational health and safety issues, consistent with the principles in this policy, will be issued as appropriate.*



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Endorsed by



**Gallagher**





Event / Venue	Type of Work being performed <i>e.g. refuelling, waving flag, walking to work area</i>
Area / Location	
Date	

LIKELIHOOD	Consequence			
	1 Insignificant	2 Minor	3 Moderate	4 Major
A - Almost Certain	High	High	<b>Extreme</b>	<b>Extreme</b>
B - Likely	Medium	High	High	<b>Extreme</b>
C - Possible	Low	Medium	High	<b>Extreme</b>
D – Unlikely	Low	Low	Medium	High

**ACTIONS REQUIRED FOLLOWING ASSESSMENT OF RISK:**

Extreme risk    Immediate actions required  
 High risk        Senior Management (Senior Event Official) attention needed  
 Medium risk     Management (Organiser) responsibility must be specified  
 Low risk         Manage by current procedures / continue current process

*Note: "Management" and "Official" are considered to be like terms*  
 See reverse for descriptions of Likelihood and Consequence outcomes

**IDENTIFIED RISKS:**

Description of identified Risks	Likelihood (A-D)	Consequence (1-4)	Resultant Risk	Controls / Treatment performed What has been done about it ?	Who will Implement?	Who will Check?	Who confirmed actions were completed (sign)
<i>Example: spectator could be hit by debris from car</i>	<i>C</i>	<i>3</i>	<i>HIGH</i>	<i>Debris fence, move spectators further back, additional crowd control officials</i>	<i>Organiser Marshals</i>	<i>Race Sec</i>	
1.							
2.							
3.							
4.							



**LIKELIHOOD/CONSEQUENCE DESCRIPTIONS:**

Likelihood		Consequence	Personal Injury	Administrative
A - Almost certain	Action will probably occur numerous times or in many circumstances	4 – Major Consequence	Death, permanent or extensive injury requiring hospitalisation to one or more people.	Significant hardship to Organisation
B - Likely	Action may occur occasionally or in some circumstances	3 – Moderate Consequence	Serious injury requiring hospitalisation; broken limbs or stand down for duration of event	Significant rejigging of organisational plans required
C - Possible	Action may occur in exceptional circumstances and has been known to occur elsewhere	2 – Minor Consequence	Medical attention on-site or ongoing attention to injury may be required	Minor rearrangement of plans required to address the situation
D - Unlikely	Whist theoretically possible is not known to have occurred	1 – Insignificant Consequence	Minor first aid, if at all. No ongoing medical attention	Localised assessment of affected issue to be considered

**POINTS TO REMEMBER:**

What can cause injury or death?
<ul style="list-style-type: none"> <li>▪ slips/trips</li> <li>▪ Collapse of structures</li> <li>▪ Dangerous or flammable Materials</li> <li>▪ Electrical cables</li> <li>▪ Heavy equipment</li> <li>▪ Public access / egress / behaviour</li> <li>▪ Weather (e.g. Rain / Hail / Wind / Thunderstorms)</li> <li>▪ Projectiles</li> </ul>

Four Risk Treatments
<ul style="list-style-type: none"> <li>▪ Avoid: Don't do the activity</li> <li>▪ Treat: Reduce by use of controls</li> <li>▪ Accept: If low or if consequences can be tolerated.</li> <li>▪ Transfer: (Caution – not possible to transfer duty of care.)</li> </ul>

Levels of Control Methods
<ul style="list-style-type: none"> <li>▪ Avoid ← Try to start here</li> <li>▪ Substitute</li> <li>▪ Isolate</li> <li>▪ Reduce by physical controls</li> <li>▪ Reduce by admin warning and rules</li> <li>▪ Use Personal Protection Equipment ← Last resort</li> </ul>

**WHO DID YOU TALK TO IN ASSESSING AND IDENTIFYING THIS RISK?**

Date	Name	Position	Signature

Completed by: \_\_\_\_\_

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

**Appendix 7**

**Access options AMP**

**Appendix 8**

**ELA Bushfire Emergency Evacuation Plan**

## 1. Location details

Facility type:

- Motorsport Park in land zoned as "Priority Agriculture" area

Location:

- Lot 5780 Down Road, Drome, Western Australia

Infrastructure:

- A motorsport Park including a motorcycle track and raceway track plus associated buildings.

Occupation (number of people):

- Maximum occupants:
  - 200-500 people (club event)
  - 10,000 people (full event)

Access:

- Four different internal driveways accessing four separate points along Down Road West and Down Road South; and
- An Emergency Access Way is to be constructed to enable access/ egress to Albany Hwy. The EAW is to the south of Down Road South.

Fire Weather Forecast Area:

- South West Land Division Fire District
- Stirling Coast Region

## 2. Communications

Mobile:

- Mobile reception is available – however, mobile communications can become unreliable during bushfire/emergency events due to the volume of usage

Landline / NBN:

- Landline: **to be confirmed**
- Satellite phone: **to be confirmed**

Radio:

- ABC: 720 AM

Internet Sites:

- Preparing your Property – [DFES Link](#)
- Emergency WA – [www.emergency.wa.gov.au](http://www.emergency.wa.gov.au)
- DFES on Facebook - [www.facebook.com/dfeswa](http://www.facebook.com/dfeswa)
- DFES on Twitter - [www.twitter.com/dfes\\_wa](http://www.twitter.com/dfes_wa)
- National Bushfires app - [www.bushfireblankets.com/bushfire-app.html](http://www.bushfireblankets.com/bushfire-app.html)

## 3. Contacts

Fire reporting	000
Warden	<b>to be confirmed</b>   <b>to be confirmed</b>
DFES (Emergency Information)	13 33 37
SES (Emergency Assistance)	132 500
SES (Local)	9841 2400
WA Police	000
Police Station (Local – Albany)	9892 9300
WA Ambulance	000
Ambulance (Local)	9841 4212
Albany Hospital	9892 2222
Bureau of Meteorology (BoM) Recorded Information	1300 659 213

## 4. Evacuation preparedness

- All staff must be briefed during the Bushfire Danger Period (November-April) on the bushfire evacuation procedures with updated advice provided when the fire danger exceeds Very High or a fire warning is issued by Emergency Services (currently DFES) for the locality.
- This Evacuation Plan is to be displayed in all buildings around the Motorsport Park.

### BUSHFIRE PREPAREDNESS MATRIX

ACTION	LOW/MOD	HIGH	VERY HIGH	SEVERE	EXTREME	CATASTROPHIC
Warden to perform daily check (after 4pm) on the DFES and BoM websites to determine the Fire Danger Rating (FDR) for the following day and weekly prediction. Update staff and parents if there is a likelihood of the site being closed to due to Catastrophic Fire Danger Rating.						
Warden to monitor Emergency WA / or DFES website or ABC Radio or 'National Bushfires' app for fire incidents		Min. 1pm	Min. 1pm, 3pm	Min. 9am, 11am, 1pm, 3pm (or more frequently if fire event in locality)	Facility to be closed	Facility to be closed
Complete building preparedness checks			By 10am	By 8am		

## 5. Evacuation triggers

A decision to evacuate off-site is to be determined by:

- Instructions from Police, DFES, other Emergency Services, the Warden or the manager of the Motorsport Park.
- the Bushfire Evacuation Matrix (overleaf) or public bushfire warnings in conjunction with confirmation from DFES / Emergency Services.

Minimum time for evacuation is **to be confirmed**. To travel from the Motorsport Park to Albany, will take approximately 25 minutes.

### SEE EVACUATION DECISION MATRIX (OVERLEAF)

## 6. Evacuation Procedures

Every bushfire attack is different. The response to each must therefore be specific and be in response to bushfire warnings

Bushfire Warning Notification

- **Emergency WA website, SMS or the 'National Bushfires' App (for smartphones)** will provide initial notification of a fire and evacuation instructions.
- DFES, Police (or other incident personnel) may also attempt to notify the Motorsport Park.
- The Motorsport Park is also responsible to ensure any visitors are aware of a fire warning has been issued

Off-site refuge

- Off-site evacuation is always safer, provided adequate time is available to complete it safely. Confirm with Lead Agency (DFES or other Emergency Service) prior to evacuating and follow all directions.
- Off-site evacuation is to occur by buses to the nominated off-site refuge at **to be confirmed**.
- Evacuation well in advance of a fire's predicted arrival time is safer than remaining on-site.

On-site safer Location

- Evacuating to the nominated Safer Location may be required where it is not possible to evacuate to the off-site refuge.
- The on-site safer location are the club rooms adjacent to the motorbike track or to the open space adjacent to the main race track.
- A building (site location to be determined later) ensuring that the building is subject to a radiant heat flux of <10 kW/m<sup>2</sup>, is accessible by emergency service vehicles and has an approximate floor space of 375 m<sup>2</sup> for 500 people (assuming 0.75m<sup>2</sup> per person).
- The open space on-site safer location is within an area that is subject to a radiant heat flux of <2 kW/m<sup>2</sup>. This area is 10,634 m<sup>2</sup> which is sufficient to accommodate up to 10,000 people (maximum amount of people for a full event, assuming a minimum of 1m<sup>2</sup> per person).

## 7. Staff welfare during shelter in offsite refuge and on-site safer location

- The Facility Manager/Warden and Accredited First Aid Officers nominated will be in charge of spectator/ users welfare. Serious medical needs will require emergency response via 000.

## 8. Building Preparedness Checks

- Include such tasks as ensuring reduced fuel loads around buildings, routine maintenance is up to date including cleaning of gutters, fire breaks are in place, and static water supply is available.
- Checklists on tasks for completion before the fire season is provided within the schools College Bushfire Plan
- Detailed information and checklists are available on the DFES website including the *'The Homeowner's Bushfire Survival Manual'* and the *'Prepare Act Survive Booklet'* published by DFES:  
[https://www.dfes.wa.gov.au/safetyinformation/fire/bushfire/BushfireManualsandGuides/DFES\\_Bushfire-Homeowners\\_Survival\\_Manual.pdf](https://www.dfes.wa.gov.au/safetyinformation/fire/bushfire/BushfireManualsandGuides/DFES_Bushfire-Homeowners_Survival_Manual.pdf)  
<https://www.dfes.wa.gov.au/safetyinformation/fire/bushfire/BushfireManualsandGuides/DFES-Fire-Chat-Bushfire-Preparedness-Toolkit.pdf>

## 9. Notes on Fire Danger Rating and Total Fire Ban Declaration

### REPORT ITEM DIS245 REFER



- The Fire Danger Rating (FDR) gives an indication of the potential consequences of a fire, if a fire was to start.
- The rating is based on predicted conditions such as the forecast temperature, humidity, wind and dryness of the landscape.
- The higher the fire danger rating, the more dangerous the conditions.
- During the Bushfire Danger Period (1<sup>st</sup> November – 30<sup>th</sup> April) the forecast FDR for the following day is typically released around 4pm but can be changed as weather conditions unfold.
- Both predicted and current FDR are available from the DFES and BoM websites.

A 'Total Fire Ban' (known as TFB) is a separate declaration (i.e. a particular day or part thereof may have both 'Severe' FDR and a TFB).

## 10. What to do if caught in a bushfire

The following provide current guidelines\* on what to do if caught in a bushfire in a building or on foot. Each requires a different response involving critical decisions for your survival.

What to do if caught in a bushfire IN A BUILDING

Outside your building

- Ensure you drink plenty of water so you do not dehydrate
- Block your downpipes, (a sock full of sand/soil will help) and fill your gutters with water
- Move flammable items such as outdoor furniture, doormats,
- Gas cylinders should have the valve facing away from the building
- Do not stand on the roof with a hose. In bush fires, often more people are injured by falling from roofs than suffering burns
- Patrol the outside of the building, putting out any embers and spot fires that may start. An ember or spark can reach your home hours before the fire front arrives
- Just before the fire arrives, wet down timber decks and gardens close to the building
- Move any firefighting equipment to a place where it will not get burnt.

Inside your building

- Continue to drink water so you do not dehydrate
- Close doors, windows, vents, blinds and curtains to prevent flames, smoke and embers from entering
- Put tape across the inside of the windows so they stay in place if they break
- Shut off gas at the meter or bottle
- Move furniture away from the windows to prevent any embers that enter the building from igniting
- Fill sinks, bath and buckets with water for putting out any fires that may start inside
- Place wet towels around window and door edges to stop smoke and embers from entering
- Put a ladder next to the access hole to the roof space so you can check for spot fires.

During the fire

- When the fire arrives, go inside to protect you from the radiant heat
- Ensure you have torches ready as it is likely to become completely dark and you will not be able to see
- Patrol the inside of the building, including the roof space for sparks and embers
- Remember – if your life is at risk, call Triple Zero (000) immediately.

After the fire

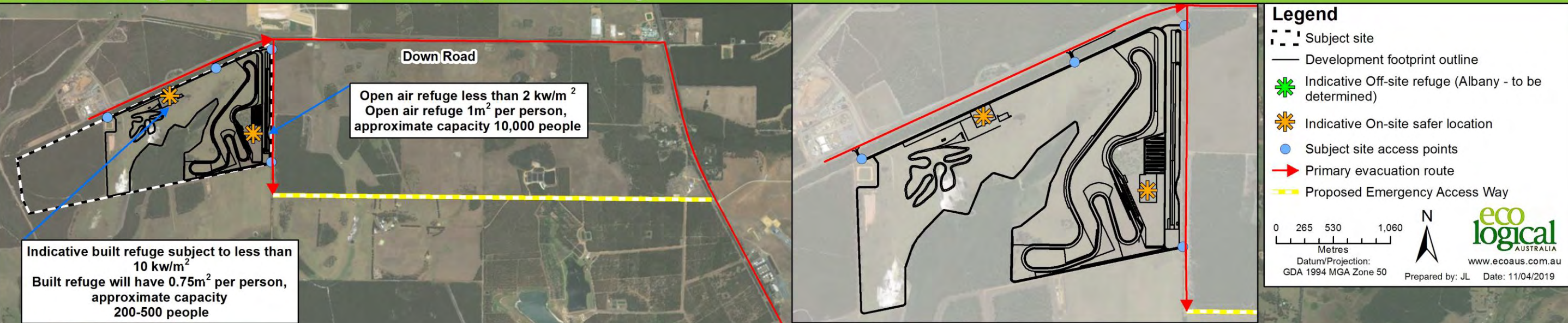
- Once the fire has passed, you may need to patrol the property for hours. Go outside and put out any part of the building which is alight.
- An ember or spark from a fire can impact on a house many hours after the main fire front has passed and small spot fires can quickly get out of control.

What to do if caught in a bushfire ON FOOT/ IN VEHICLE

- Try to move on to bare or burnt ground at least 100 m from where fire is likely to burn, if this is not feasible find the largest bare or burnt ground possible
- Do not run uphill or away from the fire unless you know a safe refuge is able to be reached before the fire arrives. Try and position yourself downhill of the on-coming fire.
- Move across the slope out of the path of the fire front and work your way downslope towards the back of the fire or onto burnt ground.
- Do not attempt to run through flames unless you can see clearly behind them. This generally means that the flames are less than 1 metre high and less than 1 to 2 metres deep at the back or on the flanks of the fire.
- Lulls in the fire often result in the flames in these parts being low enough to step or run through to the burnt ground beyond.
- When conditions become severe use every possible means to protect yourself from radiation. On bare ground cover yourself, use wheel ruts, depressions, large rocks or logs to give protection.
- Take refuge in ponds, running streams or culverts, but behind solid objects such a rock
- Remain calm and do not run blindly from the fire. If you become exhausted you are much more prone to heat stroke and you may easily overlook a safe refuge. Consider an alternative course of action.

\* adapted from NSW RFS bushfire training modules.

**Bushfire Emergency Evacuation Plan - Motorsport Park Albany**



RISK STATUS	LOW/ MOD	HIGH	VERY HIGH	SEVERE	EXTREME	CATASTROPHIC
Fire predicted to impact site or egress				If fire is greater than <b>to be confirmed</b> km north-east counter clockwise to north-west of the subject site then: • evacuate to the <b>xx – to be confirmed</b> if safe (seek advice from DFES / Emergency Services) or if instructed to do so*1 • For fires in all other directions from the subject site confirm evacuation plan with DFES / Emergency Services or if instructed to do so*1	Close Motorsport Park for forecast period  Confirm with DFES / Emergency Services to evacuate if FDR changes during the day	
Fire predicted to impact site within <b>to be confirmed</b> *2	Allow a minimum of <b>xx hours</b> to evacuate the Motorsport Park.					
Fires exist in region but no risk to site	• <b>Seek refuge in on-site Safer Location</b> *3 • <b>Contact DFES / Emergency Services for advice</b> • <b>Do not evacuate unless advised by DFES / Emergency Services</b> • <b>Allow minimum of xx hours to evacuate the Motorsport Park</b>					
No fires	• <b>Obtain emergency service advice on whether to close the Motorsport Park and evacuate staff and spectators off-site.</b>					
Event scheduling	Clear triggers & guidelines for scheduling events or cancelling based on such factors as Fire Danger Rating (FDR), evening events during certain times of the year, 'Total Fire Ban' days and "Restricted vehicle movement days" (harvest bans).  To be developed at a later stage					

\*1 Evacuation safety is dependent on factors such as Fire Danger Rating, wind strength and direction, and the proximity and direction of the fire. Follow advice of emergency service broadcast fire warnings or telephone them. Do not evacuate to **xx – to be confirmed** unless this can be completed many hours before the potential fire arrival. Advice from DFES or other Emergency Service should be sought before evacuating.  
 \*2 NB: time to relocate is the estimated time for all staff and users access and drive to **xx – to be confirmed** PLUS adding extra precautionary time based upon the FDR. Check with emergency service warnings before evacuating. Pre-emptive closure of the Motorsport Park should occur the day before where forecasted FDR is Catastrophic (i.e. no later than 4.30 pm the day before a planned closure). Refer to BMP for justification of triggers.  
 \*3 Relocate – ONLY if safe to do so e.g. flames are not visible or nearby dense smoke is not blown directly toward you. If you risk being caught on foot or in a car prior to reaching the on-site refuge, stay inside the classroom or building.

**Appendix 9**

**ELA Method 2 BAL Assessment**



**NBC Bushfire Attack Assessment Report V2.1**

AS3959 (2009) Appendix B - Detailed Method 2

Printed: 11/04/2019 Assessment Date: 27/02/2019



Site Street Address: Albany Motorsport Complex, Albany  
 Assessor: Bruce Horkings; Ecological Australia  
 Local Government Area: WA Alpine Area: No

**Equations Used**

Transmissivity: Fuss and Hammins, 2002  
 Flame Length: RFS PBP, 2001  
 Rate of Fire Spread: Noble et al., 1980  
 Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005  
 Peak Elevation of Receiver: Tan et al., 2005  
 Peak Flame Angle: Tan et al., 2005

Run Description: Plot 10 - 10 kW/m2

**Vegetation Information**

Vegetation Type:	Woodland	Vegetation Group:	Forest and Woodland
Vegetation Slope:	5 Degrees	Vegetation Slope Type:	Downslope
Surface Fuel Load(t/ha):	15	Overall Fuel Load(t/ha):	25

**Site Information**

Site Slope:	0 Degrees	Site Slope Type:	Level
Elevation of Receiver(m):	Default	APZ/Separation(m):	56

**Fire Inputs**

Veg./Flame Width(m):	100	Flame Temp(K)	1200
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**Calculation Parameters**

Flame Emissivity:	95	Relative Humidity(%):	25
Heat of Combustion(kJ/kg)	18600	Ambient Temp(K):	308
Moisture Factor:	5	FDI:	80

**Program Outputs**

Category of Attack:	LOW	Peak Elevation of Receiver(m):	7.93
Level of Construction:	BAL 12.5	Fire Intensity(kW/m):	26263
Radiant Heat(kW/m2):	9.85	Flame Angle (degrees):	78
Flame Length(m):	16.22	Maximum View Factor:	0.114
Rate Of Spread (km/h):	2.03	Inner Protection Area(m):	56
Transmissivity:	0.773	Outer Protection Area(m):	0

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**Run Description:** Plot 10 - 2 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Woodland	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	5 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	15	<b>Overall Fuel Load(t/ha):</b>	25

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**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	138

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

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**Program Outputs**

<b>Category of Attack:</b>	VERY LOW	<b>Peak Elevation of Receiver(m):</b>	8.06
<b>Level of Construction:</b>	BAL LOW	<b>Fire Intensity(kW/m):</b>	26263
<b>Radiant Heat(kW/m2):</b>	1.99	<b>Flame Angle (degrees):</b>	84
<b>Flame Length(m):</b>	16.22	<b>Maximum View Factor:</b>	0.025
<b>Rate Of Spread (km/h):</b>	2.03	<b>Inner Protection Area(m):</b>	138
<b>Transmissivity:</b>	0.711	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 11 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Woodland	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	10 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	15	<b>Overall Fuel Load(t/ha):</b>	25

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**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	67

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

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**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	10.51
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	37083
<b>Radiant Heat(kW/m2):</b>	9.96	<b>Flame Angle (degrees):</b>	76
<b>Flame Length(m):</b>	21.66	<b>Maximum View Factor:</b>	0.117
<b>Rate Of Spread (km/h):</b>	2.87	<b>Inner Protection Area(m):</b>	67
<b>Transmissivity:</b>	0.761	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 11 - 2 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Woodland	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	10 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	15	<b>Overall Fuel Load(t/ha):</b>	25

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**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	160

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

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**Program Outputs**

<b>Category of Attack:</b>	VERY LOW	<b>Peak Elevation of Receiver(m):</b>	10.75
<b>Level of Construction:</b>	BAL LOW	<b>Fire Intensity(kW/m):</b>	37083
<b>Radiant Heat(kW/m2):</b>	1.98	<b>Flame Angle (degrees):</b>	83
<b>Flame Length(m):</b>	21.66	<b>Maximum View Factor:</b>	0.025
<b>Rate Of Spread (km/h):</b>	2.87	<b>Inner Protection Area(m):</b>	160
<b>Transmissivity:</b>	0.697	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 12 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Shrubland/Short Heath	<b>Vegetation Group:</b>	Shrub & Heath
<b>Vegetation Slope:</b>	5 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	15	<b>Overall Fuel Load(t/ha):</b>	15

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	37

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

---

**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	4.48
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	31357
<b>Radiant Heat(kW/m2):</b>	9.89	<b>Flame Angle (degrees):</b>	81
<b>Flame Length(m):</b>	9.07	<b>Maximum View Factor:</b>	0.111
<b>Rate Of Spread (km/h):</b>	4.05	<b>Inner Protection Area(m):</b>	37
<b>Transmissivity:</b>	0.801	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 12 - 2 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Shrubland/Short Heath	<b>Vegetation Group:</b>	Shrub & Heath
<b>Vegetation Slope:</b>	5 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	15	<b>Overall Fuel Load(t/ha):</b>	15

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	102

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

---

**Program Outputs**

<b>Category of Attack:</b>	VERY LOW	<b>Peak Elevation of Receiver(m):</b>	4.52
<b>Level of Construction:</b>	BAL LOW	<b>Fire Intensity(kW/m):</b>	31357
<b>Radiant Heat(kW/m2):</b>	1.98	<b>Flame Angle (degrees):</b>	86
<b>Flame Length(m):</b>	9.07	<b>Maximum View Factor:</b>	0.024
<b>Rate Of Spread (km/h):</b>	4.05	<b>Inner Protection Area(m):</b>	102
<b>Transmissivity:</b>	0.733	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 13 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Scrub/Tall Heath	<b>Vegetation Group:</b>	Shrub & Heath
<b>Vegetation Slope:</b>	5 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	25	<b>Overall Fuel Load(t/ha):</b>	25

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**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	50

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

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**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	6.69
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	75988
<b>Radiant Heat(kW/m2):</b>	9.79	<b>Flame Angle (degrees):</b>	79
<b>Flame Length(m):</b>	13.63	<b>Maximum View Factor:</b>	0.112
<b>Rate Of Spread (km/h):</b>	5.88	<b>Inner Protection Area(m):</b>	50
<b>Transmissivity:</b>	0.78	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 13 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Scrub/Tall Heath	<b>Vegetation Group:</b>	Shrub & Heath
<b>Vegetation Slope:</b>	5 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	25	<b>Overall Fuel Load(t/ha):</b>	25

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**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	126

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

---

**Program Outputs**

<b>Category of Attack:</b>	VERY LOW	<b>Peak Elevation of Receiver(m):</b>	6.78
<b>Level of Construction:</b>	BAL LOW	<b>Fire Intensity(kW/m):</b>	75988
<b>Radiant Heat(kW/m2):</b>	2	<b>Flame Angle (degrees):</b>	84
<b>Flame Length(m):</b>	13.63	<b>Maximum View Factor:</b>	0.025
<b>Rate Of Spread (km/h):</b>	5.88	<b>Inner Protection Area(m):</b>	126
<b>Transmissivity:</b>	0.718	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 14 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Scrub/Tall Heath	<b>Vegetation Group:</b>	Shrub & Heath
<b>Vegetation Slope:</b>	0 Degrees	<b>Vegetation Slope Type:</b>	Level
<b>Surface Fuel Load(t/ha):</b>	25	<b>Overall Fuel Load(t/ha):</b>	25

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	45

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

---

**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	5.73
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	53816
<b>Radiant Heat(kW/m2):</b>	9.71	<b>Flame Angle (degrees):</b>	80
<b>Flame Length(m):</b>	11.63	<b>Maximum View Factor:</b>	0.11
<b>Rate Of Spread (km/h):</b>	4.17	<b>Inner Protection Area(m):</b>	45
<b>Transmissivity:</b>	0.787	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 14 - 2 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Scrub/Tall Heath	<b>Vegetation Group:</b>	Shrub & Heath
<b>Vegetation Slope:</b>	0 Degrees	<b>Vegetation Slope Type:</b>	Level
<b>Surface Fuel Load(t/ha):</b>	25	<b>Overall Fuel Load(t/ha):</b>	25

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	116

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

---

**Program Outputs**

<b>Category of Attack:</b>	VERY LOW	<b>Peak Elevation of Receiver(m):</b>	5.79
<b>Level of Construction:</b>	BAL LOW	<b>Fire Intensity(kW/m):</b>	53816
<b>Radiant Heat(kW/m2):</b>	1.99	<b>Flame Angle (degrees):</b>	85
<b>Flame Length(m):</b>	11.63	<b>Maximum View Factor:</b>	0.025
<b>Rate Of Spread (km/h):</b>	4.17	<b>Inner Protection Area(m):</b>	116
<b>Transmissivity:</b>	0.724	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 3 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Forest	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	0 Degrees	<b>Vegetation Slope Type:</b>	Level
<b>Surface Fuel Load(t/ha):</b>	25	<b>Overall Fuel Load(t/ha):</b>	35

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	64

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

---

**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	9.65
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	43400
<b>Radiant Heat(kW/m2):</b>	9.78	<b>Flame Angle (degrees):</b>	77
<b>Flame Length(m):</b>	19.8	<b>Maximum View Factor:</b>	0.115
<b>Rate Of Spread (km/h):</b>	2.4	<b>Inner Protection Area(m):</b>	47
<b>Transmissivity:</b>	0.764	<b>Outer Protection Area(m):</b>	17

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**Run Description:** Plot 3 - 2 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Forest	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	0 Degrees	<b>Vegetation Slope Type:</b>	Level
<b>Surface Fuel Load(t/ha):</b>	25	<b>Overall Fuel Load(t/ha):</b>	35

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	153

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

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**Program Outputs**

<b>Category of Attack:</b>	VERY LOW	<b>Peak Elevation of Receiver(m):</b>	9.83
<b>Level of Construction:</b>	BAL LOW	<b>Fire Intensity(kW/m):</b>	43400
<b>Radiant Heat(kW/m2):</b>	1.98	<b>Flame Angle (degrees):</b>	83
<b>Flame Length(m):</b>	19.8	<b>Maximum View Factor:</b>	0.025
<b>Rate Of Spread (km/h):</b>	2.4	<b>Inner Protection Area(m):</b>	120
<b>Transmissivity:</b>	0.702	<b>Outer Protection Area(m):</b>	33

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**Run Description:** Plot 4 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Forest	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	5 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	25	<b>Overall Fuel Load(t/ha):</b>	35

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**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	76

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

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**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	12.61
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	61280
<b>Radiant Heat(kW/m2):</b>	9.83	<b>Flame Angle (degrees):</b>	74
<b>Flame Length(m):</b>	26.23	<b>Maximum View Factor:</b>	0.117
<b>Rate Of Spread (km/h):</b>	3.39	<b>Inner Protection Area(m):</b>	56
<b>Transmissivity:</b>	0.754	<b>Outer Protection Area(m):</b>	20

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**Run Description:** Plot 4 - 2 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Forest	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	5 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	25	<b>Overall Fuel Load(t/ha):</b>	35

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**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	175

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

---

**Program Outputs**

<b>Category of Attack:</b>	VERY LOW	<b>Peak Elevation of Receiver(m):</b>	12.99
<b>Level of Construction:</b>	BAL LOW	<b>Fire Intensity(kW/m):</b>	61280
<b>Radiant Heat(kW/m2):</b>	2	<b>Flame Angle (degrees):</b>	82
<b>Flame Length(m):</b>	26.23	<b>Maximum View Factor:</b>	0.026
<b>Rate Of Spread (km/h):</b>	3.39	<b>Inner Protection Area(m):</b>	138
<b>Transmissivity:</b>	0.689	<b>Outer Protection Area(m):</b>	37

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**Run Description:** Plot 5 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Forest	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	15 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	25	<b>Overall Fuel Load(t/ha):</b>	35

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	108

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

---

**Program Outputs**

<b>Category of Attack:</b>	VERY LOW	<b>Peak Elevation of Receiver(m):</b>	22.31
<b>Level of Construction:</b>	BAL LOW	<b>Fire Intensity(kW/m):</b>	122176
<b>Radiant Heat(kW/m2):</b>	9.93	<b>Flame Angle (degrees):</b>	68
<b>Flame Length(m):</b>	48.12	<b>Maximum View Factor:</b>	0.121
<b>Rate Of Spread (km/h):</b>	6.76	<b>Inner Protection Area(m):</b>	81
<b>Transmissivity:</b>	0.735	<b>Outer Protection Area(m):</b>	27

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**Run Description:** Plot 5 - 2 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Forest	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	15 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	25	<b>Overall Fuel Load(t/ha):</b>	35

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**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	240

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

---

**Program Outputs**

<b>Category of Attack:</b>	VERY LOW	<b>Peak Elevation of Receiver(m):</b>	23.62
<b>Level of Construction:</b>	BAL LOW	<b>Fire Intensity(kW/m):</b>	122176
<b>Radiant Heat(kW/m2):</b>	1.99	<b>Flame Angle (degrees):</b>	79
<b>Flame Length(m):</b>	48.12	<b>Maximum View Factor:</b>	0.026
<b>Rate Of Spread (km/h):</b>	6.76	<b>Inner Protection Area(m):</b>	186
<b>Transmissivity:</b>	0.681	<b>Outer Protection Area(m):</b>	54

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**Run Description:** Plot 6 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Grassland	<b>Vegetation Group:</b>	Grassland
<b>Vegetation Slope:</b>	10 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	4.5	<b>Overall Fuel Load(t/ha):</b>	4.5

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	39

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	110

---

**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	4.79
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	66286
<b>Radiant Heat(kW/m2):</b>	9.86	<b>Flame Angle (degrees):</b>	81
<b>Flame Length(m):</b>	9.7	<b>Maximum View Factor:</b>	0.111
<b>Rate Of Spread (km/h):</b>	28.51	<b>Inner Protection Area(m):</b>	39
<b>Transmissivity:</b>	0.797	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 6 - 2 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Grassland	<b>Vegetation Group:</b>	Grassland
<b>Vegetation Slope:</b>	10 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	4.5	<b>Overall Fuel Load(t/ha):</b>	4.5

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	105

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	110

---

**Program Outputs**

<b>Category of Attack:</b>	VERY LOW	<b>Peak Elevation of Receiver(m):</b>	4.83
<b>Level of Construction:</b>	BAL LOW	<b>Fire Intensity(kW/m):</b>	66286
<b>Radiant Heat(kW/m2):</b>	2	<b>Flame Angle (degrees):</b>	85
<b>Flame Length(m):</b>	9.7	<b>Maximum View Factor:</b>	0.025
<b>Rate Of Spread (km/h):</b>	28.51	<b>Inner Protection Area(m):</b>	105
<b>Transmissivity:</b>	0.731	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 7 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Grassland	<b>Vegetation Group:</b>	Grassland
<b>Vegetation Slope:</b>	5 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	4.5	<b>Overall Fuel Load(t/ha):</b>	4.5

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	34

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	110

---

**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	4.04
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	46945
<b>Radiant Heat(kW/m2):</b>	9.94	<b>Flame Angle (degrees):</b>	82
<b>Flame Length(m):</b>	8.17	<b>Maximum View Factor:</b>	0.11
<b>Rate Of Spread (km/h):</b>	20.19	<b>Inner Protection Area(m):</b>	34
<b>Transmissivity:</b>	0.806	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 7 - 2 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Grassland	<b>Vegetation Group:</b>	Grassland
<b>Vegetation Slope:</b>	5 Degrees	<b>Vegetation Slope Type:</b>	Downslope
<b>Surface Fuel Load(t/ha):</b>	4.5	<b>Overall Fuel Load(t/ha):</b>	4.5

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	96

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	110

---

**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	4.07
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	46945
<b>Radiant Heat(kW/m2):</b>	1.99	<b>Flame Angle (degrees):</b>	86
<b>Flame Length(m):</b>	8.17	<b>Maximum View Factor:</b>	0.024
<b>Rate Of Spread (km/h):</b>	20.19	<b>Inner Protection Area(m):</b>	96
<b>Transmissivity:</b>	0.737	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 8 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Grassland	<b>Vegetation Group:</b>	Grassland
<b>Vegetation Slope:</b>	0 Degrees	<b>Vegetation Slope Type:</b>	Level
<b>Surface Fuel Load(t/ha):</b>	4.5	<b>Overall Fuel Load(t/ha):</b>	4.5

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	30

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	110

---

**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	3.4
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	33248
<b>Radiant Heat(kW/m2):</b>	9.79	<b>Flame Angle (degrees):</b>	82
<b>Flame Length(m):</b>	6.87	<b>Maximum View Factor:</b>	0.108
<b>Rate Of Spread (km/h):</b>	14.3	<b>Inner Protection Area(m):</b>	30
<b>Transmissivity:</b>	0.815	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 8 - 2 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Grassland	<b>Vegetation Group:</b>	Grassland
<b>Vegetation Slope:</b>	0 Degrees	<b>Vegetation Slope Type:</b>	Level
<b>Surface Fuel Load(t/ha):</b>	4.5	<b>Overall Fuel Load(t/ha):</b>	4.5

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	87

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	110

---

**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	3.43
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	33248
<b>Radiant Heat(kW/m2):</b>	1.99	<b>Flame Angle (degrees):</b>	86
<b>Flame Length(m):</b>	6.87	<b>Maximum View Factor:</b>	0.024
<b>Rate Of Spread (km/h):</b>	14.3	<b>Inner Protection Area(m):</b>	87
<b>Transmissivity:</b>	0.743	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 9 - 10 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Woodland	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	0 Degrees	<b>Vegetation Slope Type:</b>	Level
<b>Surface Fuel Load(t/ha):</b>	15	<b>Overall Fuel Load(t/ha):</b>	25

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**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	47

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

---

**Program Outputs**

<b>Category of Attack:</b>	LOW	<b>Peak Elevation of Receiver(m):</b>	6.09
<b>Level of Construction:</b>	BAL 12.5	<b>Fire Intensity(kW/m):</b>	18600
<b>Radiant Heat(kW/m2):</b>	9.7	<b>Flame Angle (degrees):</b>	80
<b>Flame Length(m):</b>	12.36	<b>Maximum View Factor:</b>	0.111
<b>Rate Of Spread (km/h):</b>	1.44	<b>Inner Protection Area(m):</b>	47
<b>Transmissivity:</b>	0.784	<b>Outer Protection Area(m):</b>	0

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**Run Description:** Plot 9 - 2 kW/m2

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**Vegetation Information**

<b>Vegetation Type:</b>	Woodland	<b>Vegetation Group:</b>	Forest and Woodland
<b>Vegetation Slope:</b>	0 Degrees	<b>Vegetation Slope Type:</b>	Level
<b>Surface Fuel Load(t/ha):</b>	15	<b>Overall Fuel Load(t/ha):</b>	25

---

**Site Information**

<b>Site Slope:</b>	0 Degrees	<b>Site Slope Type:</b>	Level
<b>Elevation of Receiver(m):</b>	Default	<b>APZ/Separation(m):</b>	120

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**Fire Inputs**

<b>Veg./Flame Width(m):</b>	100	<b>Flame Temp(K)</b>	1200
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**Calculation Parameters**

<b>Flame Emissivity:</b>	95	<b>Relative Humidity(%):</b>	25
<b>Heat of Combustion(kJ/kg)</b>	18600	<b>Ambient Temp(K):</b>	308
<b>Moisture Factor:</b>	5	<b>FDI:</b>	80

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**Program Outputs**

<b>Category of Attack:</b>	VERY LOW	<b>Peak Elevation of Receiver(m):</b>	6.16
<b>Level of Construction:</b>	BAL LOW	<b>Fire Intensity(kW/m):</b>	18600
<b>Radiant Heat(kW/m2):</b>	1.99	<b>Flame Angle (degrees):</b>	85
<b>Flame Length(m):</b>	12.36	<b>Maximum View Factor:</b>	0.025
<b>Rate Of Spread (km/h):</b>	1.44	<b>Inner Protection Area(m):</b>	120
<b>Transmissivity:</b>	0.722	<b>Outer Protection Area(m):</b>	0

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**Appendix 10**

**WAPC APZ standards to apply**

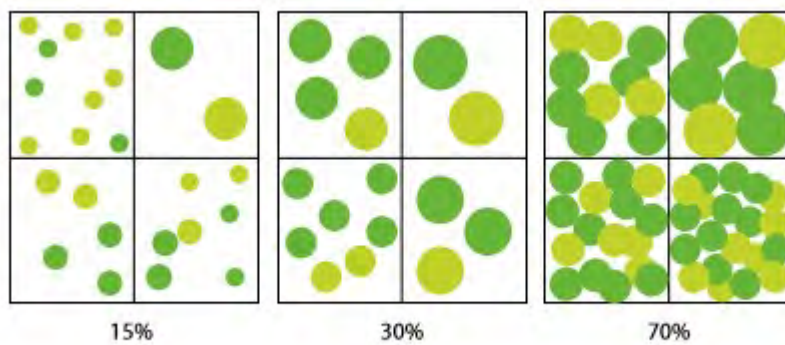
**Standards for an Asset Protection Zone (APZ) (WAPC, 2017)**

**Fences:** Within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

**Objects:** Within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.

**Fine Fuel load:** Combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.

**Trees (> 5 metres in height):** Trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy. See Figure 10 (WAPC Figure 16, Appendix 4) below.



**Figure 1 – Tree Canopy Cover**

(WAPC, 2017)

**Shrubs (0.5 metres to 5 metres in height):** Should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m<sup>2</sup> in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

**Ground covers (<0.5 metres in height):** Can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs. –

**Grass:** Should be managed to maintain a height of 100 millimetres or less.

**Appendix 11**

**ELA Peer Review**



28 March 2019

Our ref: 12360

To whom it may concern,

**Peer review of Bushfire Management Plan  
Albany Motorsport Park: Lot 5780 Down Road, Drome**

Eco Logical Australia (ELA) was engaged by Bio Diverse Solutions (BDS) to undertake a technical peer review of a Bushfire Management Plan (BMP) for the proposed development of the above-mentioned site.

ELA has not physically inspected the site, however, has reviewed data and photographs taken by BDS during their site assessments.

The technical peer review was undertaken by ELA Senior Bushfire Consultants Daniel Panickar (BPAD 37802) and Bruce Horkings (BPAD 29962). Bruce is a BPAD Level 3 accredited practitioner in NSW and has attended the relevant FPA workshop held in Sydney specifically for NSW based consultants undertaking BPAD Level 3 accredited works in WA.

BDS engaged ELA to undertake a technical peer review of the final Bushfire Management Plan (BMP), prepare a Bushfire Emergency Evacuation Plan (BEEP) and provide a letter documenting the completion of the review.

## PEER REVIEW

The peer review process began at the inception of the project with the provision of ongoing technical advice and guidance in the development of the report. The final version of the BMP (dated 12 April 2019) was assessed against Policy Measures 6.2 and 6.3 of *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7; WAPC December 2015) with consideration given to Policy measure 6.6, and is technically consistent with the identified requirements of SPP 3.7 and *Guidelines for Planning in Bushfire Prone Areas v 1.3* (the Guidelines; WAPC December 2017).

The proposed development meets the bushfire protection criteria of the Guidelines using Acceptable Solutions where possible. Compliance with the Acceptable Solutions for *Element 3: Vehicular Access* is not possible and as such, the BEEP prepared to support this development provides contingency actions in accordance with the requirements of the *Draft Position Statement: Tourism land uses within bushfire*

*prone areas* (WAPC, 2018). These contingencies include early closure of the site, off-site evacuation and as a last resort, refuge on site in a suitable building / open space.

ELA note there are a few minor typographical errors in the report, however these do not detract from the overall outcomes of the plan.

### BUSHFIRE EMERGENCY EVACUATION PLAN

The BEEP developed by ELA was produced in a usable poster style to be located at relevant locations in the site.

The aim of the BEEP is early, safe and timely evacuation of the site prior to bushfire events and no events are to be held on site during Catastrophic Fire Danger Rating (FDR) days. The BEEP has been prepared to support the proposed development will address on-site and off-site refuges, triggers for evacuation and roles and responsibilities for staff and stakeholders. As the proposed development progresses beyond the rezoning phase, the BEEP will be updated for each stage including further specific details.

As previously identified, the design of the site does not allow for alternative access and is a legacy issue. As a result of legacy issues of the surrounding public road network, these constraints are addressed by the BEEP providing contingency measures to address identified risks including:

- Clear triggers for off and onsite evacuation (to be updated to support future planning applications);
- Clear triggers & guidelines for scheduling events or cancelling based on such factors as Fire Danger Rating (FDR), evening events during certain times of the year, 'Total Fire Ban' days and "Restricted vehicle movement days" (harvest bans);
- An on-site refuge for use in an emergency (i.e. a building constructed to the requirements of a 'community refuge' as per the Australian Building Codes Board 'Design and Construction of Community Bushfire Refuges' that can accommodate the number of people using that part of the facility (i.e. 200-500 for a club event);
- The proposed building located within the site and position to limit radiant heat exposure to <10 kW/m<sup>2</sup> and constructed to BAL-29; and
- Open air refuge with the capacity for a large event (upto 10,000 approx.) located in area where radiant heat exposure is limited to <2 kW/m<sup>2</sup> and preferably shaded with non-combustible material.

This is compliant with the *WAPC Draft Position Statement: Tourism land uses within bushfire prone areas* (WAPC 2018). The BEEP will form part of the Emergency Management Plan for the site which will be developed prior to operation of the site.

## CONCLUSION

The peer review undertaken by ELA of the Bushfire Management Plan written by BDS (dated 13 April 2018) concludes that this report meets the technical requirements of SPP 3.7 and the Guidelines. Furthermore, the BMP incorporates a Bushfire Emergency Evacuation Plan developed by a suitably accredited Bushfire Planning Practitioner.

CV's of the ELA bushfire consultants involved in this project are included below.

Yours sincerely,



**Daniel Panickar**  
**Manager and Bushfire Lead - WA (BPAD 37802)**



**Bruce Horkings**  
**Senior Bushfire Consultant (BPAD 29962)**





**Daniel Panickar** MANAGER AND BUSHFIRE LEAD - WA

Daniel is an experienced environmental and bushfire consultant with over eight years' experience in the consulting industry. Initially trained as an ecologist and environmental planner, Daniel has gained invaluable experience in fire ecology, flora and fauna surveys and environmental approvals. Since being involved in the industry, Daniel's skills have diversified to include bushfire management planning and team management and he has held senior roles including lead ecologist and lead bushfire consultant. Daniel currently manages ELA's Western Australian operations.

Daniel also possesses well-developed project management skills and has managed over 50 land development projects throughout Western Australia and has been responsible for undertaking field investigations, managing sub-consultants and provision of advice regarding bushfire and environmental approvals.

Daniel has worked on over 500 bushfire management projects across Australia and is an accredited Level 2 Bushfire Planning and Design (BPAD) practitioner with experience in Bushfire Attack Level (BAL) assessments, preparation of Bushfire Management Plans, Bushfire Emergency Evacuation Plans, Bushfire Risk Assessments and providing expert advice at Joint Development Assessment Panel (JDAP) meetings and State Administrative Tribunal (SAT) hearings.

Daniel's experience in environmental approvals and bushfire planning, particularly in the land development and infrastructure sectors allow him to provide accurate, pragmatic advice regarding opportunities and constraints, and develop innovative solutions to facilitate development in potentially problematic areas. This experience has been acknowledged through Daniel's membership on the Fire Protection Association Australia (FPAA) WA Bushfire Working Group, National Environmental Law Association (NELA) WA State Committee and the Urban Development Institute of Australia (UDIA) Outlook Committee.

## QUALIFICATIONS

Bachelor of Science (Environmental Biology; Honours), Curtin University of Technology, 2011

Graduate Diploma in Bushfire Protection, Western Sydney University, in progress

Level 2 accredited Bushfire Planning and Design (BPAD) practitioner, 2016

## PUBLICATIONS

Panickar, D 2018, 'Bushfire protection and environmental management for mine sites in arid and semi-arid regions', *Goldfields Environmental Management Group, Kalgoorlie, 16-18 May*.

## PROJECT EXPERIENCE

### Land development

Daniel has been involved in over 100 urban development projects across WA, NSW and QLD. A few detailed examples are provided below, and some other key projects have been listed further to this.

*The Hales: Satterley Property Group:* Environmental project manager to ensure the project meets the requirements of all relevant environmental legislation whilst meeting project timeframes and yield objectives. Undertook and/or coordinated all environmental surveys within the development site (ecological and bushfire assessments, groundwater monitoring and contaminated sites investigations). Provided ongoing strategic environmental and bushfire management advice and prepared all required environmental approvals documentation including a native vegetation clearing permit application and referral to the Commonwealth Department of the Environment. Prepared the Bushfire Management Plan for the estate.

*Shorehaven: Peet Limited:* Led and coordinated all bushfire assessments within the development site. Provided ongoing strategic advice to reduce bushfire risk and maintain visual amenity and prepared/reviewed Bushfire Management Plans, Bushfire Attack Level Assessments and associated Native Vegetation Clearing permits to facilitate development. Assisted in negotiations with adjacent landowners to clear vegetation and reduce bushfire risk to the Shorehaven site.

*Sienna Wood: Stockland:* Undertook a bushfire hazard level assessment of the estate (including wetlands of conservation significance, revegetation areas and Aboriginal heritage areas). Provision of advice to the project team regarding redesigning road networks and landscaping areas (including natural streams and wetlands) to achieve a layout that was fully compliant with bushfire planning guidelines and State legislation while maintaining the integrity of the planning vision for the estate. The final Bushfire Management Plan prepared for the estate was endorsed by the Department of Fire and Emergency Services (DFES), the Department of Parks and Wildlife (Parks and Wildlife) and local government and approved for use.

*Redevelopment of St Vincent's Aged Care Facility: Catholic Homes Inc.:* Undertook a bushfire hazard level assessment, prepared a Bushfire Management and Evacuation Plan and coordinated geotechnical investigations. Site constraints compromised the ability to achieve a compliant bushfire management outcome and a strategy was developed whereby vegetation on neighbouring land would be cleared and landscaped to facilitate a compliant outcome. Organised meetings between the Western Australia Planning Commission, the project team and other relevant stakeholders to negotiate a favourable outcome. All stakeholders agreed with my proposed approach and following the preparation of the revised development design; the DA was lodged successfully.

*Rezoning support – 119 Hammond Road: Private land developer:* Managed and undertook an environmental opportunities and constraints analysis to inform proposed rezoning of the site. Facilitated environmental and bushfire planning approvals for the site which included undertaking a flora, vegetation and black cockatoo survey and preparation of a Bushfire Management Plan.

*Frenchman Bay Resort: Private land developer:* Developed a Bushfire Management Plan and Bushfire Emergency Evacuation Plan to support a resort in Frenchman Bay (an extreme bushfire risk area). Method 2 Bushfire Attack Level (BAL) assessments and performance-based bushfire management solutions were developed to facilitate development and ensure a safer outcome for future guests. The plans were approved by the City of Albany and Department of Fire and Emergency Services.

Some other key land development projects Daniel has been involved in as an environmental and bushfire consultant are:

- Butler North District Open Space, Butler;
- Baldivis District Open Space;
- Catalina Estate, Clarkson;
- Brightwood Estate, Baldivis;
- Flamewood Estate, Brabham;
- Mason Green Estate, Piara Waters;
- The Village at Wellard Estate, Wellard;
- Newhaven Estate, Piara Waters;
- Beenyup Grove Estate, Byford;
- Allara Estate, Eglinton;
- Burns Beach Estate, Burns Beach;
- Holland Park Estate, Piara Waters;
- Numerous BP and Caltex service stations across Western Australia;



- Chinatown Revitalisation Project, Broome;
- Glenmore Park/Mulgoa, Western Sydney;
- New Breeze Estate, Bardia (NSW).

## Department of Defence

Daniel has been involved in ecological surveys and the preparation of bushfire management reports for numerous Department of Defence bases across Australia. Some key projects are highlighted below. Daniel also has baseline security clearance from the Department of Defence.

*Preparation of bushfire construction advice (Campbell Barracks and RAAF Base Townsville):* Assessed proposed building upgrades, refurbishments and new structures at Campbell Barracks, Western Australia and RAAF Base Townsville, Queensland. All structures were assessed for bushfire risk and treatments were prescribed based on State and National guidelines as well as relevant construction standards.

*Preparation of Bushfire Management Plans for HMAS Stirling and Exmouth properties:* Project manager and author for a new Bushfire Risk Management Plan, Emergency Evacuation Plan and Operations Plan for the entirety of Defence's operations on Garden Island and Exmouth, Western Australia. The project involved close liaison with Defence, Department of Biodiversity Conservation and Attractions, Department of Fire and Emergency Services and local stakeholders. Risk workshops were organised and facilitated to discuss risks and responses prior to finalisation.

*Preparation of Bushfire Management Plans for RAAF Base Learmonth and Lancelin Defence Training Area:* Project manager and author for a new Bushfire Risk Management Plan, Emergency Evacuation Plan, Bushfire Prevention Plan and Operations Plan for the entirety of Defence's operations at Learmonth and Lancelin, Western Australia. State of the art fire spread modelling was also undertaken to identify impacts associated with Defence activities on the base and surrounding properties. The project involved close liaison with Defence, Department of Fire and Emergency Services and local stakeholders. Risk workshops were organised and facilitated to discuss risks and responses prior to finalisation.

*Preparation of Bushfire Management Plans for HMAS Albatross, Bhewerre Ridge and Beecroft Air Weapons Range properties:* Prepared bushfire risk management plans and strategies for these three Defence properties in Shoalhaven NSW. Developed Emergency Evacuation Plans for HMAS Albatross and the high-risk Bhewerre Ridge properties as part of the works package.

*Weed surveys for HMAS Stirling Garden Island:* Managed and coordinated weed surveys throughout Garden Island, Western Australia to inform annual weed control programs and identify new species of invasive plants on the naval base and surrounding island.



## Bruce Horkings SENIOR BUSHFIRE CONSULTANT

Bruce holds a Post Graduate Diploma in Bushfire Protection from the University of Western Sydney, and also both an Associate Degree in Forestry Management and Diploma of Conservation and Land Management from Melbourne University. Bruce has over 14 years' experience in the environmental and bushfire realm with a focus on bushfire consulting over the last 10 years in Western Australia, Victoria and New South Wales and is an accredited Level 3 Bushfire Planning and Design (BPAD) practitioner.

Work undertaken includes bushfire site assessments and production of reports including constraints & analysis, Bushfire Protection Assessments, Bushfire Management Plans, Evacuations Plans and acceptable and performance-based solutions in line with current state standards and Australian Standard AS 3959. Most recently he has been involved with complex projects involving detailed bushfire weather analysis, short fire run modelling and landscape based modelling using SPARK.

He has a good working knowledge of bushfire planning legislation in many states and territories across the country especially WA, NSW and Vic and specialises in complex assessments, bushfire modelling and the development of performance solution response. Bruce is experienced in bushfire site assessment and analysis, project management, tender preparation and assessment, and detailed technical analysis of building design and construction materials against AS 3959.

### QUALIFICATIONS

- Post Graduate Diploma of Bushfire Protection, University of Western Sydney (2013)
- Development and Building in Bushfire Prone Areas, UTS Centre for Local Government (2013)
- Associate Degree of Forestry Management, Melbourne University (2006)
- Diploma of Conservation and Land Management, Melbourne University (2004-2006)

### PROJECT EXPERIENCE

- Development of a detailed bushfire risk analysis at a landscape and local scale of built assets, critical infrastructure and research facilities for CSIRO in Canberra with a corresponding Bushfire Operations Plan to implement risk mitigation measures to enhance resilience from bushfire for the rural site and surrounding residential developments.
- Use and development of the landscape bushfire modelling tool SPARK developed by CSIRO for projects where thousands of bushfire scenarios are assessed.
- Creation of a Short Fire Run models (point ignition) to demonstrate bushfire behaviour as part of developing performance solutions where the standard fire models found in AS 3959 over predict this scenario.
- Development of performance based solutions to demonstrate compliance to various state based bushfire planning requirements.
- Completion of hundreds of bushfire assessments across the country.
- Assessment of Defence projects from Bushfire Management Plans to compliance with bushfire specifications detailed in the Manual of Fire Protection Engineering (MFPE) and state-based requirements.
- Analysis of building design and construction materials against AS 3959 for residential and non-residential buildings.



City of Albany  
Albany Motorsport Park  
Noise Assessment

September 2020

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- Appendix A - Glossary of noise terminology
- Appendix B – Monitoring results
- Appendix C – Example Noise Management Plan

## Glossary of acronyms and terms

4WD	Four wheel drive
ADR	Australian Design Rule
AMP	Albany Motorsport Park
AS	Australian Standard
ATV	All-terrain vehicle
BoM	Bureau of Meteorology
CadnaA	Computer Aided Noise Abatement software used for calculating predicted noise emissions
CAMS	Confederation of Australian Motor Sports
CEO	Chief Executive Officer
CONCAWE	Conservation of Clean Air and Water in Europe
DWER	Department of Water and Environmental Regulation
FIA	Fédération Internationalé de l'Automobile
FIM	Fédération Internationalé Motocyclisme
GHD	GHD Pty Ltd
GSMG	Great Southern Motorplex Group Inc.
IF	Influencing Factor
MA	Motorcycling Australia

Note: Refer to Appendix A for an explanation of the noise terminology used throughout this report.

# 1. Introduction

## 1.1 Project background

Participation in motorsports is a popular recreational activity for many Australians, including residents in Albany and the Great Southern region. By one estimate, motorsport is the fourth most watched sport in Australia, with over 150,000 participants across the country<sup>1</sup>. Anecdotally, motorsport in Albany and the surrounding areas is already known to be popular, with several well organised clubs, a national-level venue for speedway, a state-level venue for go-karts and widely recognised events such as the Albany Classic, Show 'n Shine and Race Wars at Albany Airport. However, some motorsport disciplines lack suitable facilities in the region. In particular, the closure of Albany Motorcycle Club's facility at Roberts Road in 2011 has meant that motocross and enduro motorcycle riders currently lack a permanent formalised facility to pursue their sport in the lower Great Southern region.

By their nature, motorsports are very capital intensive, requiring significant investment in equipment and facilities by participants, clubs and supporting organisations such as local and state governments. Recently, an independent proposal has been advanced by the Great Southern Motorplex Group Inc. (GSMG) to develop a multi-use Albany Motorsport Park (AMP) near the Mirambeena timber processing precinct on Down Road. This proposal aims to:

- Promote and facilitate multiple motorsports on a club and state level in Albany and the Great Southern region.
- Provide a safe environment and venue for multiple motorsports clubs (and other compatible sports, such as cycling).
- Provide a venue to promote and facilitate commercial driver education and training.
- Provide a safe environment for companies to test and tune their vehicles.
- Promote Albany and the Great Southern region by attracting participants and tourists.
- Boost the regional economy through increased visitors, funding and sponsorship for events.



## 1.2 Project description

The concept design for the Albany Motorsport Park has been developed by the not-for-profit Great Southern Motorplex Group (GSMG) and Roberts Gardiner Architects. The GSMG has undertaken significant research into the requirements for track licensing by the Confederation of Australian Motor Sport (CAMS) and the specifications of:

- Fédération Internationalé de l'Automobile (FIA)
- Fédération Internationalé Motocyclisme (FIM)
- Motorcycling Australia (MA)

The proposed AMP will consist of:

1. Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with CAMS' *Track Operator's Safety Guide*<sup>2</sup> and MA's *Track Guidelines*<sup>3</sup>.

<sup>1</sup> CAMS. (2014). *Economic contribution of the Australian motor sport industry*. Malvern East: Confederation of Australian Motor Sport.

<sup>2</sup> CAMS. (2012). *Track Operator's Safety Guide*. Malvern East: Confederation of Australian Motor Sports.

<sup>3</sup> MA. (2011). *Track Guidelines*. South Melbourne: Motorcycling Australia.



- To be licensed by CAMS for FIA Grade 2 and FIM Grade B (i.e. up to second-tier international motor racing).
- 2. A motocross circuit designed and constructed in association with MA guidelines.
- 3. An off-road four wheel drive (4WD) and all-terrain vehicle (ATV) training area

At full development, the AMP will also include associated facilities, such as:

- Toilets
- Manager's office
- Medical / first aid station
- Meeting / briefing room
- Kitchen / canteen
- Storage / grounds maintenance workshop
- Vehicle scrutineers' workshop
- Control tower
- Spectators viewing areas
- Grassed spectators' picnic area with shade and BBQs
- Competitors parking
- Spectators parking

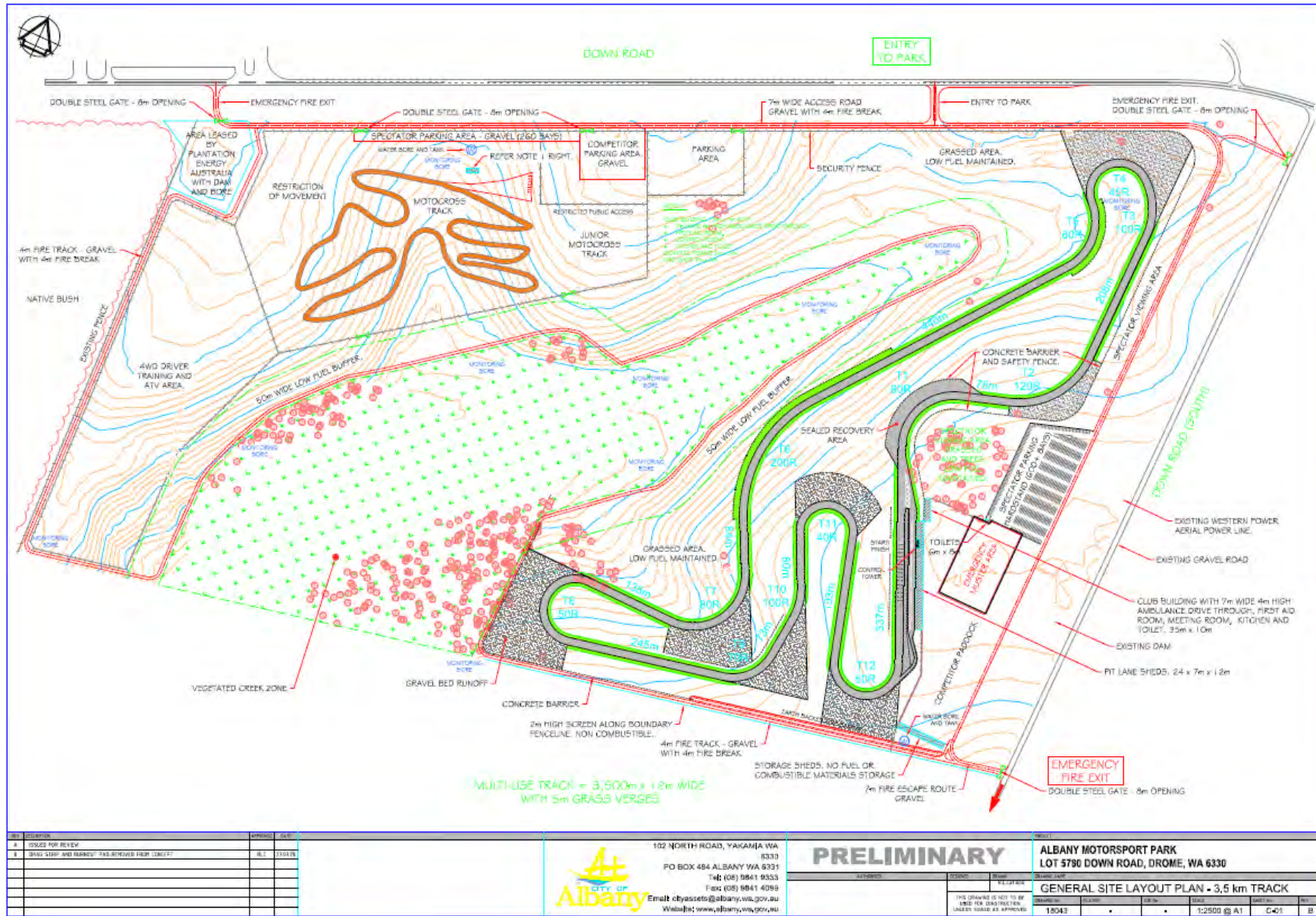


Figure 1-1 Albany Motorsport Park general site layout plan

## 1.3 Scope of work

GHD Pty Ltd (GHD) was commissioned by City of Albany to prepare planning approvals documentation for the proposed Albany Motorsport Park. As part of this commission, GHD was required to assess the potential acoustic impacts for the construction and operation of AMP.

This report assesses the potential noise and vibration impacts from construction and operation of AMP. The report's scope is to:

- Identify noise sensitive locations potentially impacted by the construction and operation of AMP.
- Describe the existing noise environment at noise sensitive locations potentially impacted by the construction and operation of AMP.
- Identify noise and vibration sources associated with construction and operation of AMP.
- Develop an environmental noise model to predict noise impacts from the operation of AMP using CadnaA noise modelling software, for a variety of proposed motorsport events.
- Assess the potential noise impacts on nearby noise sensitive receptors and compare the impacts with assigned noise levels.
- Identify opportunities for attenuation and management of noise impacts from AMP on noise sensitive areas should predicted noise impacts exceed the assigned noise levels.

## 1.4 Approach

The approach adopted by GHD for the assessment of noise impacts from the Albany Motorsport Park is summarised in the following points. Each point is described in detail in the subsequent sections of this report.

- Outline of AMP, including proposed events and anticipated operational noise sources (Section 2).
- Identification of the relevant noise criteria and guidelines applicable to AMP assessment (Section 3).
- Investigation of the existing noise environment, including identification of sensitive receptors, noise logging and assessment of noise monitoring to determine background and various time related noise levels (Section 4).
- Desktop assessment of construction noise and vibration (Section 5).
- Noise modelling for the assessment of predicted noise impacts during operation of AMP (Section 6).
- Recommend in-principle noise mitigation measures for construction and operational noise sources (Section 7).
- Conclusions drawn from the above assessment (Section 8, subject to the scope of works (Section 1.3) and Limitations (Section 1.5)).

## 1.5 Limitations

This report has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and the City of Albany as set out in Section 1.3 of this report.

## REPORT ITEM DIS245 REFERS

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD accepts no responsibility for the integrity of the software coding of the approved noise model (CadnaA) used.

GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of insects and other noise sources) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

## 2. Noise sources

### 2.1 Events and usage

Outlined in Table 2-1 is the expected usage of the Albany Motorsport Park, as conceptualised by the GSMG. For the purposes of sizing facilities and servicing infrastructure, a typical / frequent site attendance of 500 persons has been assumed (i.e. competitors, officials and spectators). This was determined through discussion with the GSMG on the nature and size of expected typical events.

Table 2-1 Indicative AMP event profile

Use	Level	Frequency	Duration	Entrants	Spectators
Driver training, schools, manufacturer testing		Week days	Day	50	0
Car test and tune day	Club	4 week days / month	Day	30	30
Car speed events	Club	1 weekend / month	Day	100	200 – 500
Car speed events	State	1 weekend / month	Day	100 – 200	200 – 1000
Car speed events	National	1 weekend / year	Day	200 – 300	2000 – 5000
Motorkhana	Club	1 day / month	Day	50	200
Supercars events	National	1 × 3 day weekend / year	Day	200 – 300	10,000 – 20,000
Bike test and tune day	Club	4 week days / month	Day	50	50
Bike speed events	Club	1 weekend / month	Day	100	200 – 500
Bike speed events – Champions Ride Day	State	1 weekend / month	Day	100	200 – 1000
Bike speed events	National	1 weekend / year	Day	200	1000 – 5000
Motocross events	Club	3 days / week training 4 single days / month	Day	100 – 200	200 – 400
Motocross events	State	1 weekend / month	Day	200 – 300	500 – 1000
Drifting day	Club	2 days / month	Day and evening	30	30
Drifting day	State	1 weekend / month	Day and evening	50	200 – 500

Duration of events:

- Typical day operation is 8:00 am to 6:00 pm, Monday to Saturday, 9:00 am to 6:00 pm on Sunday and public holidays. No evening (after 7:00 pm) or night (after 10:00 pm) events will be scheduled.
- No events occurring on the multi-use track and motocross track at the same time.
- The 4WD training area and multi-use track are expected to be in operation year round, taking advantage of Albany's cooler summer climate.
- In addition to driver and 4WD training, it is expected there will be motorsports club training sessions on every weekday. No evening sessions will be scheduled.
- At full development, it is likely there will be a motorsport event almost every weekend of the year. The cost of lighting for the motocross track and multi-use track is too high to contemplate evening events.

## 2.2 Noise sources

Noise sources from Albany Motorsport Park will be primarily from vehicles competing and preparing for various motorsport events, spectators and the public address system. A summary of each major noise source is presented below, with detailed information on assessment of each noise source provided in Section 6.

- Noise levels at residences due to the operation of the public address (PA) system will depend strongly on the design of the system, including number of speakers, directionality and orientation. With appropriate design, noise from this source should be controllable to less than 40 dBA at residences, and would generally not be audible.
- Driver training, schools and manufacturer testing, to be held during the day on the multi-use track – Vehicles will be road registered and comply with Australia Design Rule (ADR) requirements for vehicle noise emissions.
- Multi-use track events, such as car test and tune days, car speed events, supercars events, bike test and tune days, bike speed events, motorkhana events and drifting days, to be held during the day only. Noise impacts assessed based on vehicles competing in such events meeting the maximum CAMS noise level requirement of 95 dBA at a distance of 30 m.
- Motocross events, to be held during the day only on the motocross track. Noise impacts assessed based on noise levels from senior class motocross bikes.
- 4WD and all-terrain vehicle (ATV) off road training, to be held during the day only. Noise levels based on road registered 4WD vehicles.

It is important to note that no events are proposed to occur during the evening period (7:00 pm to 10:00 pm) and night period (between 10:00 pm to 7:00 am Monday to Saturday and 9:00 am on Sunday and public holidays).

## 3. Noise criteria

Environmental noise is managed through the *Environmental Protection (Noise) Regulations 1997* (the Regulations). The Regulations specify maximum allowable external noise levels at noise sensitive, commercial and industrial premises.

### 3.1 Construction noise

The Regulations state that for construction work carried out between 7.00 am and 7.00 pm on any day which is not a Sunday or public holiday:

- Construction work must be carried out in accordance with control of environmental noise practices set out in Section 6 of Australian Standard (AS) 2436-2010 *Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites*.
- The equipment used for construction must be the quietest reasonably available.
- The Chief Executive Officer (CEO) (of the Department of Water and Environmental Regulation (DWER)) may request that a noise management plan be submitted for the construction work at any time and complied with during construction activities.

For construction work done outside these hours:

- The construction work must be carried out in accordance with control of environmental noise practices set out in Section 6 of AS 2436-2010.
- The equipment used for construction must be the quietest reasonably available.
- The contractor must advise all nearby sensitive receptors likely to receive noise levels which fail to comply with the assigned levels under Regulation 8 (Table 3-1) of the work to be done at least 24 hours before it commences.
- The contractor must show that it was reasonably necessary for the work to be done out of hours.
- The contractor must submit to the CEO a noise management plan at least seven days prior to the commencement of out of hours work and the plan must be approved by the CEO before work commences. The plan must include details of:
  - Reasons for the construction work needing to be completed out of hours.
  - Details of activities which are likely to result in noise emissions that lead to exceedance of assigned levels.
  - Predictions of the noise emissions on the site.
  - Details of measures used to control noise (including vibration) emissions.
  - Procedures to be adopted for monitoring noise (including vibration) emissions.
  - Complaint response procedures to be adopted.

### 3.2 Operational noise

The Regulations (Regulation 7) define prescribed standards for noise emissions as follows:

*7. (1) Noise emitted from any premises or public place when received at other premises –*

*(a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind*

(b) *Must be free of –*

- (i) *Tonality (e.g. whining or droning)*
- (ii) *Impulsiveness (e.g. sirens)*
- (iii) *Modulation (e.g. banging or thumping)*

The assigned levels for noise sensitive premises (Regulation 8) are shown in Table 3-1.

Assigned noise levels (Table 3-1) are set differently for noise sensitive, commercial and industrial and utility premises. For noise sensitive premises an influencing factor (IF) is incorporated into the assigned noise levels. IF depends on land use zonings within circles of 100 m and 450 m radius from the noise receiver, including:

- Proportion of industrial land use zonings
- Proportion of commercial zonings
- Presence of major roads (more than 15,000 vehicles per day) or secondary (6,000 to 15,000 vehicles per day)

For this assessment, it has been assumed that IF will be zero (based on the absence of major and secondary roads). The resultant assigned levels used for this assessment of the AMP are shown in Table 3-3.

As motorsport events are scheduled to occur during the day period (refer Table 2-1), including Sundays after 9:00 am, the LA10 assigned level of 40 dBA day has been used in this assessment.

Table 3-1 Assigned noise levels (dBA)

Type of premise receiving noise	Time of day	Assigned level		
		LA 10	LA 1	LA Max
Noise sensitive <sup>[4]</sup>	7.00 am to 7.00 pm Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	9.00 am to 7.00 pm Sunday and public holidays (Sunday)	40 + IF	50 + IF	65 + IF
	7.00 pm to 10.00 pm all days (Evenings)	40 + IF	50 + IF	55 + IF
	10.00 pm on any day to 7.00 am Monday to Saturday and 9.00 am Sunday and public holidays (Night)	35 + IF	45 + IF	55 + IF
Noise sensitive <sup>[5]</sup>	All hours	60	75	80

IF = influencing factor

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

- a. The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission.
- b. The noise emission complies with the standard after the adjustments of Table 3-2 are made to the noise emission as measured at the point of reception.

<sup>4</sup> Highly sensitive areas include a building, or a part of a building, on the premises that is used for a noise sensitive purpose and any other part of the premises within 15 metres of that building or that part of the building.

<sup>5</sup> Any area other than highly sensitive area.



Table 3-2 Adjustment for intrusive or dominant noise characteristics<sup>[6]</sup>

Tonality <sup>[7]</sup>	Impulsiveness <sup>[7]</sup>	Modulation <sup>[7]</sup>
+5 dB	+5 dB	+5 dB

Table 3-3 Assigned noise levels (dBA) for AMP

Type of premise receiving noise	Time of day	Assigned level		
		L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Amax</sub>
Noise sensitive	7.00 am to 7.00 pm Monday to Saturday (Day)	45	55	65
	9.00 am to 7.00 pm Sunday and public holidays (Sunday)	40	50	65
	7.00 pm to 10.00 pm all days (Evenings)	40	50	55
	10.00 pm on any day to 7.00 am Monday to Saturday and 9.00 am Sunday and public holidays (Night)	35	45	55

### 3.3 Noise sensitive receptors

A number of residential receptors were identified in proximity to the AMP, as listed in Table 3-4 and shown in Figure 3-1.

Table 3-4 Receptor locations

ID	Location (MGA 94)		Distance from nearest AMP boundary (m)	Worst case wind direction (°)
	Easting (m)	Northing (m)		
SR01	569713	6133385	1150	310
SR02	567355	6132573	1120	10
SR03	564483	6133265	1930	80
SR04	565029	6134675	1920	100

<sup>6</sup> Adjustment applies where noise emission is not music.

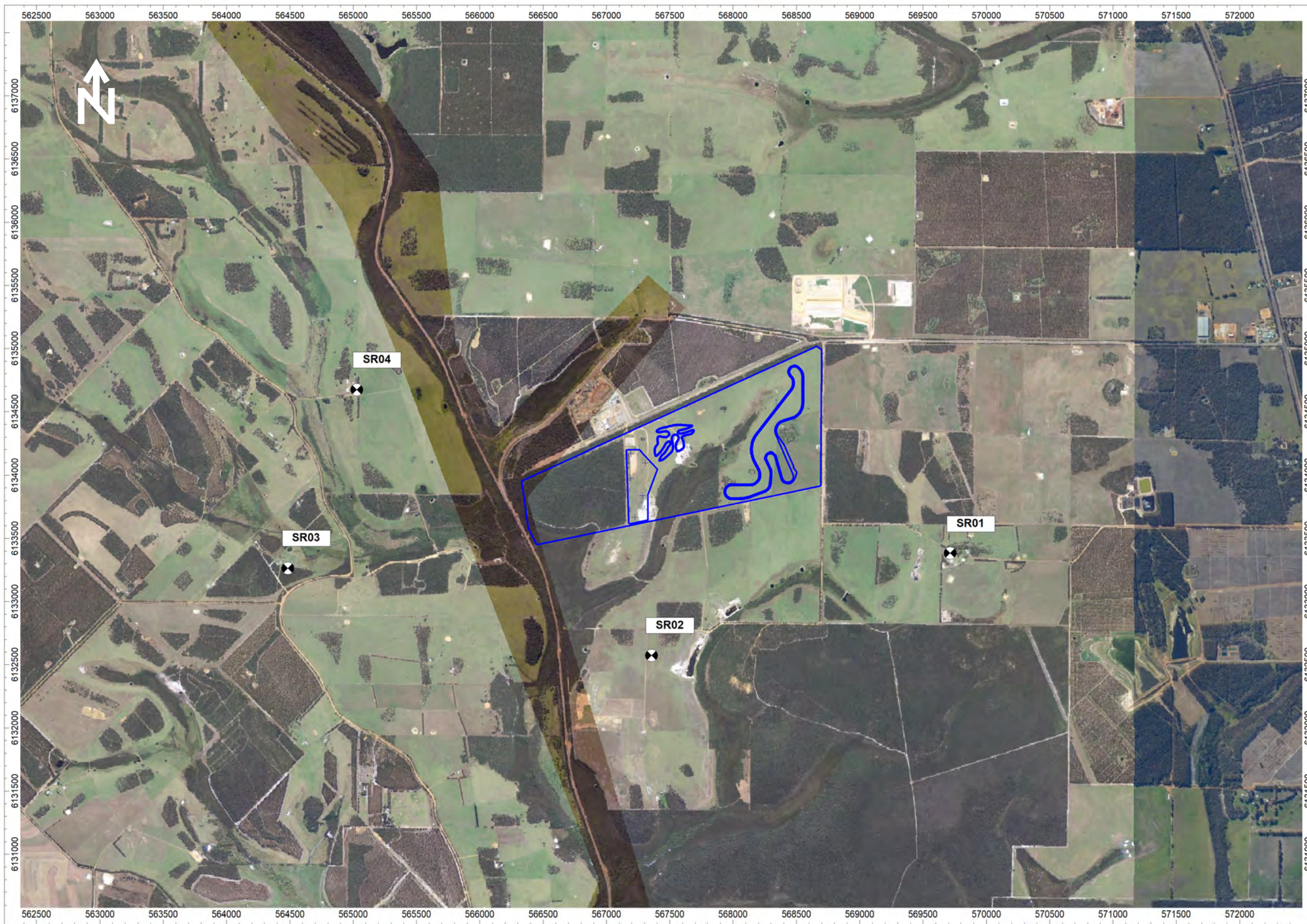
<sup>7</sup> Adjustments are cumulative to a maximum of 15 dB.

**PREDICTED NOISE LEVELS**

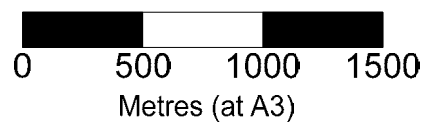


**LEGEND**

- Noise sensitive receptor
- Development area boundary



**SCALE**



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MAP PROJECTION: Universal Transverse Mercator  
HORIZONTAL DATUM: Geocentric Datum of Australia (GDA)  
GRID: Map Gnd of Australia 1994, Zone 50

DATE 10.08.2020	FILE LOCATION N:\AU\Albany WA\Projects\61137331\Technical\Noise
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**ALBANY MOTORSPORT PARK**

**NOISE SENSITIVE RECEPTOR LOCATIONS**

**FIGURE 3-1**

**Noise Assessment**



## 4. Noise monitoring



### 4.1 Noise monitoring locations

Noise monitoring was used to measure existing noise levels experienced by receptors located within the project area. Unattended noise monitoring was undertaken at three sites within the vicinity of the proposed Albany Motorsport Park.

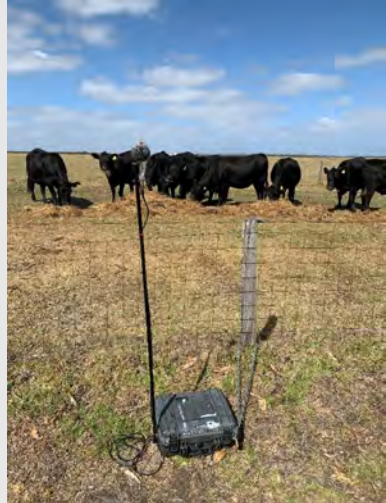
Monitoring locations were chosen so as to be located at existing residential locations which are considered will be most affected by the Project. The monitoring locations were also identified as being safe and secure for unattended equipment, minimising the risk of theft or vandalism. In each case, the loggers were located as close as possible to the most effected facade, and were located to not be influenced by pumps, air conditioner compressors etc.

A summary of relevant information such as site coordinates, distance to the nearest boundary of the site and a photo of noise logger setup is provided in Table 4-1. The three monitoring locations are shown in Figure 4-1.

Table 4-1 Noise monitoring location summary

Site ID	Address	Easting (m)	Northing (m)	Distance of logger to AMP (m)	Noise logger setup
Site A (SR 01)	35552 Albany Hwy, DROME WA 6330	569713	6133385	1150	
Site B (SR 02)	114 Down Rd South, DROME WA 6330	567355	6132573	1120	

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Site ID	Address	Easting (m)	Northing (m)	Distance of logger to AMP (m)	Noise logger setup
Site C (SR 04)	727 Marbelup North Rd, MARBELUP WA 6330	565029	6134675	1920	

### 4.2 Unattended noise monitoring methodology

Unattended noise logging for Sites A, B, and C was conducted from 5 to 14 March 2019. The instruments were programmed to accumulate environmental noise data ( $L_{Aeq}$ ,  $L_{Amin}$  and  $L_{Amax}$ ) continuously over sampling periods of 15-minutes for the entire monitoring period. Details of the noise logger setup are as follows:

- Model – Svan 955
- Type – Type 1
- Time interval – 15 minutes
- Frequency weighting – A weighted

Prior to deployment and at monitoring completion, the loggers were calibrated with a sound pressure level of 94 dB at 1 kHz using a Larson Davis CAL200 sound level calibrator. The data collected by the loggers was downloaded and analysed and any invalid data removed.

All noise sampling activities were undertaken with consideration to the specifications outlined in *AS 1055-1997 - Description and Measurement of Environmental Noise*.

### 4.3 Noise monitoring results

Sampled noise levels for the monitoring period are provided graphically in Appendix B along with the corresponding meteorological conditions obtained from the nearest Bureau of Meteorology automatic weather station at Albany Airport, including precipitation and wind speed and direction for each site. Data excluded during filtering for sample periods of rainfall of  $> 0.2$  mm and/or wind speed  $> 18$  km/h at the noise logger have been highlighted in Appendix B.

Review of the noise monitoring data plots (Appendix B) demonstrates time periods where monitoring locations appear to be influenced by unknown noise, and hence required filtering to remove such anomalous results:

- Site B
  - Saturday 9 March 2019 23:00 to Sunday 10 March 07:15
  - Sunday 10 March 2019 14:00 to 16:00
- Site C
  - Monday 11 March 2019 10:30 to 10:45



– Tuesday 12 March 2019 12:00 to 17:00

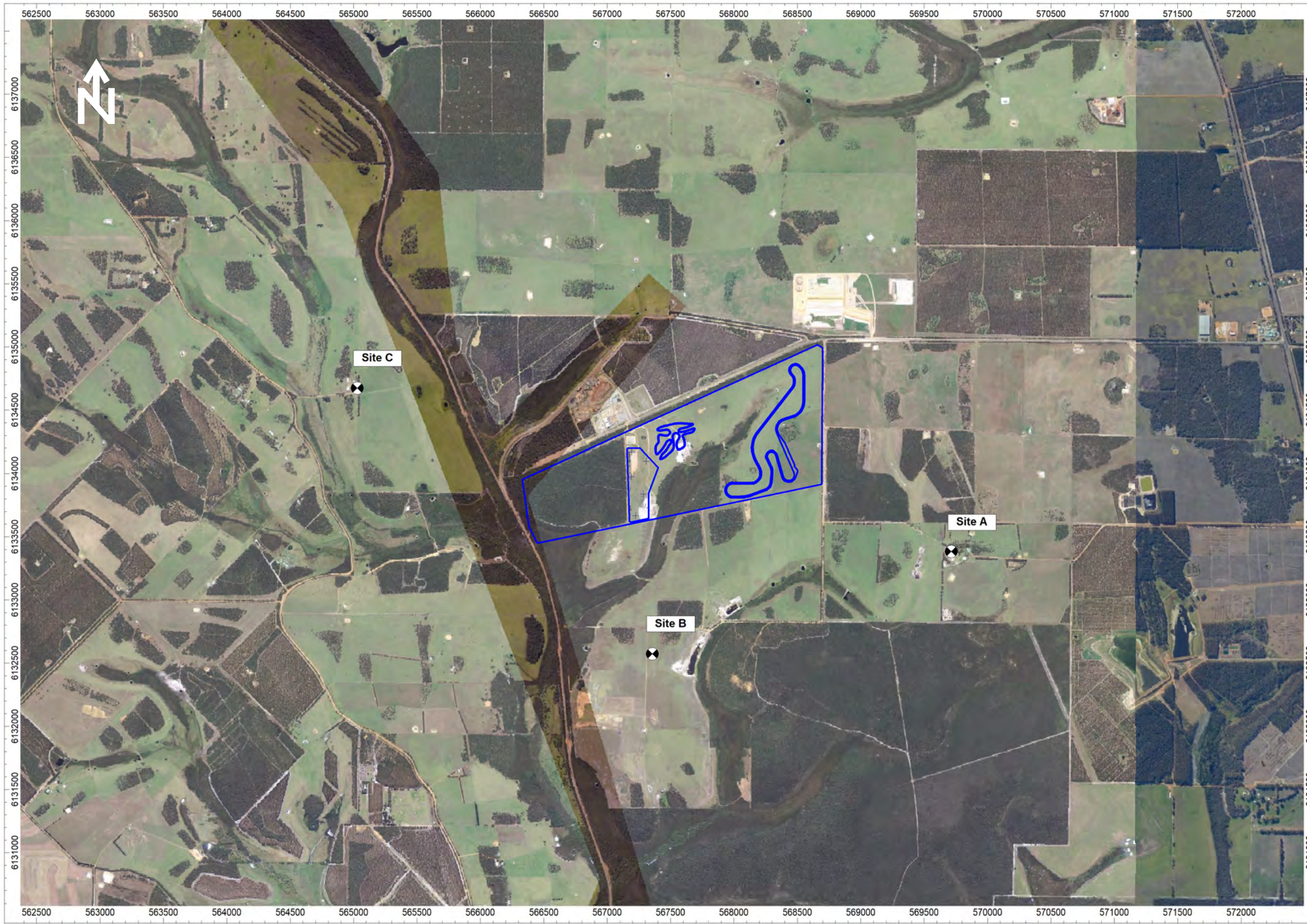
Daily noise monitoring results for each site are shown in Table 4-2, with entries significantly affected by meteorological conditions and anomalous results in the time periods above, removed.

**PREDICTED NOISE LEVELS**

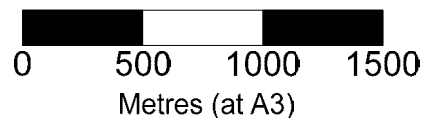
-  35 dBA
-  40 dBA
-  45 dBA
-  50 dBA
-  55 dBA
-  60 dBA
-  65 dBA
-  70 dBA
-  75 dBA
-  80 dBA
-  85 dBA
-  90 dBA

**LEGEND**

-  Noise sensitive receptor
-  Development area boundary



**SCALE**



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MAP PROJECTION: Universal Transverse Mercator  
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DATE 10.08.2020	FILE LOCATION N:\AU\Albany WA\Projects\61137331\Technical\Noise
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**ALBANY MOTORSPORT PARK**

**NOISE MONITORING LOCATIONS**

**FIGURE 4-1**

Noise Assessment



Table 4-2 Daily L<sub>A90</sub> noise levels, dBA

Site ID	Site A (SR01)			Site B (SR02)			Site C (SR04)		
Date	L <sub>A90</sub> day	L <sub>A90</sub> evening	L <sub>A90</sub> night	L <sub>A90</sub> day	L <sub>A90</sub> evening	L <sub>A90</sub> night	L <sub>A90</sub> day	L <sub>A90</sub> evening	L <sub>A90</sub> night
Tuesday 5 March 2019	37.7	28.5	28.8	33.2	18.8	26.9	44.7	23.8	27.3
Wednesday 6 March 2019	39.8	31.8	27.2	32.4	25.9	20.0	42.2	30.9	22.2
Thursday 7 March 2019	32.5	27.2	28.8	28.8	17.1	19.1	36.3	23.0	28.6
Friday 8 March 2019	36.9	28.5	28.0	47.8	18.7	18.0	39.1	26.3	24.9
Saturday 9 March 2019	33.9	28.1	28.5	[8]	[8]	24.5	32.1	29.2	23.0
Sunday 10 March 2019	34.0	28.1	28.6	34.5	18.4	18.5	31.0	20.7	21.1
Monday 11 March 2019	33.9	27.4	29.5	40.5	15.1	23.4	32.7	24.5	28.9
Tuesday 12 March 2019	33.3	27.2	27.2	27.7	18.7	17.6	39.4	31.0	28.4
Wednesday 13 March 2019	32.0	-	-	25.7					
<i>Average</i>	<i>35.7</i>	<i>28.6</i>	<i>28.4</i>	<i>39.5</i>	<i>19.8</i>	<i>22.3</i>	<i>39.6</i>	<i>27.6</i>	<i>26.5</i>

L<sub>A90</sub> values were not recorded during noise monitoring due to incorrect monitor setup. L<sub>Amin</sub> values were recorded and have been adjusted to provide L<sub>A90</sub> values. DWER have advised, based on a previous ambient measurements in a rural area, L<sub>Amin</sub> values would be less than or equal to the L<sub>A90</sub> levels and on average, the L<sub>A90</sub> levels (15-minute duration) were less than 1 dB above the L<sub>Amin</sub> for the logged period for night time and less than 3 dB above the L<sub>Amin</sub> for the logged period for day time. These adjustments have been applied to the L<sub>Amin</sub> values recorded.

<sup>8</sup> Filtering to remove anomalous noise monitoring results in no valid data

Table 4-3 provides the rating background level (RBL) for each location. The RBL is defined as:

*The overall single figure background level representing each assessment period (day/evening/night) over the whole monitoring period, defined as the median value of:*

- *All the day assessment background levels over the monitoring period for the day (7.00 am to 7.00 pm).*
- *All the evening assessment background levels over the monitoring period for the evening (7.00 pm to 10.00 pm).*
- *All the night assessment background levels over the monitoring period for the night (10.00 pm to 7.00 am).*

Table 4-3 Overall L<sub>A90</sub> noise levels, dBA

Site ID	L <sub>A90</sub> day	L <sub>A90</sub> evening	L <sub>A90</sub> night
Site A (SR01)	33.9	28.1	28.6
Site B (SR02)	32.4	18.6	19.5
Site C (SR04)	37.7	25.4	26.1

Noise monitoring and observations indicate a noise environment for each location as follows:

- **Site A: 35552 Albany Hwy, DROME WA 6330** – A rural environment with the main sources of noise occasional vehicle traffic on farm roads, livestock (in the distance) and sounds of nature (birds, insects and wind in trees). The APEC wood chip mill was in operation during the noise monitoring but was not audible. The Plantation Energy pellet facility was not in operation during the noise monitoring.
- **Site B: 114 Down Rd South, DROME WA 6330** – A rural environment with the main sources of noise occasional vehicle traffic on farm roads, livestock and sounds of nature (birds, insects and wind in trees). Elevated noise levels during the day and night period are most likely due to vehicle traffic on farm roads, such as tractors and quad bikes, and livestock. The APEC wood chip mill was in operation during the noise monitoring but was not audible. The Plantation Energy pellet facility was not in operation during the noise monitoring.
- **Site C: 727 Marbelup North Rd, MARBELUP WA 6330** – A rural environment with the main sources of noise occasional vehicle traffic on farm roads, livestock and sounds of nature (birds, insects and wind in trees). Elevated noise levels during all periods is most likely due to vehicle traffic on farm roads, such as tractors and quad bikes, and livestock, which was located close to the noise logger location. The APEC wood chip mill was in operation during the noise monitoring but was not audible. The Plantation Energy pellet facility was not in operation during the noise monitoring.

Noise monitoring at sensitive receptors in the vicinity of the Albany Motorsport Park indicates there were no existing noise sources, operating at the time of the noise monitoring, which need to be considered as 'significantly contributing'. On this basis, the assessment has been completed for noise impacts from the Albany Motorsport Park in isolation.



## 5. Construction noise and vibration assessment

### 5.1 Construction noise

Construction noise impacts associated with the Albany Motorsport Park were estimated using the following distance attenuation relationship:

$$SPL = SWL - 20 \log(d) + 10 \log(Q) - 11$$

where:  $d$  = Distance between the source and receptor (m)  
 $Q$  = Directivity index (2 for a flat surface)  
 $SPL$  = Sound pressure level at the distance from the source (dB)  
 $SWL$  = Sound power level of the source (dB)

Typical noise levels produced by construction plant anticipated to be used on-site were sourced from *AS 2436 – 2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites*.

Propagation calculations take into account sound intensity losses due to spherical spreading, with additional minor losses such as atmospheric absorption, directivity and ground absorption ignored in the calculations. As a result, predicted received noise levels are expected to slightly overstate actual received levels and thus provide a measure of conservatism.

Received noise produced by anticipated activities during the construction of the AMP are shown in Table 5-1 for a variety of distances, with no noise barriers or acoustic shielding in place and with each plant item operating at full power. The sound pressure levels shown are maximum levels produced when machinery is operated under full load.

The magnitude of off-site noise impact associated with construction will be dependent upon a number of factors:

- The intensity and location of construction activities
- The type of equipment used
- Existing local noise sources
- Intervening terrain
- The prevailing weather conditions

Construction machinery will move about the AMP site area, altering the directivity of the noise source with respect to individual receptors. During any given period the machinery items used in the AMP area will operate at maximum sound power levels for only brief times. At other times the machinery may produce lower sound levels while carrying out activities not requiring full power. It is unlikely that all construction equipment would be operating at their maximum sound power levels at any one time. Finally, certain types of construction machinery will be present in the AMP area for only brief periods during construction.

Table 5-1 Predicted plant activity noise levels (dBA)

Plant	Estimated SWL (dBA)	Estimated SPL (dBA) at distance (m)						
		50	250	500	750	1000	2000	3000
Backhoe	104	62	48	42	39	36	30	26
Backhoe (with auger)	106	64	50	44	41	38	32	28
Bulldozer	108	66	52	46	43	40	34	30
Compactor	113	71	57	51	48	45	39	35
Compressor (silenced)	101	59	45	39	36	33	27	23
Concrete agitator truck	109	67	53	47	44	41	35	31
Concrete pump truck	108	66	52	46	43	40	34	30
Concrete saw	117	75	61	55	52	49	43	39
Concrete vibratory screed	115	73	59	53	50	47	41	37
Crane (mobile)	104	62	48	42	39	36	30	26
Excavator	107	65	51	45	42	39	33	29
Front end loader	113	71	57	51	48	45	39	35
Generator (diesel)	104	57	43	37	34	31	25	21
Grader	110	68	54	48	45	42	36	32
Hand tools (electric)	102	60	46	40	37	34	28	24
Hand tools (pneumatic)	116	74	60	54	51	48	42	38
Jack hammers	121	79	65	59	56	53	47	43
Rock breaker	118	76	62	56	53	50	44	40
Roller (vibratory)	108	66	52	46	43	40	34	30
Scraper	116	74	60	54	51	48	42	38
Truck (>20 tonnes)	107	65	51	45	42	39	33	29
Truck (dump)	117	75	61	55	52	49	43	39
Truck (water cart)	107	65	51	45	42	39	33	29
Vehicle (commercial, 4WD)	106	64	50	44	41	38	32	28
Welder	105	63	49	43	40	37	31	27

The closest noise sensitive receptor to any potential noise source during construction of the plant is located approximately 1120 m from the AMP. From Table 5-1, noise levels exceeding the day  $L_{A10}$  assigned level of 45 dBA are not expected to impact on the closest noise sensitive receptors, with the exception of noisy equipment with a sound power level (SWL) higher than 115 dBA.

In line with the Regulations, construction will be carried out in accordance with control of environmental noise practices set out in Section 6 of Australian Standard (AS) 2436-2010 *Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites* and equipment used will be the quietest reasonably available (basis for numbers in Table 5-1).

## 5.2 Construction vibration

Vibration impacts discussed essentially focus on potential structural damage to properties in close proximity of the AMP area and/or potentially affected by construction activities. The separation distance between construction activities and the potentially most impacted sensitive receptors is 1120 m.

The nature and levels of vibration from the site will vary with the activities being carried out on site. Table 5-2 outlines typical vibration levels for different plant activities that may be generated on the site, sourced from the NSW Roads and Traffic Authority (RTA) *Environmental Noise Management Manual*<sup>9</sup>.

<sup>9</sup> Roads and Traffic Authority (RTA), 2001. *Environmental Noise Management Manual*. Sydney, December 2001.

Table 5-2 Typical vibration levels for construction equipment

Plant item	Peak particle velocity at 10 m (mm/s)
Backhoe	1.0
Bulldozer	2.5-4.0
Compactor (7 tonne)	5.0-7.0
Front end loader	6.0-8.0
Jack hammer	0.5
Roller (15 tonne)	7.0-8.0

Construction activity may result in varying degrees of ground vibration depending on the equipment used and methods employed. Operation of construction equipment causes ground vibration which spreads through the ground and diminishes in strength with distance. Buildings founded on the soil in the vicinity of the construction site respond to these vibrations with varying outcomes.

From Table 5-2, equipment proposed for site preparation and construction of the AMP will generate low levels of vibration which are unlikely to result in any vibration risks to structures. The lower limit for vibrations resulting in building damage (5 mm/s) is normally not exceeded by general construction activities at distances greater than 20 m from the nearest sensitive receptor.

Given the distances involved between site works and the nearest receptors, vibrations affecting human comfort and building integrity are not expected to be an issue.

## 6. Operational noise assessment

### 6.1 Noise model objective

The objective of noise modelling is to determine the noise impact at the nearest noise sensitive receptors resulting from Albany Motorsport Park during events and practice, under both neutral and adverse weather conditions.

Noise modelling was undertaken using Computer Aided Noise Abatement (CadnaA) to predict the effects of noise generated by motorsport events.

### 6.2 Noise modelling software package

CadnaA, by Datakustik, is a computer program for the calculation, assessment and prognosis of noise exposure. CadnaA calculates environmental noise propagation according to the CONCAWE algorithm.

CONCAWE is a mathematical model developed to predict community noise levels from petrochemical and industrial plant for a range of meteorological conditions. A full description of the mathematical model is provided in the report prepared for the Conservation of Clean Air and Water in Europe (CONCAWE)<sup>[10]</sup> The CONCAWE prediction method is widely used in a range of environmental scenarios for predicting noise impacts of industrial facilities.

CadnaA considers local characteristics, site sources and the location of the receptor areas to predicted noise levels. The method specified consists of octave band algorithms (with nominal mid band frequencies from 31.5 Hz to 8 kHz) for calculating the attenuation of sound. The algorithms used in this model account for the following physical features:

- Geometrical divergence,
- Atmospheric absorption,
- Ground effect,
- Reflection from surfaces, and
- Screening by obstacles.

In assessing meteorological conditions, the CONCAWE method has been applied instead of ISO 9613-2 weather correction. Modelling results are based on available information provided and should only be used as a guide for comparative purposes.

### 6.3 Noise model configuration

#### 6.3.1 Proposed plant layout

The noise model developed for this assessment was based on the project layout of the AMP as provided (see Figure 1-1).

#### 6.3.2 Topography and ground absorption effects

In line with the proposed location of the AMP, the site and surrounding ground topography was included in the modelled using 1 m ground contours.

Ground absorption was taken into account in the calculations. A general ground absorption coefficient of 0.7 was used throughout the model to represent the surrounding ground type

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<sup>10</sup> Manning, 1991. *CONCAWE Report No. 4/81 – The propagation of noise from petroleum and petrochemical complexes to neighbouring communities.*

mainly comprising of mixed vegetation and soil. A ground absorption coefficient of 0 was used for paved areas such as the multi-use track and associated hardstand areas.

### 6.3.3 Meteorological conditions

The meteorological conditions selected for the model can have a significant effect on the result. As such, EPA requires compliance with the assigned noise levels to be demonstrated for 98% of the time, during day and night periods, for the month of the year in which the worst case weather conditions prevail<sup>11</sup>. EPA specifies the use of the meteorological conditions outlined in Table 6-1.

Table 6-1 Meteorological conditions for noise modelling

Meteorology	Calm	Worst case	
	Day and night	Day	Evening / Night
Wind speed	0 m/s	4 m/s	3 m/s
Stability	D-class	E-class	F-class
Temperature	20°C	20°C	15°C
Relative humidity	70%	50%	50%

As sensitive receptors are located in several directions from the AMP, assessment under worst case wind direction for each receptor has been undertaken.

### 6.3.4 Model output conversion

CadnaA calculates  $L_{Aeq}$  predicted noise levels at discrete sensitive receptors and across the modelling grid. Predicted noise levels are converted to  $L_{A10}$  predicted noise levels, for the purpose of assessing against the assigned noise levels, by applying a correction of +3 dBA to the predicted  $L_{Aeq}$  values.

## 6.4 Noise sources

A summary of expected motorsport events is provided in Section 2. Corresponding noise levels for various event types are outlined in Table 6-2. Sound power levels for the various vehicle types are provided in Table 6-3.

Table 6-2 Event type and vehicle sound power levels

Event type	Worst case sound power level	Operating time
Driving training, school and manufacturer testing	109 dBA	Day
Multi-use track events – Car and bike events	133 dBA	Day
Motocross events	133 dBA	Day
4WD off road training	109 dBA	Day

Table 6-3 Sound power levels (dBA)

Vehicle type	Sound power level (dBA)								dBA
	63	125	250	500	1000	2000	4000	8000	
Road registered car or motorbike	73	77	84	98	104	105	98	88	109
Multi-use track – CAMS approved vehicles	102	126	126	121	127	123	119	119	133

<sup>11</sup> EPA (Environmental Protection Authority), 2007. *Guidance for the Assessment of Environmental Factors – No. 8 - Environmental Noise – Draft*, Perth, May 2007.

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Vehicle type	Sound power level (dBA)								
	63	125	250	500	1000	2000	4000	8000	dBA
Motocross bike (senior class)	100	116	127	112	122	129	125	116	133
4WD off road	73	77	84	98	104	105	98	88	109

### 6.4.1 Driving training school and manufacturer testing

Noise modelling has been conducted for driver training, driver school and manufacturer testing, with 20 cars or motorbikes operating simultaneously with noise sources spaced around the multi-use track.

Noise levels from road registered cars and motorbikes are assumed to comply with Australia Design Rule (ADR) requirements for vehicle noise emissions and have been assigned a sound power level of 109 dBA<sup>[12]</sup>.

The duration of noise generation from driver training, school and manufacturer testing is unlikely to be continuous, with an assumed duration of no longer than 30 minutes in any hour. Noise impacts from this source have been assessed against LA<sub>10</sub> assigned levels.

### 6.4.2 Multi-use track events – Car and bike events, including drifting and motorkhana events

Noise modelling has been conducted for multi-use track events for cars or motorbikes, with 20 cars or motorbikes operating simultaneously with noise sources spaced around the multi-use track.

Noise levels which meet CAMS requirements have been assumed, equating to a sound power level of 132.5 dBA.

The duration of noise generation these events is unlikely to be continuous, with an assumed duration of no longer than 30 minutes in any hour. Noise impacts from this source have been assessed against LA<sub>10</sub> assigned levels.

### 6.4.3 Motocross events

Noise modelling has been conducted for a Senior Open race event, with 16 motocross bikes operating simultaneously with noise sources spaced around the motocross track and modelled heights of either 0.5 m, 2.5 m and 5.0 m to represent course terrain and jumps.

Noise levels from senior class motocross bikes have been assumed as a sound power level of 132.7 dBA.

The duration of noise generation these events is unlikely to be continuous, with an assumed duration of no longer than 30 minutes in any hour. Noise impacts from this source have been assessed against LA<sub>10</sub> assigned levels. As noise from motocross bikes typically exhibits tonal characteristics where audible, a 5 dB penalty has been applied to motocross events during this assessment.

### 6.4.4 4WD off road training

Noise modelling has been conducted for 4WD off road driver training, with five 4WD vehicles operating simultaneously with noise sources spaced around the 4WD training area. Noise levels from road registered 4WD vehicles have been assumed as a sound power level of 109 dBA.

<sup>12</sup> ADR83/00 requirement of complying with 83 dBA at 7.5 m, equivalent to sound power level of 109 dBA.

The duration of noise generation from 4WD off road training is unlikely to be continuous, with an assumed duration of no longer than 30 minutes in any hour. Noise impacts from this source have been assessed against  $L_{A10}$  assigned levels.

## 6.5 Noise modelling results

The calculated noise levels at the nearest noise sensitive premises were assessed to determine if predicted noise emissions complied with the appropriate day  $L_{A10}$  assigned noise level.

There are four residences within close proximity to Albany Motorsport Park. For the purpose of this assessment, it has been assumed that if compliance is achieved at the nearest residences, compliance would be achieved further away.

### 6.5.1 Neutral meteorological conditions

Predicted day noise levels from various motorsport events under neutral meteorological conditions are presented in Table 6-4. Table 6-4 shows predicted exceedance of the day assigned noise level as red text.

Table 6-4 Predicted day  $L_{A10}$  noise levels – Neutral meteorological conditions, dBA

Event	Assigned noise level	SR01	SR02	SR03	SR04
Background noise level, $L_{A90}$ <sup>[13]</sup>		32	26	31 <sup>[14]</sup>	31
Driver training school, manufacturer testing (DT)	40	27	21	10	16
Multi-use track events (MUT)	40	<b>54</b>	<b>51</b>	<b>42</b>	<b>46</b>
Motocross events (MX) <sup>[15]</sup>	40	<b>49</b>	<b>57</b>	40	<b>46</b>
4WD training (4WD)	40	15	28	14	17

From Table 6-4:

- Driver training school, manufacturer testing and 4WD training events are predicted to comply with the assigned levels and to not be audible over background noise levels at all sensitive receptors.
- Multi-use track events are predicted to exceed assigned levels and to be audible over background noise levels at all sensitive receptors for multi-use track events.
- Motocross events, inclusive of 5 dB penalty for tonality, are predicted to comply with assigned levels at SR03 and exceed assigned levels at SR01, SR02 and SR04. Noise levels are predicted to be audible over background noise levels at all sensitive receptors for motocross events.

Predicted day noise level contours for each single event type are presented in Figure 6-1 to Figure 6-4.

<sup>13</sup> Background noise level conservatively taken as lowest measured background noise level during monitoring

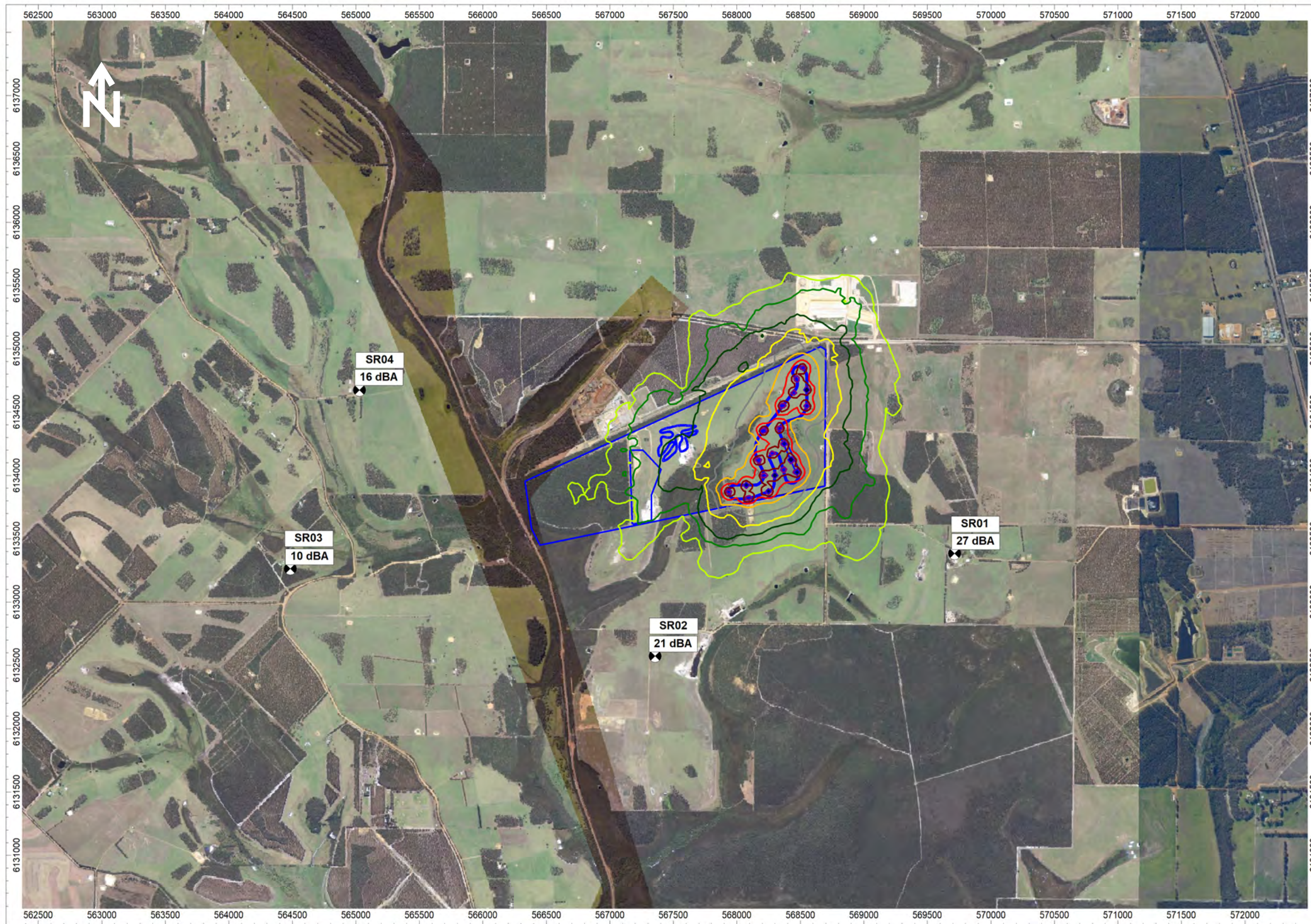
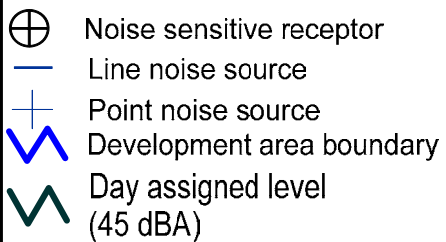
<sup>14</sup> Noise monitoring not completed at SR03, background noise assumed to be same as SR04

<sup>15</sup> Inclusive of 5 dB penalty for tonality

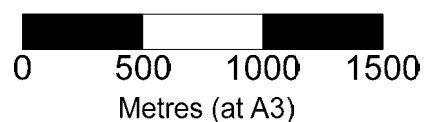
**PREDICTED NOISE LEVELS**



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**ALBANY MOTORSPORT PARK**

**Noise Assessment**

**PREDICTED DAY NOISE LEVELS  
DRIVER TRAINING**

Noise contours:  $L_{A10}$   
 Grid height: 1.4 m  
 Neutral meteorological conditions

**FIGURE 6-1**

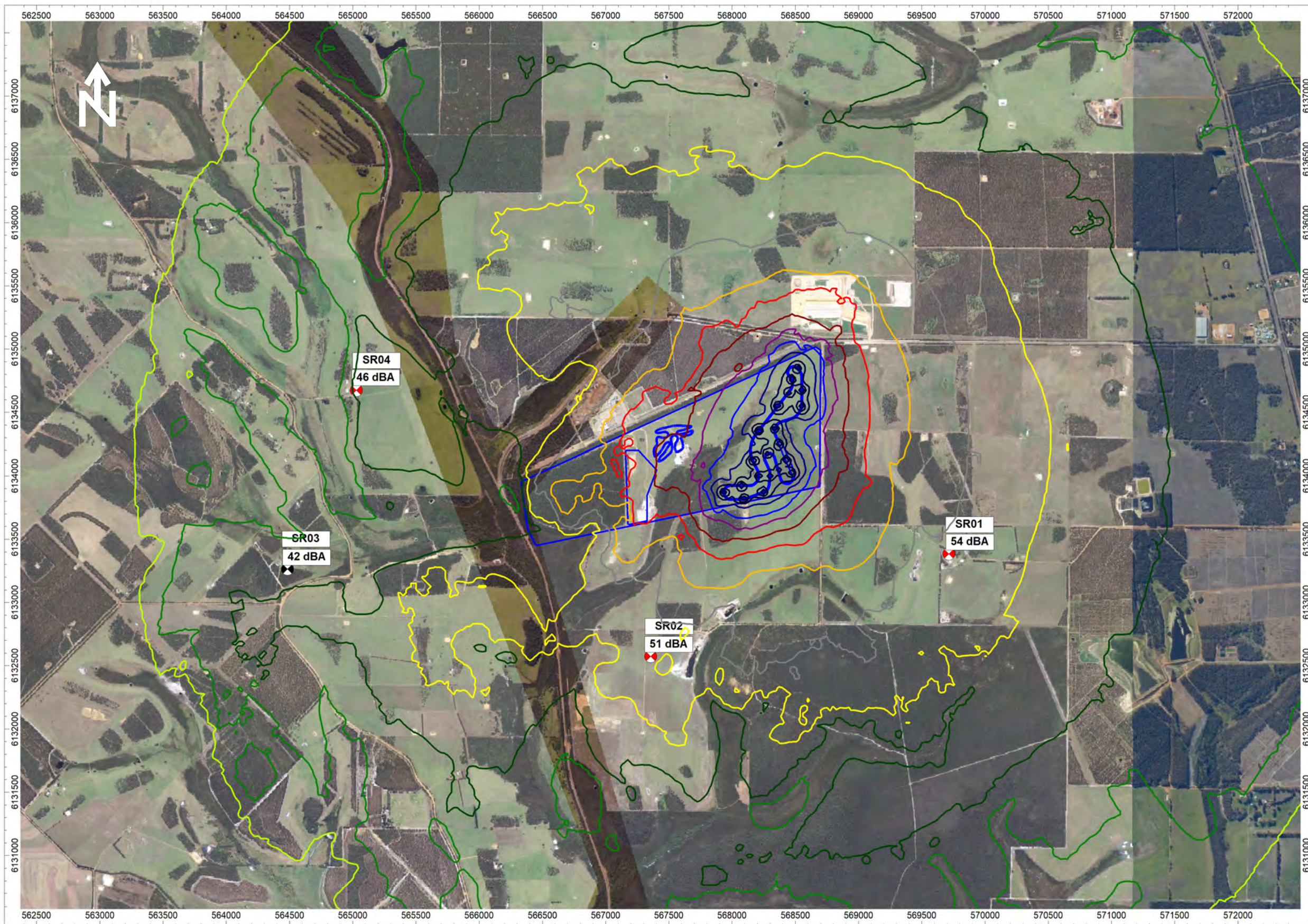
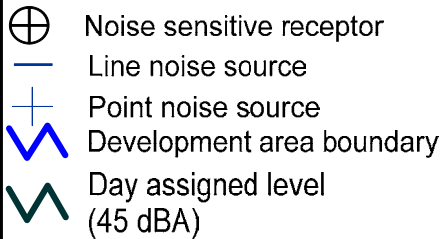




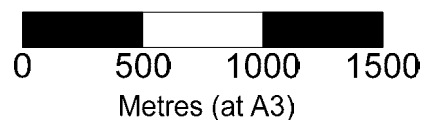
**PREDICTED NOISE LEVELS**



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**ALBANY MOTORSPORT PARK**

**Noise Assessment**

**PREDICTED DAY NOISE LEVELS  
MULTI-USE TRACK EVENT**

Noise contours:  $L_{A10}$   
 Grid height: 1.4 m  
 Neutral meteorological conditions

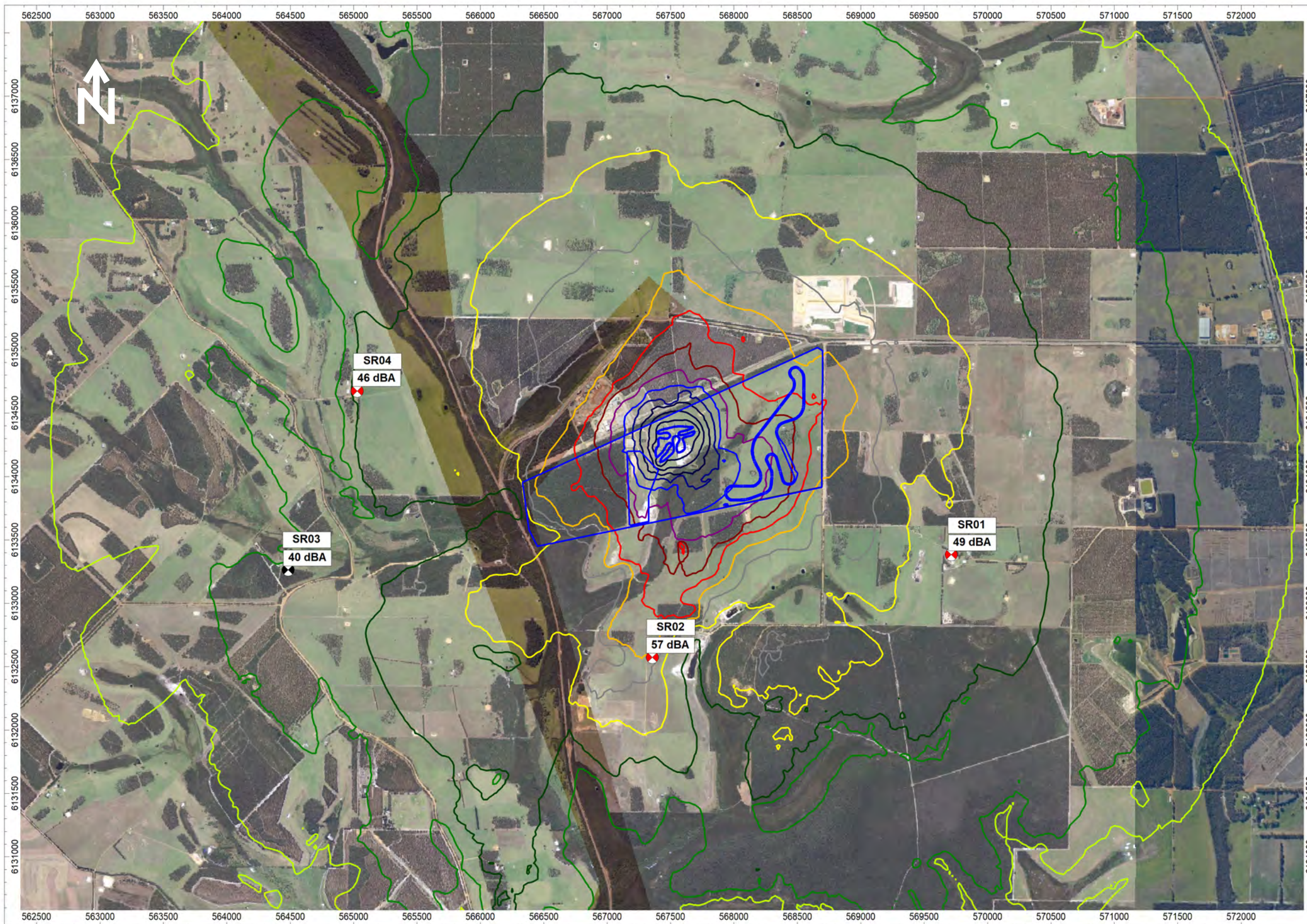
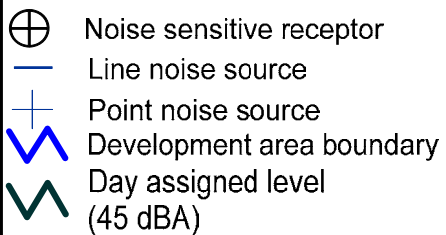
**FIGURE 6-2**



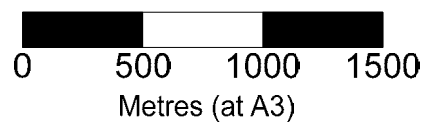
**PREDICTED NOISE LEVELS**



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**ALBANY MOTORSPORT PARK**

**Noise Assessment**

**PREDICTED DAY NOISE LEVELS  
MOTOCROSS EVENT**

Noise contours:  $L_{A10}$   
 Grid height: 1.4 m  
 Neutral meteorological conditions

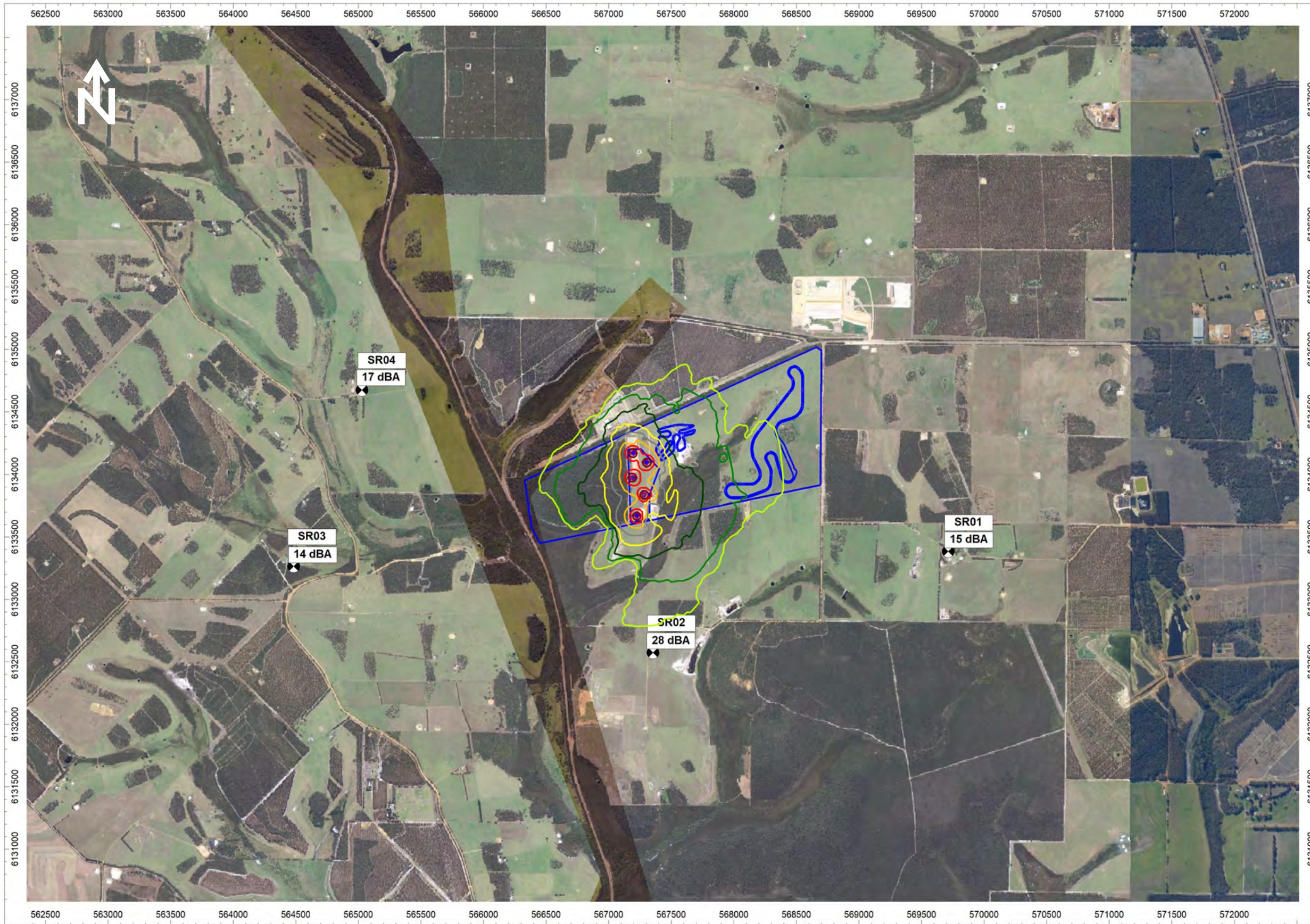
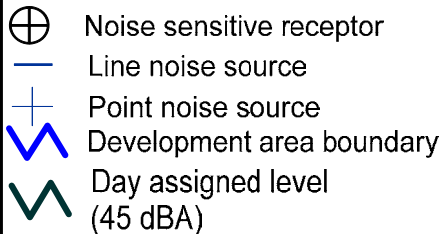
**FIGURE 6-3**



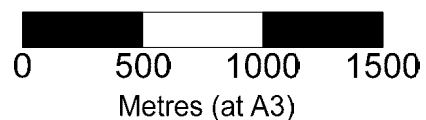
**PREDICTED NOISE LEVELS**



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**ALBANY MOTORSPORT PARK**

**Noise Assessment**

**PREDICTED DAY NOISE LEVELS  
4WD TRAINING**

Noise contours:  $L_{A10}$   
 Grid height: 1.4 m  
 Neutral meteorological conditions

**FIGURE 6-4**



6.5.2 Worst case meteorological conditions

Predicted day noise levels from various motorsport events under worst case meteorological conditions are presented in Table 6-5. Table 6-5 shows predicted exceedance of the day assigned noise level as red text.

Table 6-5 Predicted day  $L_{A10}$  noise levels – Worst case meteorological conditions, dBA

Event	Assigned noise level	SR01	SR02	SR03	SR04
Worst case wind direction (°)		310	10	80	100
Background noise level, $L_{A90}$ <sup>[13]</sup>		32	26	31 <sup>[14]</sup>	31
Driver training, school, manufacturer testing (DT)	40	33	28	18	23
Multi-use track events (MUT)	40	<b>59</b>	<b>56</b>	<b>47</b>	<b>51</b>
Motocross events (MX) <sup>[15]</sup>	40	<b>55</b>	<b>62</b>	<b>46</b>	<b>52</b>
4WD training (4WD)	40	22	34	21	24

From Table 6-5:

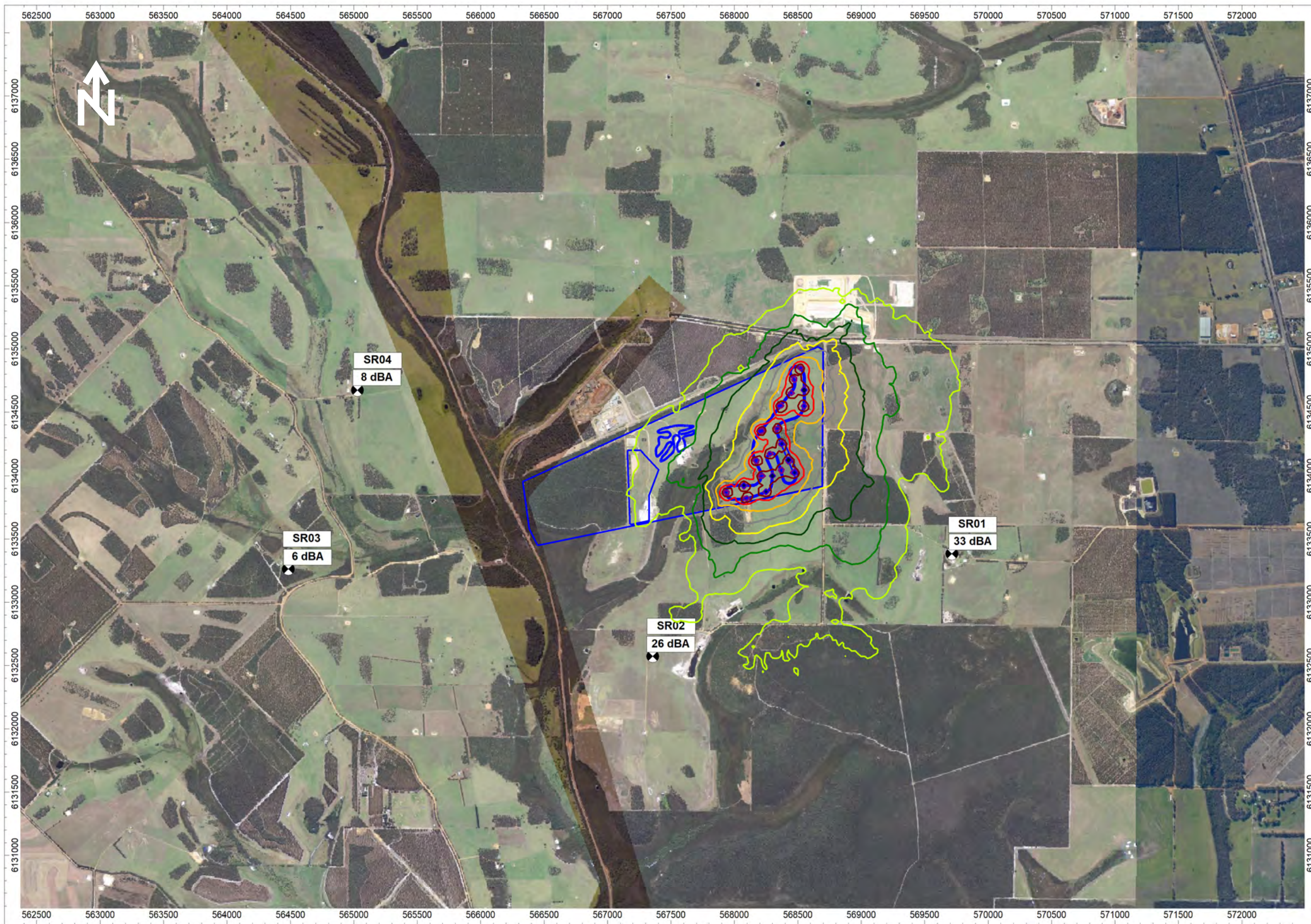
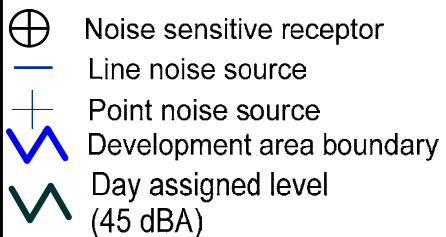
- Driver training school, manufacturer testing and 4WD training events are predicted to comply with the assigned levels and to not be audible over background noise levels at all sensitive receptors.
- Multi-use track events are predicted to exceed assigned levels and to be audible over background noise levels at all sensitive receptors.
- Motocross events are predicted exceed assigned levels and to be audible over background noise levels at all sensitive receptors.

Predicted day noise level contours for each event type are presented in Figure 6-5 to Figure 6-8. In each figure, worst case wind direction is presented for the most impacted receptor.

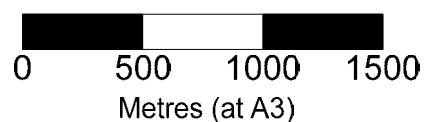
**PREDICTED NOISE LEVELS**



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**ALBANY MOTORSPORT PARK**

**Noise Assessment**

**PREDICTED DAY NOISE LEVELS DRIVER TRAINING**

Noise contours:  $L_{A10}$   
 Grid height: 1.4 m  
 Worst case meteorological conditions

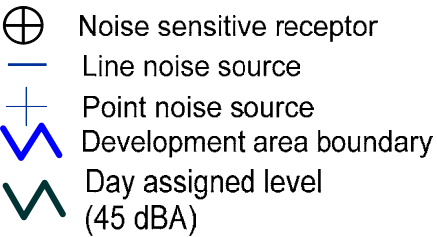
**FIGURE 6-5**



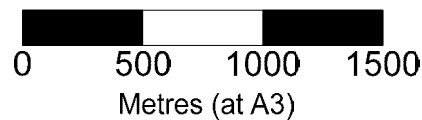
**PREDICTED NOISE LEVELS**



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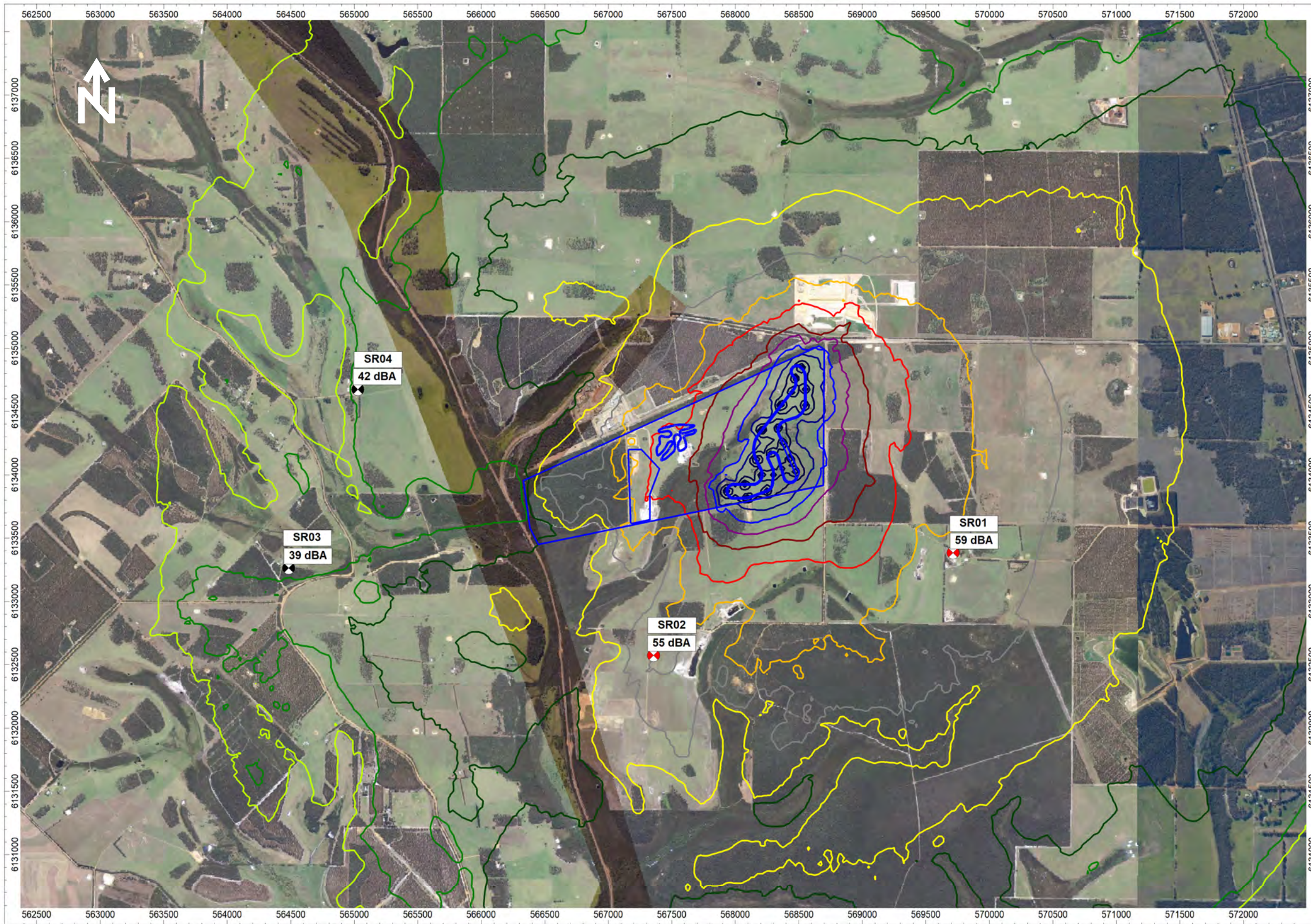
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**ALBANY MOTORSPORT PARK**

**PREDICTED DAY NOISE LEVELS  
MULTI-USE TRACK EVENTS**

Noise Assessment

Noise contours:  $L_{A10}$   
 Grid height: 1.4 m  
 Worst case meteorological conditions






**FIGURE 6-6**



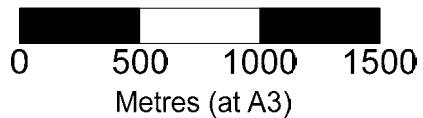
**PREDICTED NOISE LEVELS**

-  35 dBA
-  40 dBA
-  45 dBA
-  50 dBA
-  55 dBA
-  60 dBA
-  65 dBA
-  70 dBA
-  75 dBA
-  80 dBA
-  85 dBA
-  90 dBA

**LEGEND**

-  Noise sensitive receptor
-  Line noise source
-  Point noise source
-  Development area boundary
-  Day assigned level (45 dBA)

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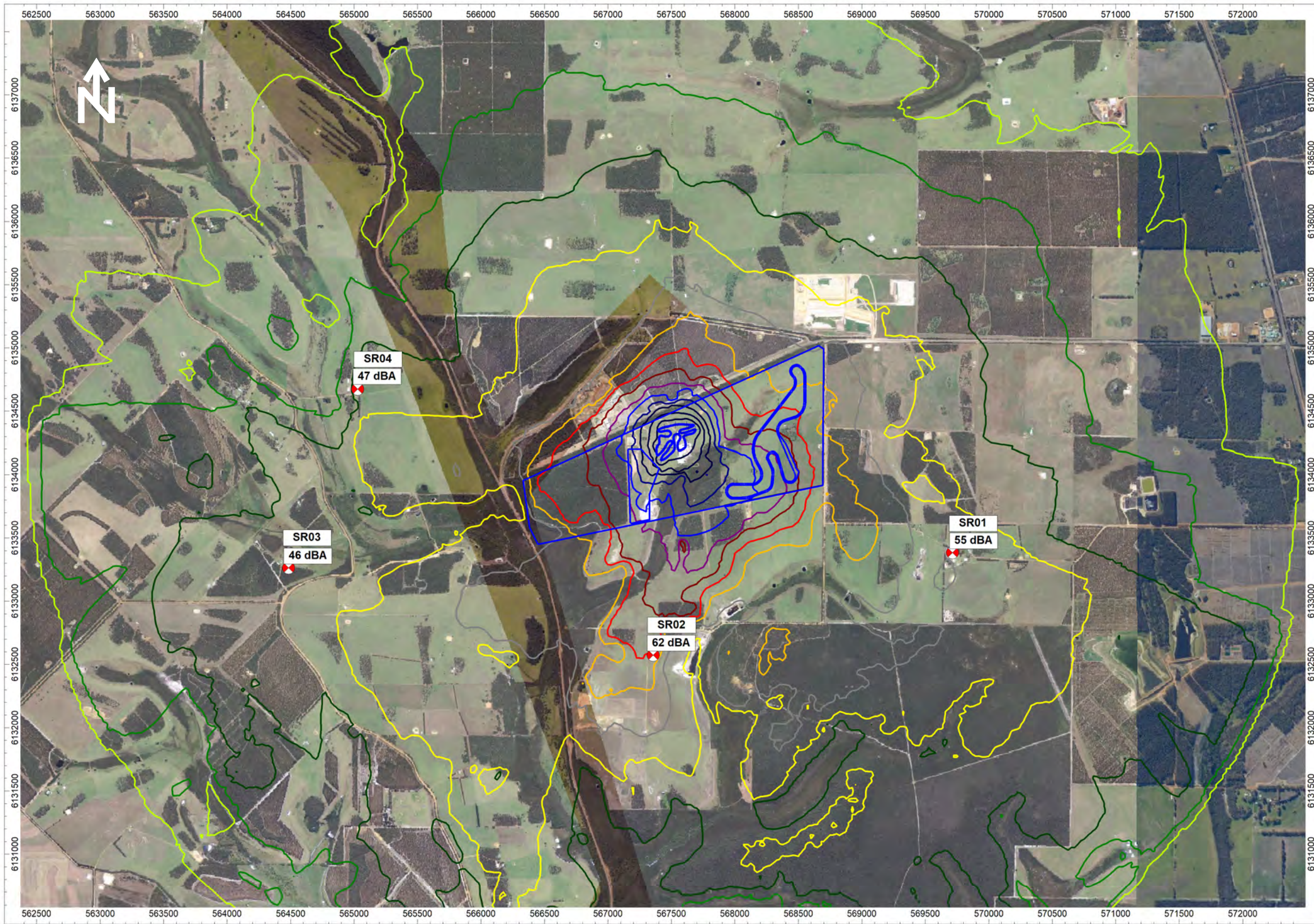
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**ALBANY MOTORSPORT PARK**

**PREDICTED DAY NOISE LEVELS  
MOTOCROSS EVENT**

Noise Assessment

Noise contours:  $L_{A10}$   
 Grid height: 1.4 m  
 Worst case meteorological conditions

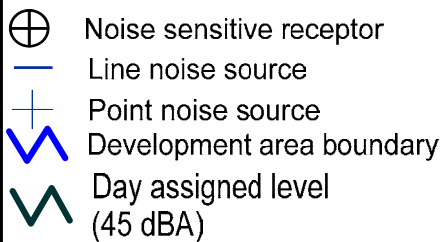
**FIGURE 6-7**



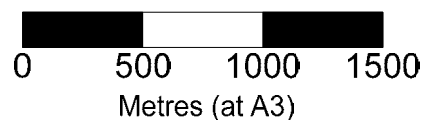
**PREDICTED NOISE LEVELS**



**LEGEND**



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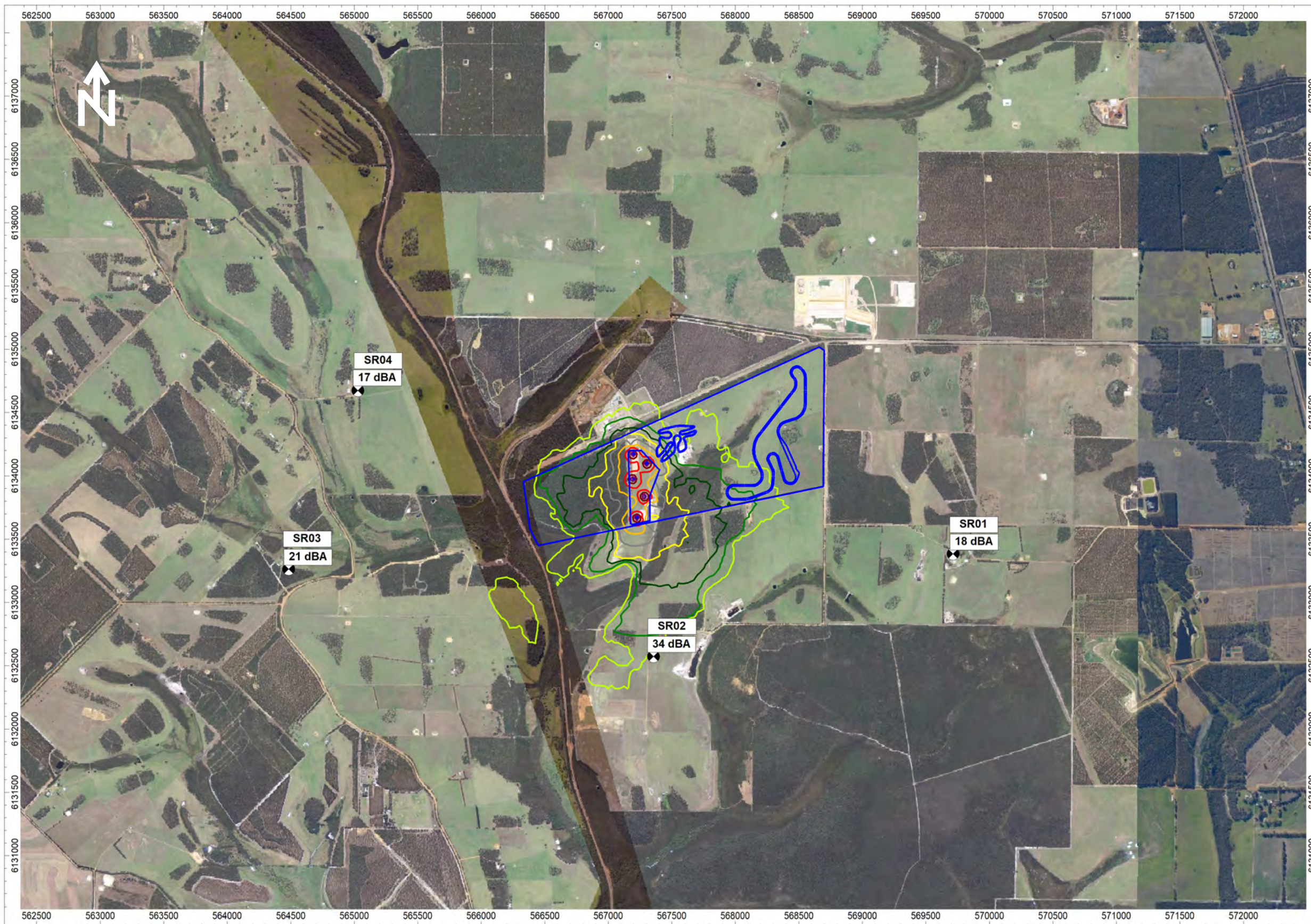
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**ALBANY MOTORSPORT PARK**

**PREDICTED DAY NOISE LEVELS  
4WD TRAINING**

Noise Assessment

Noise contours:  $L_{A10}$   
Grid height: 1.4 m  
Worst case meteorological conditions

**FIGURE 6-8**





## 6.5.3 Summary and discussion

A summary of predicted noise levels assessed against assigned noise levels for both neutral and worst case meteorological conditions is presented in Table 6-6, with negative noise levels indicating compliance with assigned noise levels and positive indicating exceedance.

**Table 6-6 Exceedance of assigned  $L_{A10}$  noise levels - Neutral/worst case meteorological conditions, dBA**

Receptor	SR01	SR02	SR03	SR04
Driver training, school, manufacturer testing (DT)	-13/-7	-19/-12	-30/-22	-24/-17
Multi-use track events (MUT)	+14/+19	+11/+16	+2/+7	+6/+11
Motocross events (MX) <sup>[15]</sup>	+9/+15	+17/+22	0/+6	+6/+12
4WD training (4WD)	-25/-18	-12/-6	-26/-19	-23/-16

The results presented in Table 6-6 demonstrate that for multi-use track and motocross events, there are occasions when the predicted noise levels from Albany Motorsport Park exceed the assigned noise levels.

As events are only planned during the day time period, predicted noise levels will not lead to sleep disturbance, and therefore will be less intrusive. As day time only events are scheduled, worst case conditions are only likely to occur due to wind direction, with no effect due to stability class (Table 6-1). Figure 6-9 presents the seasonal and annual day time wind roses for Albany for the period from 2001 to 2019.

Review of the wind roses provides an indication of how often worst case noise levels may occur at each receptor, with wind speeds up to 4 m/s (yellow and light green categories on the wind roses) representing worst case wind speed during the day period. The prevalence of worst case wind conditions at each sensitive receptor is as follows:

- SR01 – Worst case wind direction is a north-westerly, which is likely to occur approximately five percent of day time hours (between 7:00 am and 7:00 pm) (219 hours per year).
- SR02 – Worst case wind direction is a northerly, which is likely to occur approximately three percent of day time hours (132 hours per year).
- SR03 – Worst case wind direction is an easterly, which is likely to occur approximately two percent of day time hours (88 hours per year).
- SR04 – Worst case wind direction is a south-easterly, which is likely to occur approximately two percent of day time hours (88 hours per year).

For each sensitive receptor, worst case wind conditions are most likely to occur during autumn and winter, rather than spring and summer. Events will conclude earlier in autumn and winter as it is darker earlier, and lighting is not available, therefore being less intrusive than events which potentially conclude later during spring and summer.

## REPORT ITEM DIS245 REFERS

Comparison of predicted noise levels against monitored background noise levels is presented in Table 6-7, showing the emergence above background for neutral and worst case meteorological conditions.

Table 6-7 Emergence above background noise  $L_{A90}$  noise levels - Neutral/worst case meteorological conditions, dBA

Receptor	SR01	SR02	SR03	SR04
	32	26	31	30, 31
Driver training, school, manufacturer testing (DT)	-5/+1	-5/+2	-21/-13	-15/-8
Multi-use track events (MUT)	+22/+27	+25/+30	+11/+16	+15/+20
Motocross events (MX) <sup>[15]</sup>	+17/+23	+31/+36	+9/+15	+15/+18
4WD training (4WD)	-16/-10	+2/+8	-17/-10	-14/-7

Table 6-7 indicates that noise levels from multi-use track and motocross events are predicted to be clearly audible at all sensitive receptors.

Based on the above analysis of wind conditions, during the day time period for the majority of events, predicted noise levels are likely to be as per neutral conditions, rather than worst case conditions, typically up to 6 dB quieter than for worst case conditions.

Nevertheless, appropriate mitigation measures have been recommended in Section 7 in order to reduce the impact on existing and future sensitive receptors due to the motorsport facility.

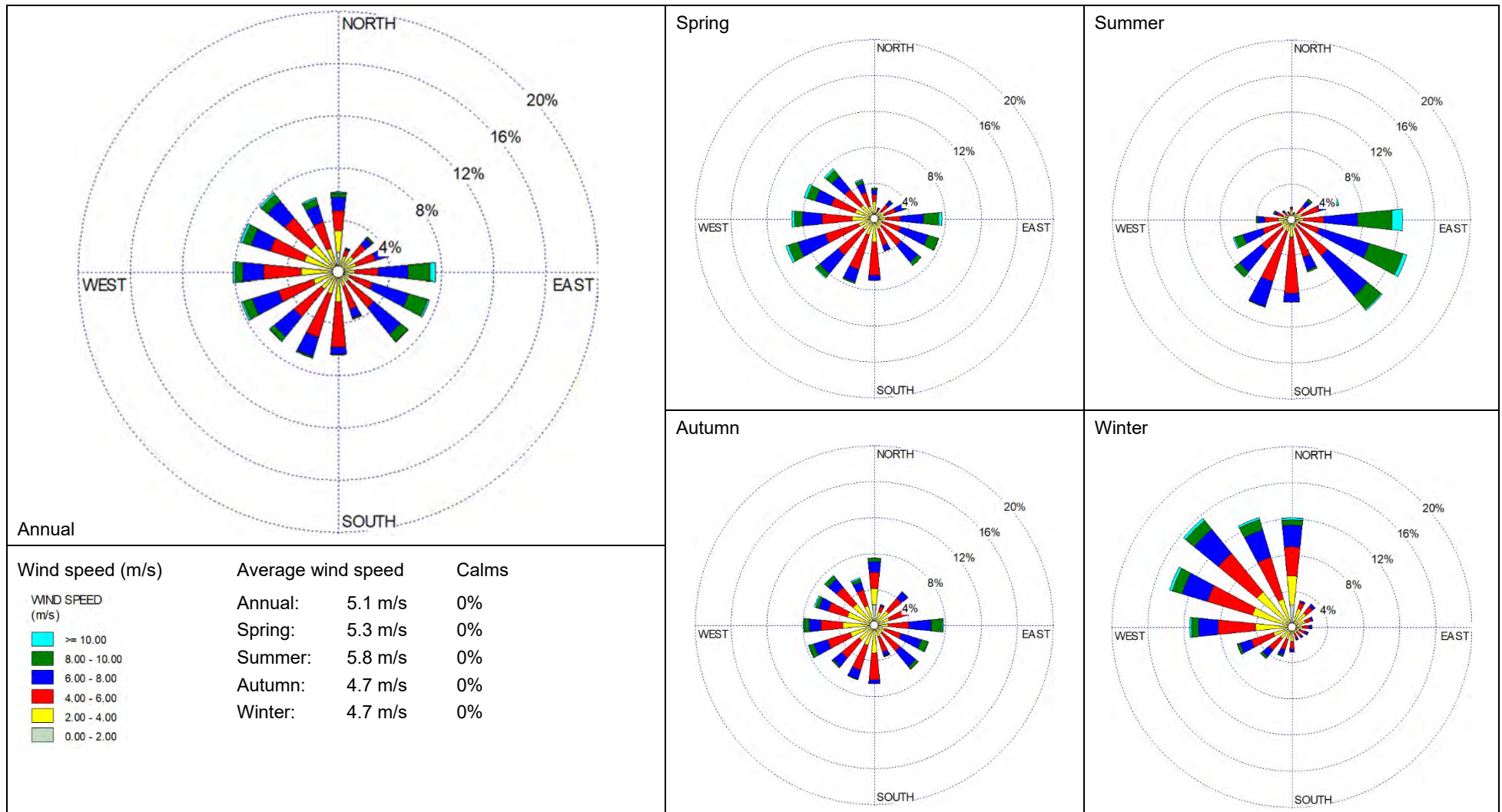


Figure 6-9 Annual and seasonal day time wind roses for observed meteorological data at Albany Airport

## 7. Managing noise impacts

The results presented in Section 6 for neutral and worst case meteorological conditions demonstrate that for some events, namely multi-use track and motocross events, there will be occasions when the predicted noise levels from Albany Motorsport Park exceed the day assigned noise levels at the nearest sensitive receptors.

As such, it is recommended that appropriate management and mitigation measures are implemented for the project.

### 7.1 Regulation – Approved noise management plan

The *Environmental Protection (Noise) Regulations 1997* set assigned (allowable) noise levels for various types of premises that receive noise from other premises. There are many activities that occur in the community that cannot, however, reasonably and practicably meet those assigned levels, but retain a degree of acceptance, either because of the temporary nature of the activity or the perceived community benefit.

In the case of a motor sport venue, good land use planning may be able to avoid noise problems in the first place – this may involve selection of a site for a new venue that is well away from sensitive receivers, or preventing encroachment by new residences into the noise-affected area around the venue.

Where a motor sport venue cannot practicably comply with the assigned noise levels, Division 3 of the Regulations allows the venue occupier to apply for a special approval. Under this approval the noise emissions from the venue are permitted to exceed the assigned levels in the Regulations provided the venue operates in accordance with an approved noise management plan (NMP) for the venue.

Regulation 16 of the *Environmental Protection (Noise) Regulations 1997* allows the Chief Executive Officer (CEO) of DWER (or delegated power such as local government CEO) to request preparation and submission of a NMP for a motor sport venue (that belongs to a recognised motor sports organisation<sup>16</sup>).

Regulation 16 includes the following:

- CEO to approve or refuse the NMP, but before approving it must seek comment from the affected residents within a kilometre of the venue and other local governments likely to be affected.
- NMP must contain certain elements:
  - A map of the venue and area
  - Description of the types of races
  - Maximum number of race meetings and practice sessions and times of the day
  - Measures to control noise emissions
  - How the community is to be informed of the race meeting program
  - Who is responsible for implementing the NMP
  - Complaints response procedure
- The CEO is be able to require the noise certification of race vehicles (if appropriate for that venue).

<sup>16</sup> *Guide to Management of Noise from Motor Sport Venues - Environmental Protection (Noise) Regulations 1997*, Department of Environment Regulation, 168 St Georges Terrace, Perth, Western Australia, July 2014.

- The CEO is able to charge fees to cover the cost of assessing the application and for noise monitoring and also to waive or reduce the fees payable.
- The CEO is able to amend or revoke the NMP, after consultation.

The status of the NMP would be that the normal assigned levels do not apply to the noise emissions as long as the venue operates as per the NMP. If the emissions were outside the NMP, for example a meeting went outside the nominated hours, the noise emissions have to comply with Regulation 7 and the normal enforcement measures under the *Environmental Protection Act 1986* would apply.

Whilst the introduction of a formal NMP may not reduce noise levels from Albany Motorsport Park, such measures will prevent noise impacts increasing due to increased number of events etc. without consultation with affected residents.

An example Noise Management Plan, prepared in line with requirements outlined in *Guide to Management of Noise from Motor Sport Venues*, has been provided in Appendix B.

### 7.2 Mitigation measures

As previously outlined, model predicted noise levels from operation of Albany Motorsport Park exceed assigned levels within the surrounding area.

As discussed above, introduction of a requirement for Albany Motorsport Park to operate according to a noise management plan provides a mechanism to prevent further increase of events without consulting residents, but may not reduce noise levels from proposed operations.

On-site mitigation measures to reduce noise levels at source from Albany Motorsport Park are limited and include:

- Scheduling of events and practice to minimise noise impacts on the existing residents. Future events scheduling at Albany Motorsport Park will take into consideration predicted noise impacts. Typical day operation is 8:00 am to 6:00 pm, Monday to Saturday, 9:00 am to 6:00 pm on Sunday and public holidays. No evening (after 7:00 pm) or night (after 10:00 pm) events will be scheduled.
- Construction of a barrier(s) (earth bund, noise walls or similar) along the boundaries of the AMP venue (primarily southern and eastern boundaries) to reduce noise levels at local residents. Based on the distance between the facility and the nearby sensitive receptors, noise barriers are only likely to lead to slight reductions in noise levels, by up to 3-5 dBA, depending on location and height. In this regard, other mitigation measures have been outlined.

Further mitigation measures are able to be implemented at existing properties and during any future residential development in the area. Mitigation measures in place or available for consideration include:

- Provision of at property treatments to maintain suitable acoustic amenity at existing noise sensitive receptors in the vicinity of AMP. Such requirements for outdoor area screening and provision of insulation packages (see below) will be assessed by completion of at property inspections, in order to provide recommended acoustic treatments. In addition, as events are only planned during the day time period, predicted noise levels will not lead to sleep disturbance, and therefore will be less intrusive.
- The existing Mirambeena Strategic Industrial Area buffer (Figure 7-1) in the vicinity to the proposed Albany Motorsport Park prevents the construction of any habitable dwellings on properties immediately adjacent, reducing the likelihood of sensitive receptors being developed in an area impacted by noise from motorsport activities in the future.

- Additional planning controls to establish a *Special Use* zone, with an associated *Special Control Area* to prevent further residential development, unless specific planning and building controls are implemented. Such planning controls would usually entail:
  - Reducing outdoor levels by implementing ‘quiet house’ design measures outlined in SPP 5.4<sup>17</sup> relating to screening of outdoor areas with the residence itself (building orientation considerations) or screen walls. Refer to Section 7.2.1.
  - Reducing internal noise levels by implementing ‘deemed to comply packages’ outlined in SPP 5.4 relating to improving noise insulation of residences. Refer to Section 7.2.1.
  - Providing information to new residents within the development of the potential noise impacts from motorsport events (notifications on titles). Refer to Section 7.2.2.

## 7.2.1 Reducing outdoor and indoor noise levels through building design

Noise levels resulting from Albany Motorsport Park are predicted to exceed assigned noise levels at existing residences or new residential areas within the vicinity. Noise mitigation measures outlined in SPP 5.4 pertain to reducing transport noise resulting from major roads and railways. In determining the required level of mitigation to maintain outdoor and indoor amenity, assessment has been made against outdoor and indoor criteria established by SPP 5.4, outlined in Table 7-1. Assessment has been made against predicted  $L_{A10}$  noise levels, as  $L_{A10}$  noise levels are considered to most closely represent  $L_{Aeq}$  criteria specified in SPP 5.4.

This approach has been reviewed and agreed to by DWER Noise Branch during previous assessments for motorsport facilities.

Table 7-1 Outdoor and indoor noise criteria, dBA

Time of day	Outdoor noise criteria	Indoor noise criteria
Day (6:00 am to 10:00 pm)	55	40
Night (10:00 pm to 6:00 am)	50	35

### **Reducing outdoor noise levels by screening outdoor areas**

Outdoor noise levels are reduced by 5-10 dBA by screening outdoor areas such that the building forms a barrier between the noise from motorsport events. Such screening is achieved by either:

- Locating outdoor living areas so as to maximise the screening effects of buildings and any barrier walls.
- Designing walls to screen part or all of the affected property.

To ensure an appropriately sized outdoor area is adequately screened may require designated building envelopes to be specified for each lot.

Evening and night time outdoor levels are not predicted to be affected as events conclude by 7:00 pm.

### **Reducing indoor noise levels by improving noise insulation of buildings**

With regard to indoor noise levels, a typical residence would see indoor levels approximately 15 dBA lower than outdoor levels (a predicted outdoor level of 65 dBA will result in indoor noise level approximately 50 dBA).

<sup>17</sup> Department of Planning, 2014, *Implementation Guidelines for State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning*, December 2014.

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Indoor noise levels are reduced by increasing insulation to reduce noise levels within a residence. SPP 5.4 outlines two 'deemed to comply' packages for residential development, Package A and Package B, as outlined in Table 7-2. A reduction of approximately 5 dBA is typically achieved by implementing design Package A and approximately 10 dBA reduction for implementing design Package B.

Table 7-2 Package A and B noise insulation measures outlined in SPP 5.4

Area type	Orientation	Package A measures
Bedrooms	Facing venue	6 mm laminated glazing Casement or awning windows No external doors Closed eaves No vents to outside walls/eaves Mechanical ventilation/air conditioning
	Side on to venue	6 mm laminated glazing Closed eaves Mechanical ventilation/air conditioning
Living and work areas	Facing venue	6 mm laminated glazing Casement or awning windows 35 mm (minimum) solid core external doors with acoustic seals Sliding doors must be fitted with acoustic seals Closed eaves No vents to outside walls/eaves Mechanical ventilation/air conditioning
	Side on to venue	6 mm glazing Closed eaves Mechanical ventilation/air conditioning
Area type	Orientation	Package B measures
Bedrooms	Facing venue	10 mm laminated glazing Casement or awning windows No external doors Closed eaves No vents to outside walls/eaves Mechanical ventilation/air conditioning
	Side on to venue	6 mm laminated glazing Casement or awning windows Closed eaves Mechanical ventilation/air conditioning
Living and work areas	Facing venue	10 mm laminated glazing Casement or awning windows 40 mm (minimum) solid core external doors with acoustic seals Sliding doors must be fitted with acoustic seals Closed eaves No vents to outside walls/eaves Mechanical ventilation/air conditioning
	Side on to venue	6 mm laminated glazing Casement or awning windows Closed eaves Mechanical ventilation/air conditioning

Noise levels under worst case meteorological conditions are predicted to exceed day assigned levels by up to 19 dBA at SR01, up to 22 dBA at SR02, up to 7 dBA at SR03 and up to 12 dBA at SR04.

Suitable screening of outdoor areas may be required at SR01, SR02 and SR04, in order to provide one outdoor area of suitable acoustic amenity.

Package A insulation measures may be required at SR01, SR02 and SR04, with Package B requirements at SR03.

Such requirements for outdoor area screening and provision of insulation packages will be assessed by completion of an at property inspection, in order to provide recommended acoustic treatments.

### 7.2.2 Special Control Area

A *Special Control Area* provides for a noise buffer to protect Albany Motorsport Park from incompatible residential encroachment, with development approval only provided when minimum house design treatments to mitigate noise are implemented.

The Local Planning Scheme could be amended to include a new *Special Control Area*, through rezoning the Albany Motorsport Park site from 'Priority Agriculture' to 'Special Use'. The new *Special Control Area* for Albany Motorsport Park would then be added to existing *Special Control Areas*, established in Part 5 of the Local Planning Scheme.

Further updates to the Scheme would be made to establish the purpose of the *Albany Motorsport Park Noise Special Control Area* and requirements of proposed residential development:

- a. Allow for the ongoing operations of the Albany Motorsport Park and require the operators to incorporate additional noise attenuation measures (e.g. earthen bunds, noise walls) to reduce noise egress into adjoining sensitive premises; including operating under an approved Noise Management Plan.
- b. Ensure that new noise sensitive developments within the *Special Control Area* incorporate design criteria in accordance with the *AS/NZS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors*, to reduce noise impacts from the Albany Motorsport Park.
- c. No dwelling or other noise-sensitive development within the *Special Control Area* shall be approved until such time as Local Government is satisfied that the design complies with the Package A or B (as appropriate) house insulation measures specified in the Implementation Guidelines for State Planning Policy 5.4.
- d. The Local Government may grant approval for noise sensitive premises and impose conditions on the approval to require the applicant to incorporate design and construction methods/materials to reduce noise impacts into the dwelling.
- e. The Local Government shall request the Commission impose a condition on the approval for the creation of any new lots created as a result of subdivision within the *Albany Motorsport Park Noise Special Control Area* be required to have a memorial placed on the Certificate of Title stating that the land may be subject to temporary high noise levels from activities conducted at the Albany Motorsport Park.



## *Special Control Area extent*

The extent of the Special Control Area has been guided by the completion of noise modelling for a typical event to be held at AMP, with a race meeting consisting of a multi-use track event considered a typical event.

Outdoor noise levels are reduced by 5-10 dBA by screening outdoor areas such that the building forms a barrier between noise from motorsport events.

Based on the daytime outdoor noise criterion outlined in Table 7-1 and the reduction of up to 10 dBA achieved through building screening:

- Development areas with predicted  $L_{A10}$  noise levels below 55 dBA will require no additional mitigation. Only notifications on the title advising of possible noise impacts from a nearby motorsport venue would be required.
- Development areas with predicted  $L_{A10}$  noise levels between 55 dBA and 65 dBA would require building screening (building envelopes) or fencing in order to meet an outdoor noise level of 55 dBA.
- Development areas predicted to exceed  $L_{A10}$  noise levels of 65 dBA will remain development free.

With regard to indoor noise levels, a typical residence would see indoor levels approximately 15 dBA lower than outdoor levels. Indoor noise levels are reduced by increasing insulation. SPP 5.4 outlines two 'deemed to comply' packages for residential development, Package A and Package B (refer to Table 7-2).

Based on daytime indoor noise criterion outlined in Table 7-1 and the reduction achieved by implementing design Package A (approximately 5 dBA) and Package B (approximately 10 dBA):

- Development areas with predicted daytime  $L_{A10}$  noise levels below 55 dBA will require no additional noise insulation. Only notifications on the title advising of possible noise impacts from a nearby motorsport venue would be required.
- Development areas with predicted daytime  $L_{A10}$  noise levels between 55 dBA and 60 dBA will require Package A noise insulation.
- Development areas with predicted daytime  $L_{A10}$  noise levels between 60 dBA and 65 dBA will require Package B noise insulation, in order to meet an internal noise level of 40 dBA.
- Development areas predicted to exceed  $L_{A10}$  noise levels of 65 dBA will remain development free.

Based on the above, the special control area would extend from the 65 dBA contour (red contour shown on Figure 7-1) to the 50 dBA (yellow) contour. From Figure 7-1, the northern quadrant from the western boundary to the eastern boundary of AMP is within the existing Mirambeena Strategic Industrial Area buffers.

Requirements to inform the special control area are as follows:

- Areas between the site boundary and the 65 dBA (red) contour would remain residence free. From Figure 7-1, the proposed residence free area only marginally extends beyond the existing Mirambeena Strategic Industrial Area buffers to the south-east of AMP.
- Areas between the 65 dBA (red) and 60 dBA (orange) contours would have conditions requiring Package B noise insulation and building screening (building envelopes) or fencing in order to meet outdoor noise levels.

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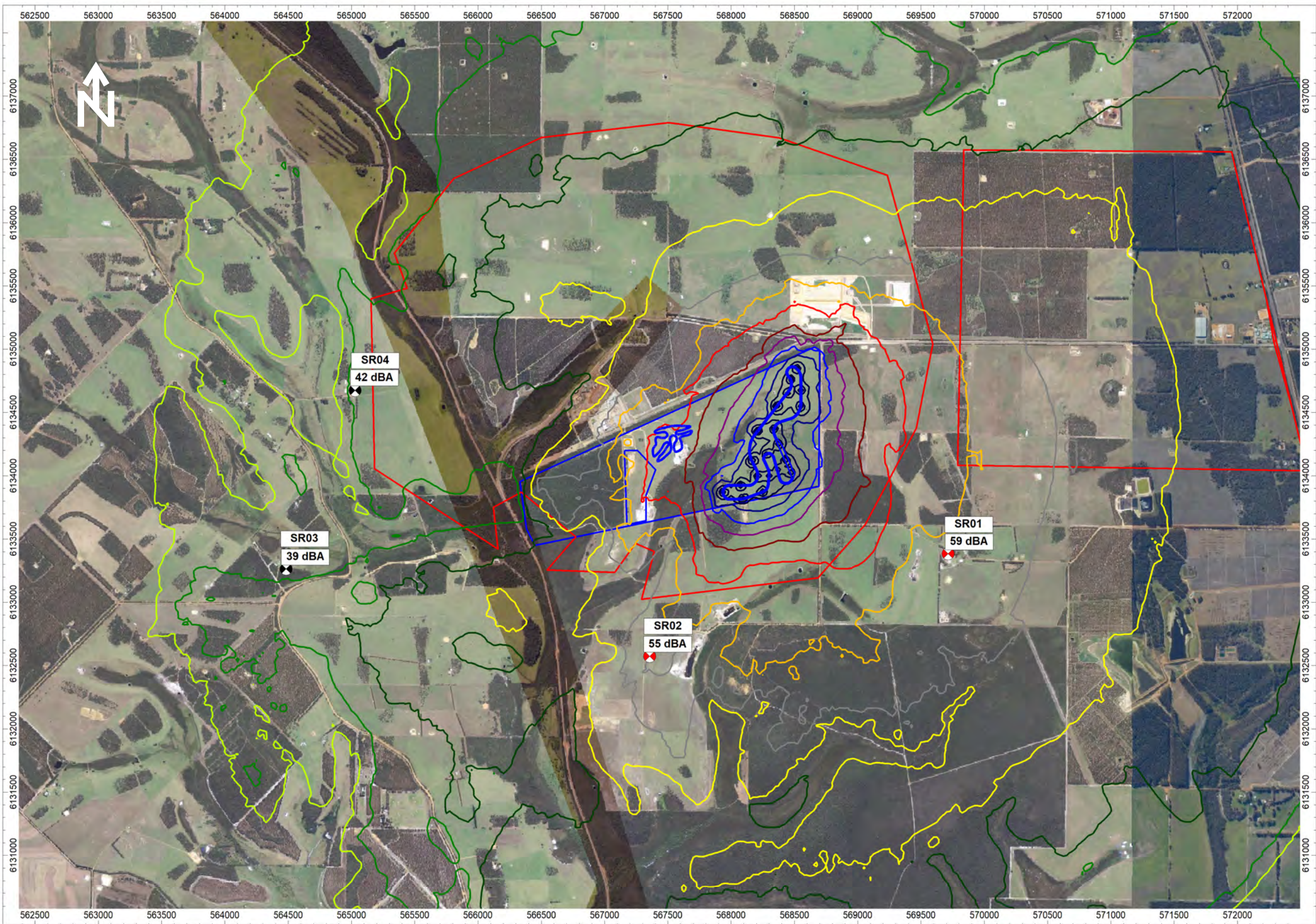
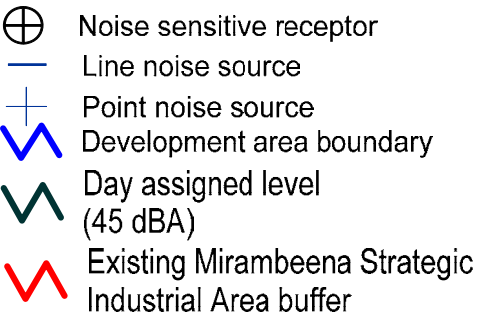
- Areas between the 60 dBA (orange) and 55 dBA (grey) contours would have conditions requiring Package A noise insulation and building screening (building envelopes) or fencing in order to meet outdoor noise levels.
- Areas between the 55 dBA (grey) and 50 dBA (yellow) contours would have no screening or insulation requirements, just a requirement for notifications on the title advising of possible noise impacts from a nearby motorsport venue.

In each case, closest cadastral boundaries should be used to define the Special Control Area, informed by the noise modelling results presented in Figure 7-1.

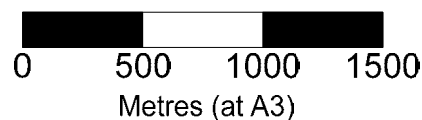
**PREDICTED NOISE LEVELS**



**LEGEND**



**SCALE**



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 HORIZONTAL DATUM: Geocentric Datum of Australia (GDA)  
 GRID: Map Gnd of Australia 1994, Zone 50

DATE 10.08.2020	FILE LOCATION N:\AU\Albany WA\Projects\61137331\Technical\Noise
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**ALBANY MOTORSPORT PARK**

**Noise Assessment**

**PREDICTED DAY NOISE LEVELS  
MULTI-USE TRACK EVENT**

Noise contours:  $L_{A10}$   
 Grid height: 1.4 m  
 Worst case meteorological conditions

**FIGURE 7-1**



## 8. Conclusions

The results presented in this assessment demonstrate that for some events, namely multi-use track and motocross events, there will be occasions when the predicted noise levels from Albany Motorsport Park exceed the assigned noise levels at the nearest sensitive receptors.

As such, it is recommended that appropriate management and mitigation measures are implemented for the project.

Noise from the Albany Motorsport Park is able to be reduced at source by including noise bunds or similar to screen noise from the closest existing sensitive receptors. Based on the distance between the facility and the nearby sensitive receptors, noise barriers are only likely to lead to slight reductions in noise levels, by up to 3-5 dBA, depending on location and height. In this regard, other mitigation measures have been outlined.

Provision of at property treatments to maintain suitable acoustic amenity at existing noise sensitive receptors in the vicinity of AMP. Such requirements for outdoor area screening and provision of insulation packages will be assessed by completion of at property inspections, in order to provide recommended acoustic treatments. In addition, as events are only planned during the day time period, predicted noise levels will not lead to sleep disturbance, and therefore will be less intrusive.

The existing industrial buffer in the vicinity to the proposed Albany Motorsport Park prevents the construction of any habitable dwellings, reducing the likelihood of sensitive receptors being developed in an area impacted by noise from motorsport activities in the future.

Additional planning controls to establish a *Special Use Zone* with an associated *Special Control Area* should be implemented to prevent further residential development, unless specific planning and building controls are implemented.

This assessment predicts exceedance of the assigned noise levels during certain event types is likely. As such consideration will be made to the preparation of a Noise Management Plan, prepared in line with requirements outlined in this report, as the project progresses.

## Appendices

## Appendix A - Glossary of noise terminology

Term	Definition
Ambient noise	Level of noise from all sources, including background noise from near and far and the source of interest
A-weighted	A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. A-weighted sound level is described as LA dB.
Background noise	Noise level from sources other than the source of concern.
dB	Decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.
Hz	Units for frequency are known as Hertz.
Impulsive noise	An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness is: "A variation in the emission of a noise where the difference between $L_{Apeak}$ and $L_{Amax, slow}$ is more than 15 dB when determined for a single representative event".
$L_{Aslow}$	This is the noise level in decibels, obtained using A-weighting and S time weighting as specified in AS1259.1-1990. Unless assessing modulation, all measurements use the slow time weighting characteristic.
$L_{Afast}$	This is the noise level in decibels, obtained using A-weighting and F time weighting as specified in AS1259.1-1990. This is used when assessing the presence of modulation only.
$L_{Apeak}$	This is the maximum reading in decibels using A-weighting and P time weighting as specified in S1259.1-1990.
$L_{Amax}$	$L_{Amax}$ level is the maximum A-weighted noise level during a particular measurement.
$L_{A1}$	$L_{A1}$ level is the A-weighted noise level which is exceeded for 1% of the measurement period and is considered to represent the average of the maximum noise levels measured.
$L_{A10}$	$L_{A10}$ level is the A-weighted noise level which is exceeded for 10% of the measurement period and is considered to represent the intrusive noise level.
$L_{A90}$	$L_{A90}$ level is the A-weighted noise level which is exceeded for 90% of the measurement period and is considered to represent the background noise level.
$L_{Aeq}$	The equivalent steady state A-weighted sound level ('equal energy') in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the average noise level.
$L_{Amax}$ assigned level	Means an assigned level which, measured as a $L_{Aslow}$ value, is not to be exceeded at any time.
$L_{A1}$ assigned level	Means an assigned level which, measured as a $L_{Aslow}$ value, is not to be exceeded for more than 1% of the representative assessment period.
$L_{A10}$ assigned level	Means an assigned level which, measured as a $L_{Aslow}$ value, is not to be exceeded for more than 10% of the representative assessment period.
Linear	Sound levels measured without any weightings are referred to as 'linear' and the units are expressed as dB(lin).
L linear, peak	Maximum reading in decibels obtained using P-time-weighting characteristic as specified in AS 1259.1-1990.
Maximum design sound level	The level of noise above which most people occupying the space start to become dissatisfied with the level of noise.
Modulating noise	A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is: Is more than 3 dB $L_{Afast}$ or is more than 3 dB $L_{Afast}$ in any one-third octave band Is present for at least 10% of the representative assessment period Is regular, cyclic and audible

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Term	Definition
One-third octave band	Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20,000 Hz inclusive.
Representative assessment period	Means a period of time not less than 15 minutes and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.
Reverberation time	Of an enclosure, for a sound of a given frequency or frequency band, the time that would be required for the reverberantly decaying sound pressure level in the enclosure to decrease by 60 decibels.
RMS	Root mean square level; used to represent the average level of a wave form such as vibration.
Satisfactory design sound level	The level of noise that has been found to be acceptable by most people for the environment in question and also to be not intrusive.
Sound pressure level (SPL)	The sound pressure level of a noise source is dependent upon its surroundings (influenced by distance, ground absorption, topography, meteorological conditions etc.) and is what the human ear actually hears. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.
Sound power level (SWL)	Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure levels at known distances. Noise modelling incorporates source sound power levels as part of the input data.
Specific noise	Relates to the component of the ambient noise that is of interest. This can be referred to as the noise of concern or the noise of interest
Tonal noise	A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is: The presence in the noise emission of tonal characteristics where the difference between - The A-weighted sound pressure level in any one-third octave band The arithmetic average of the A-weighted sound pressure levels in the two adjacent one-third octave bands is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{Aslow}$ levels. This is relatively common in most noise sources.

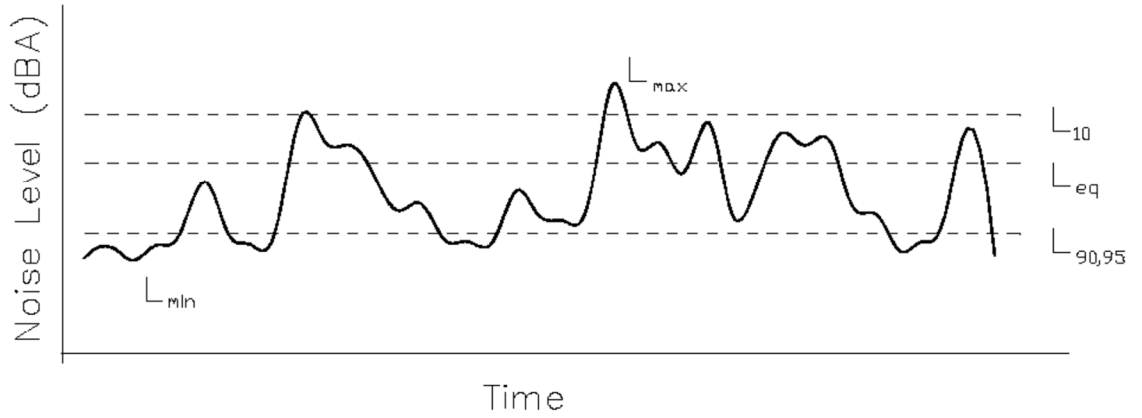
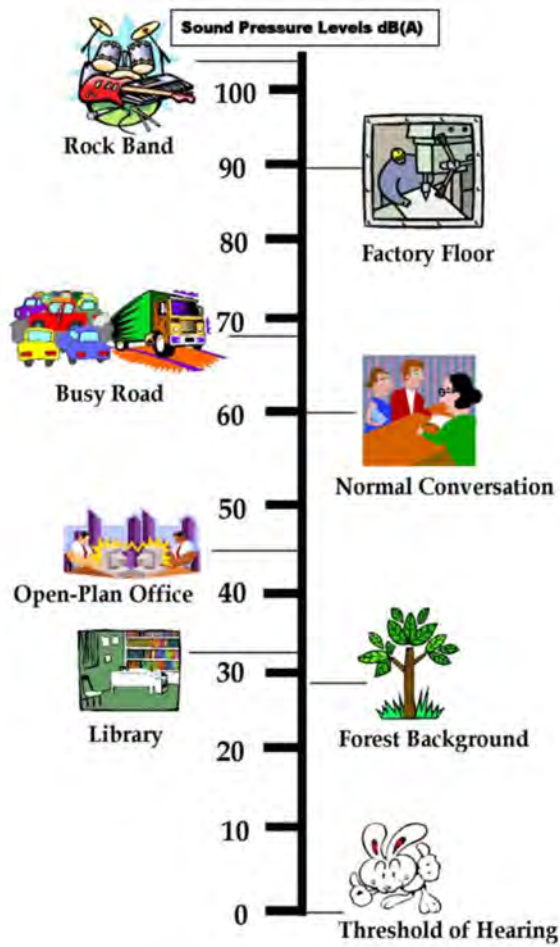


Chart of Noise Level Descriptors

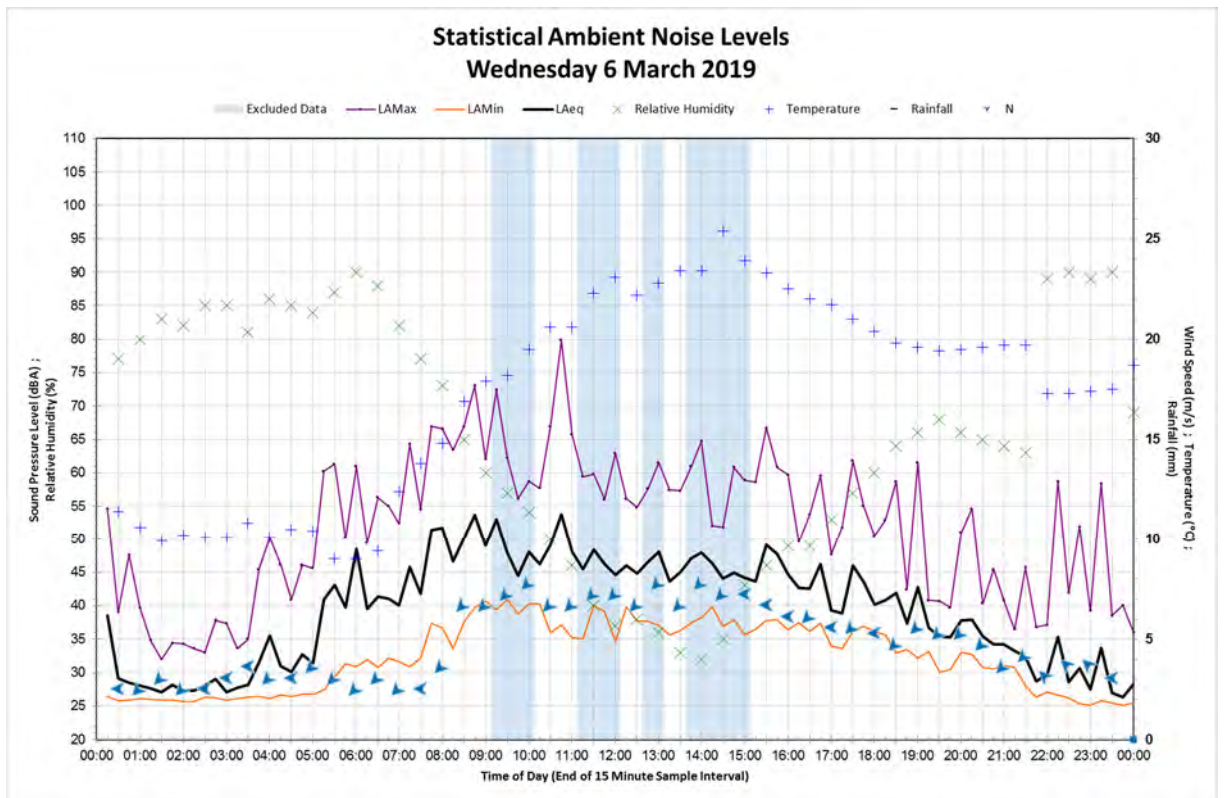
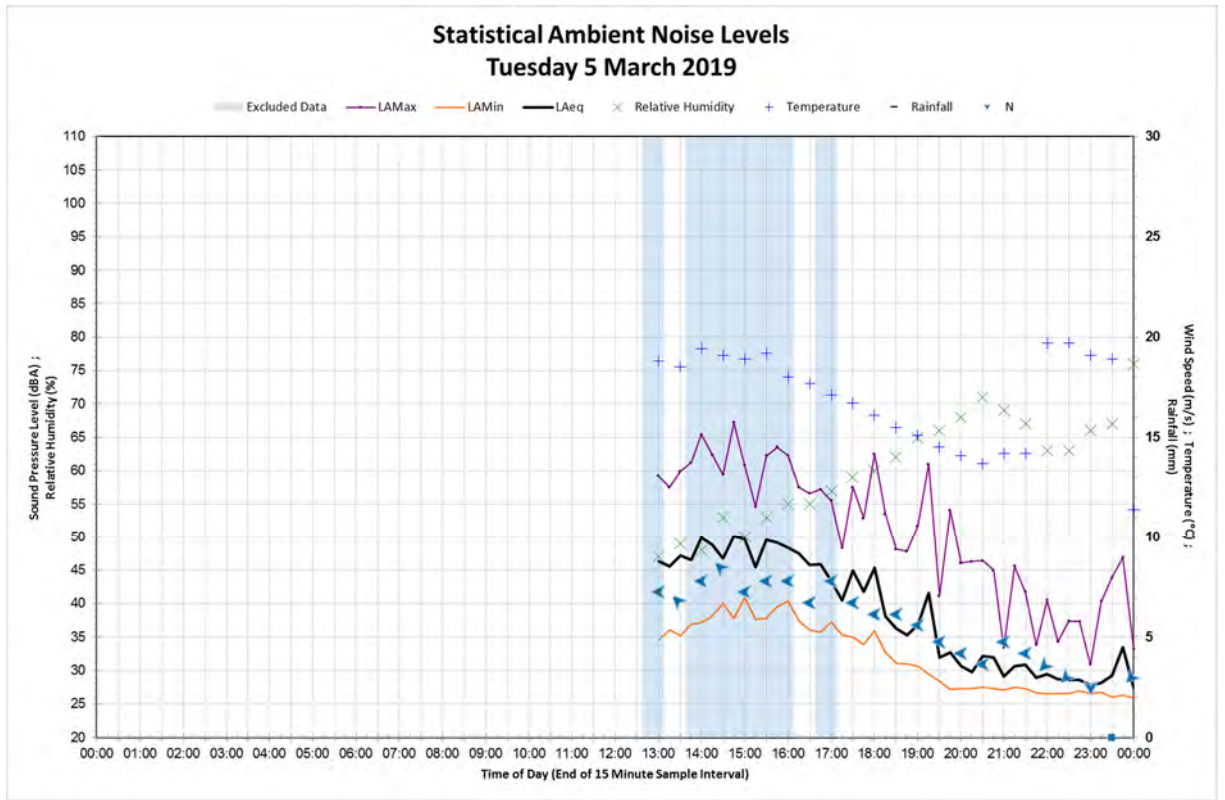


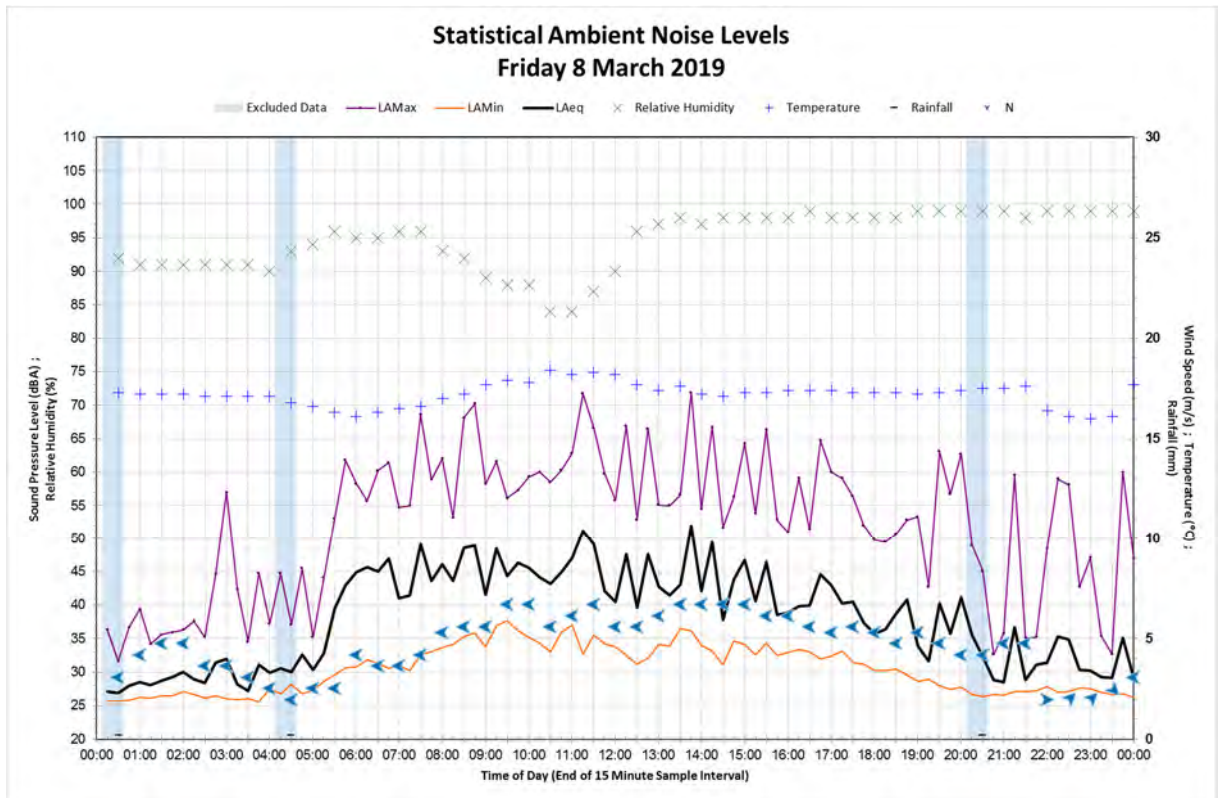
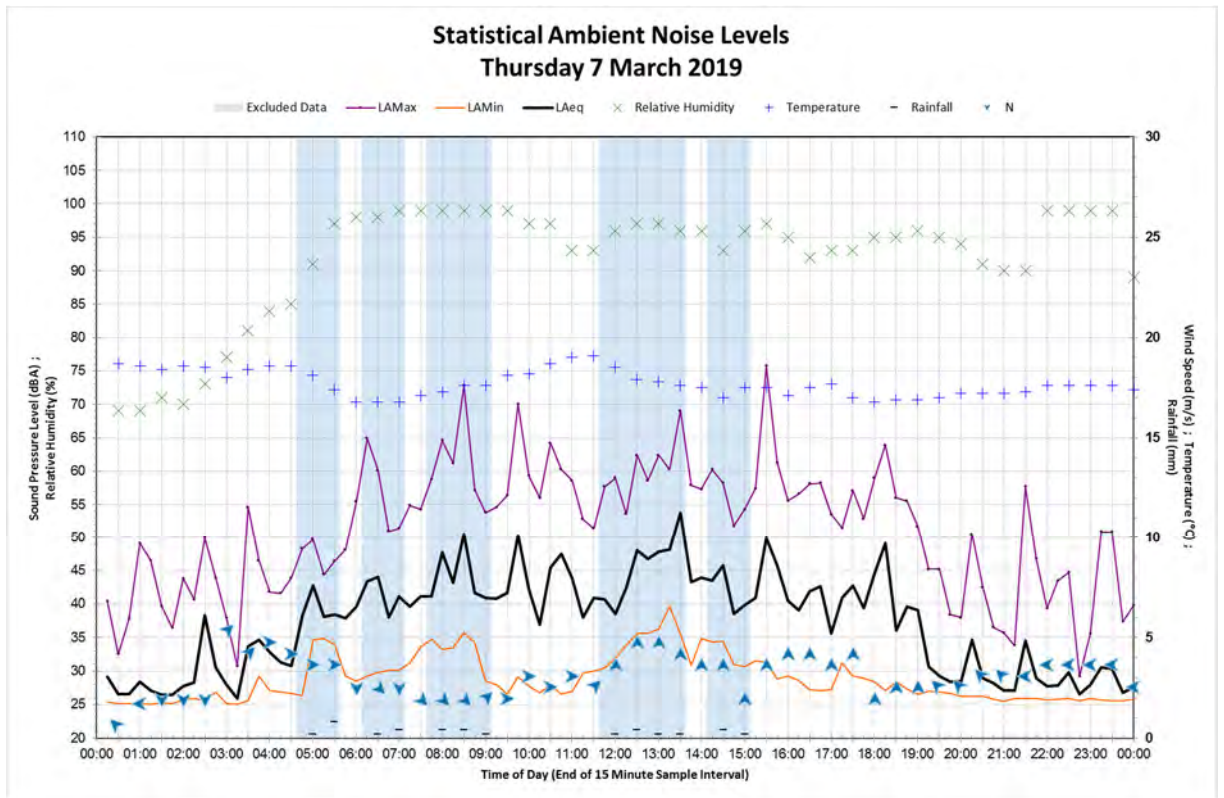
Typical Noise Levels

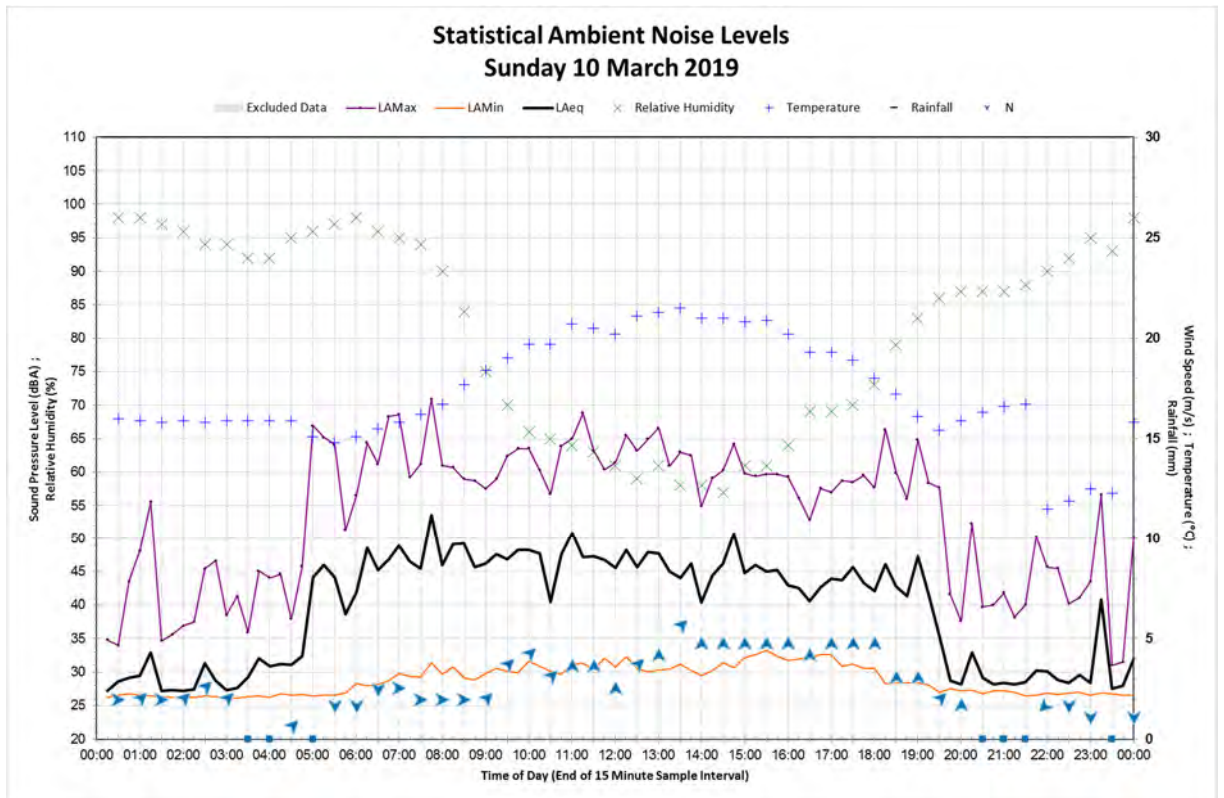
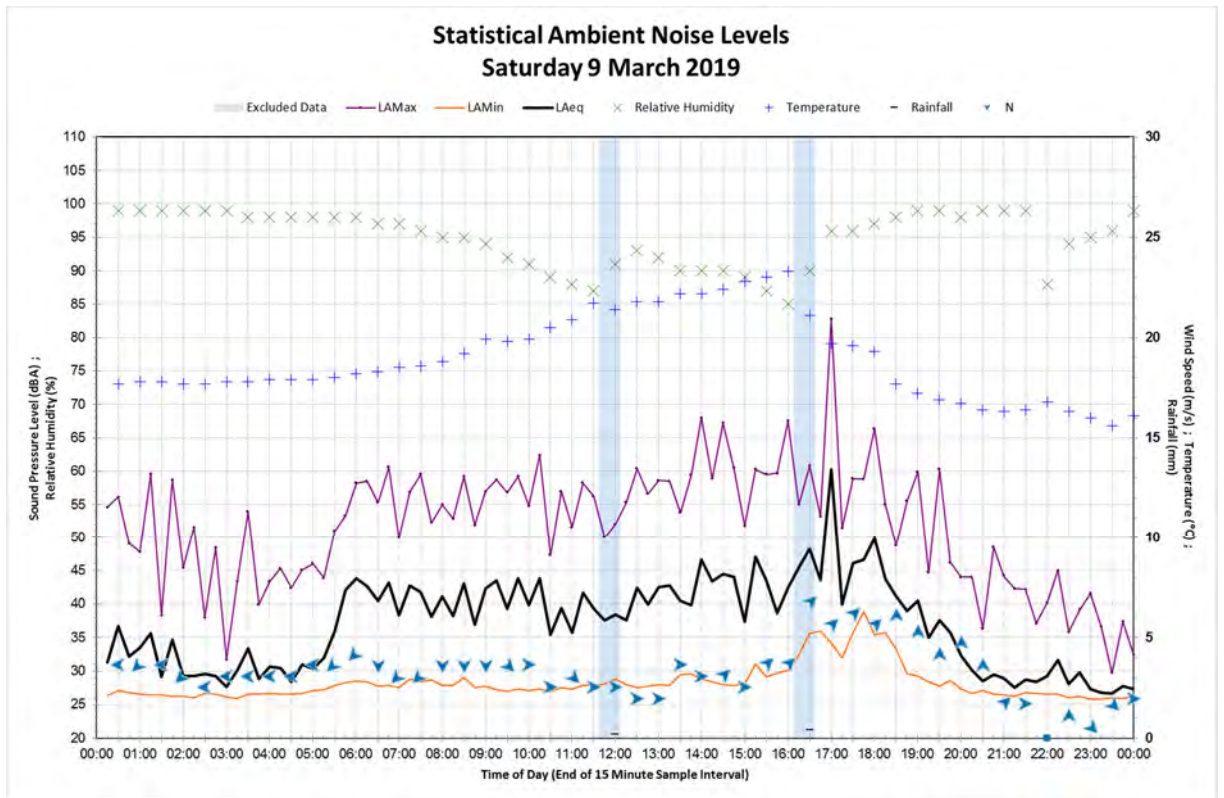


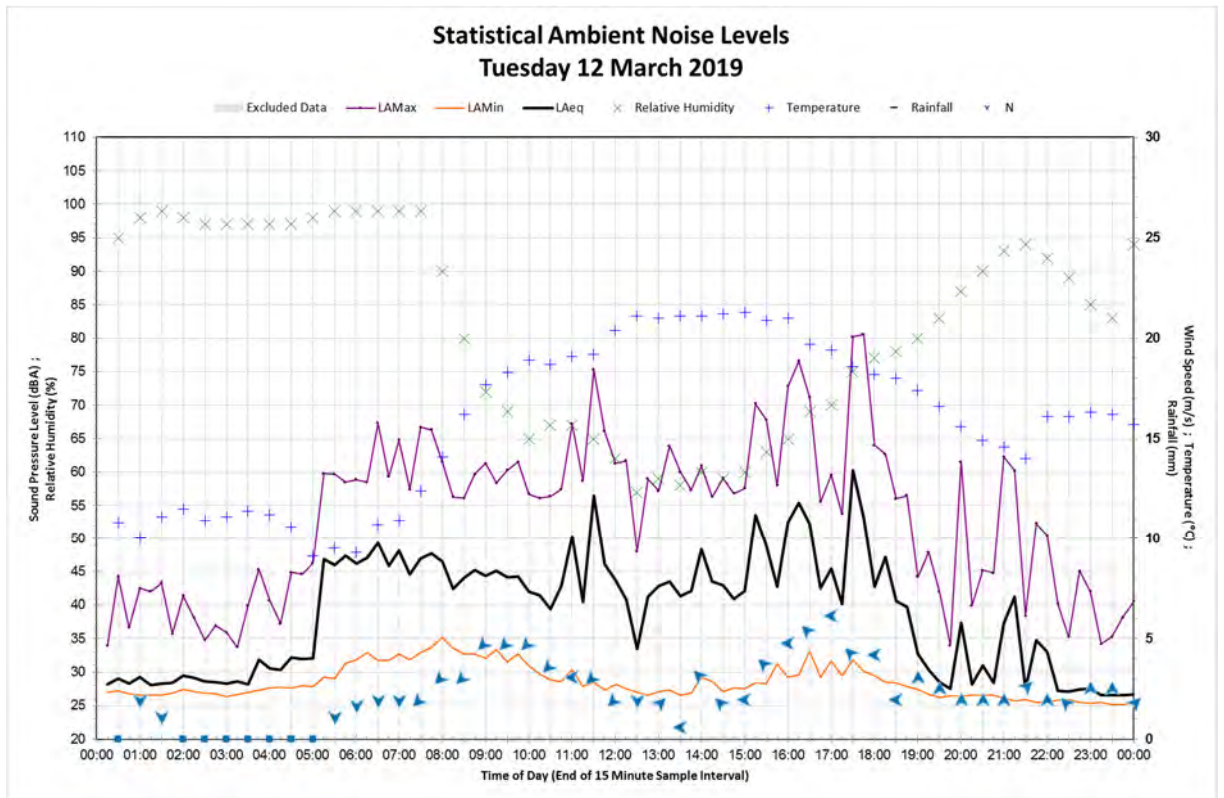
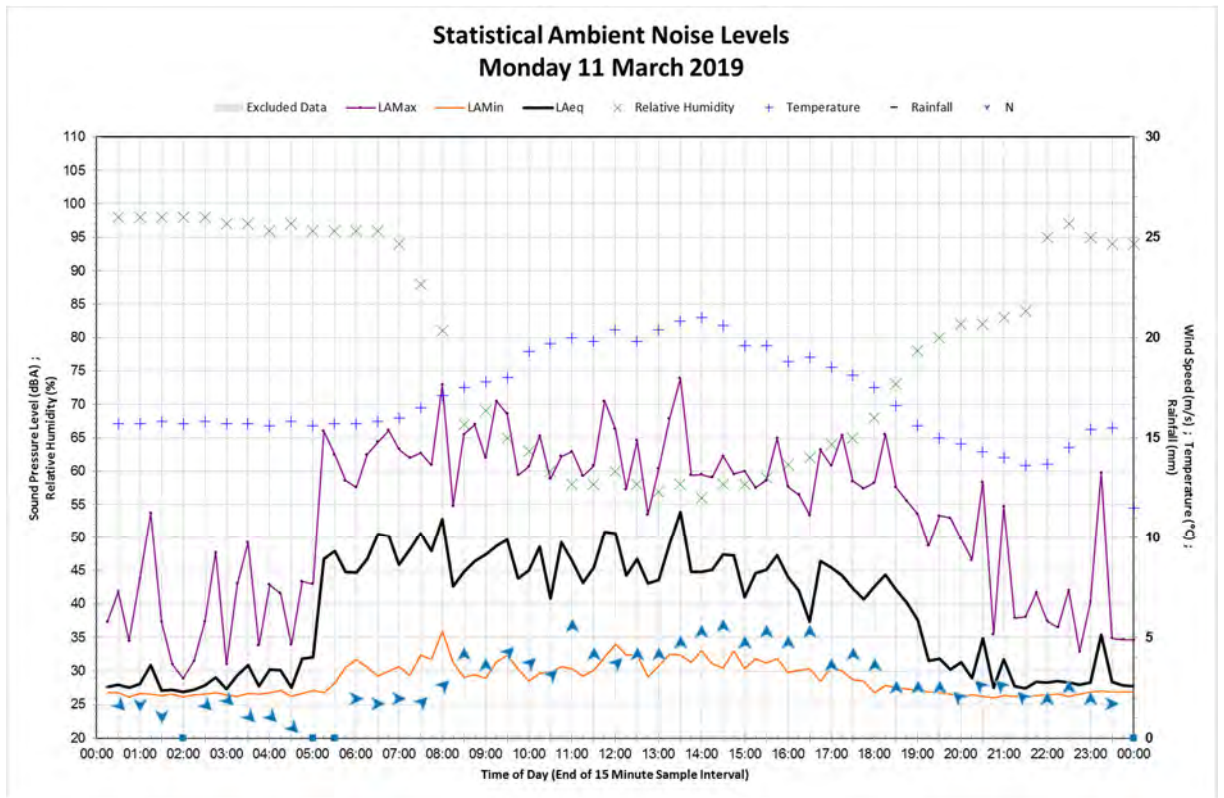
# Appendix B – Monitoring results

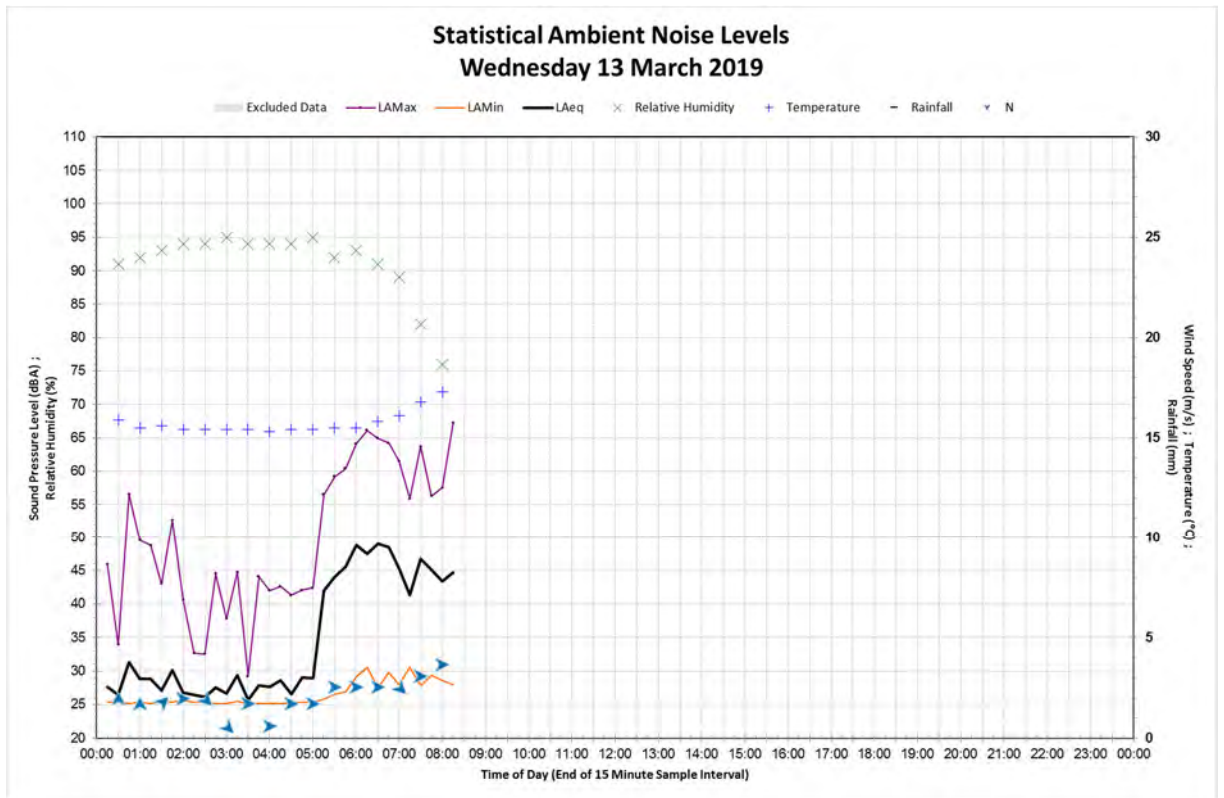
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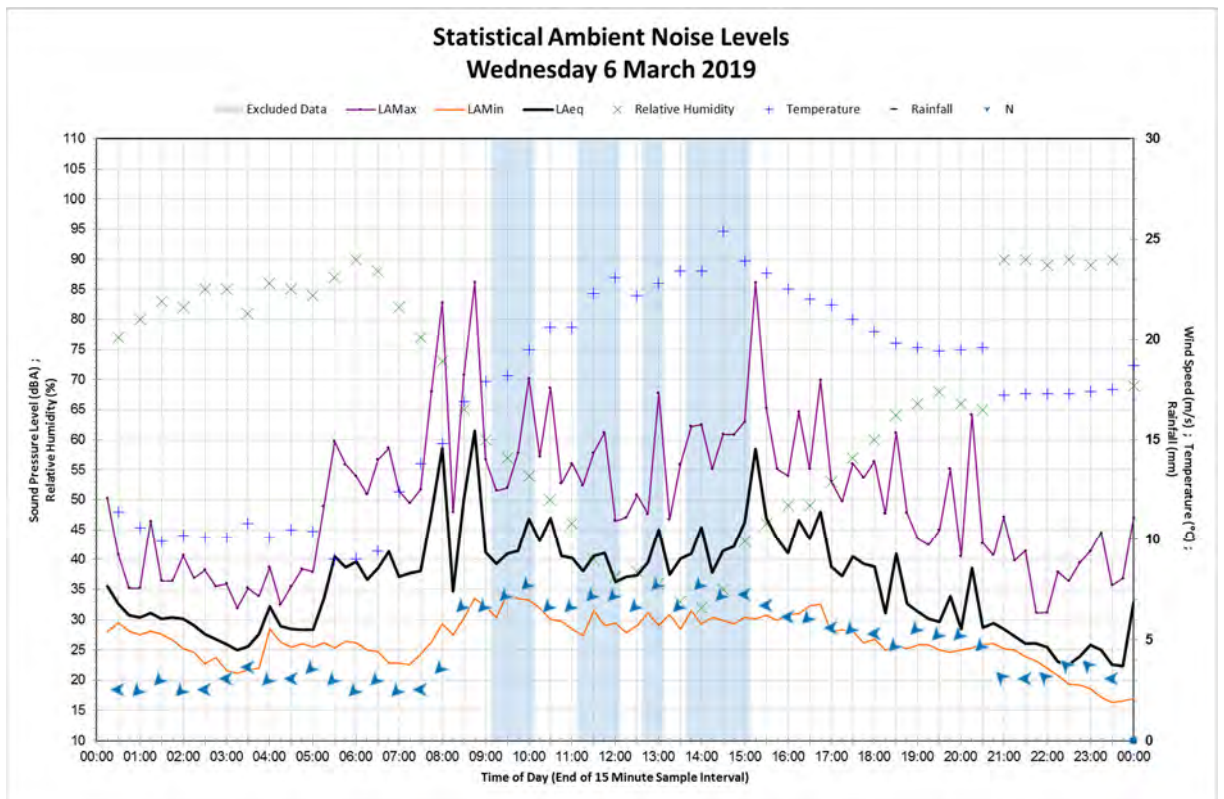
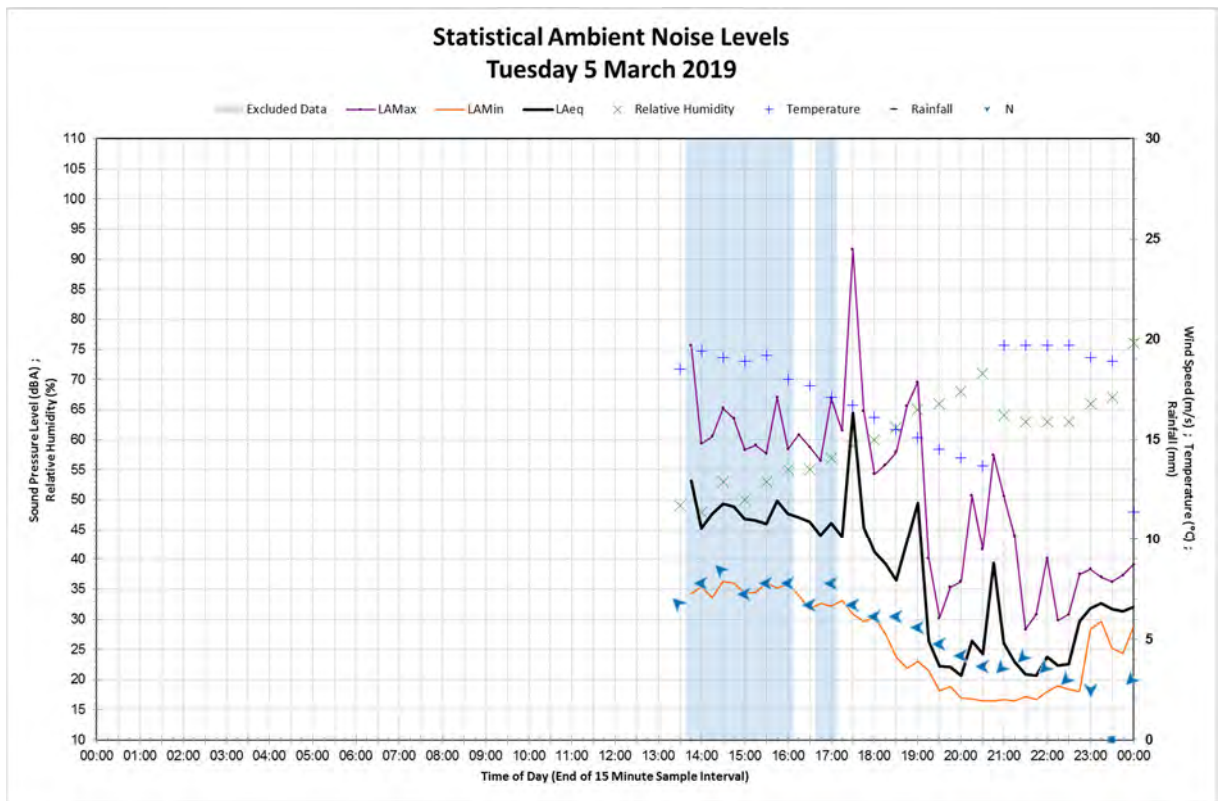


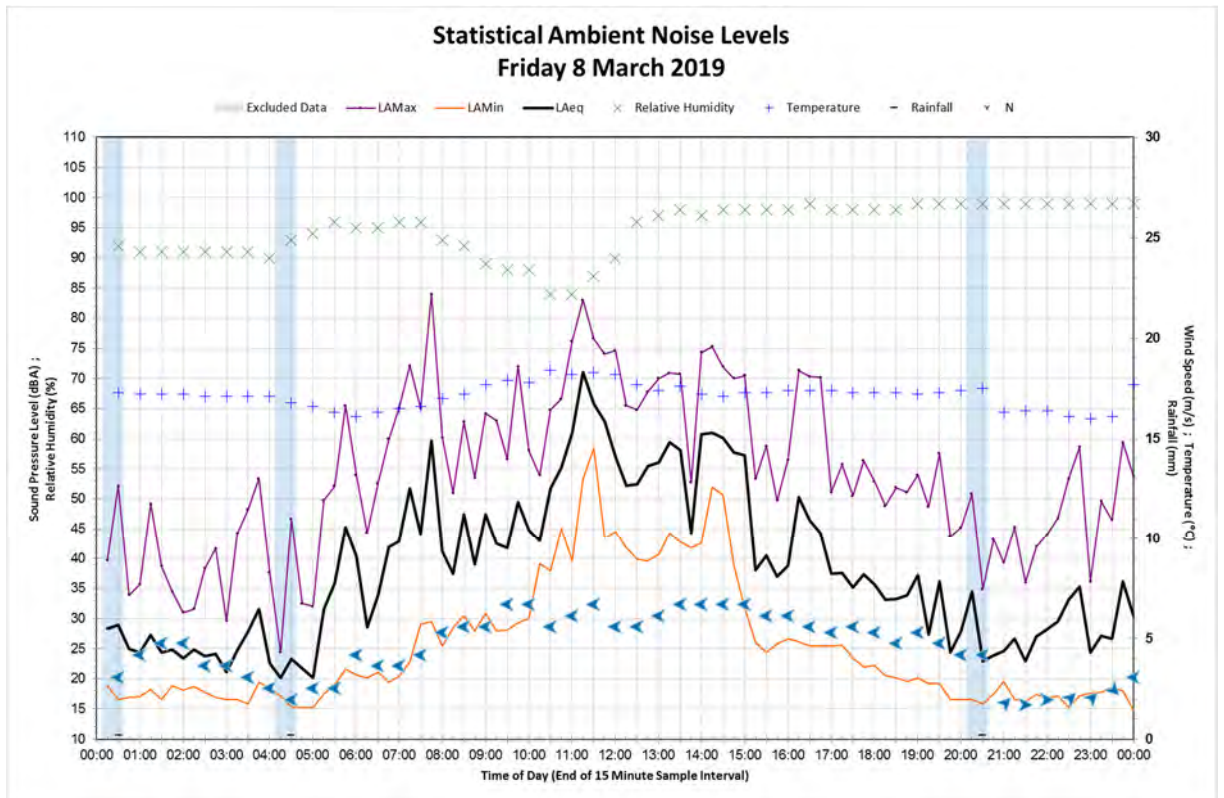
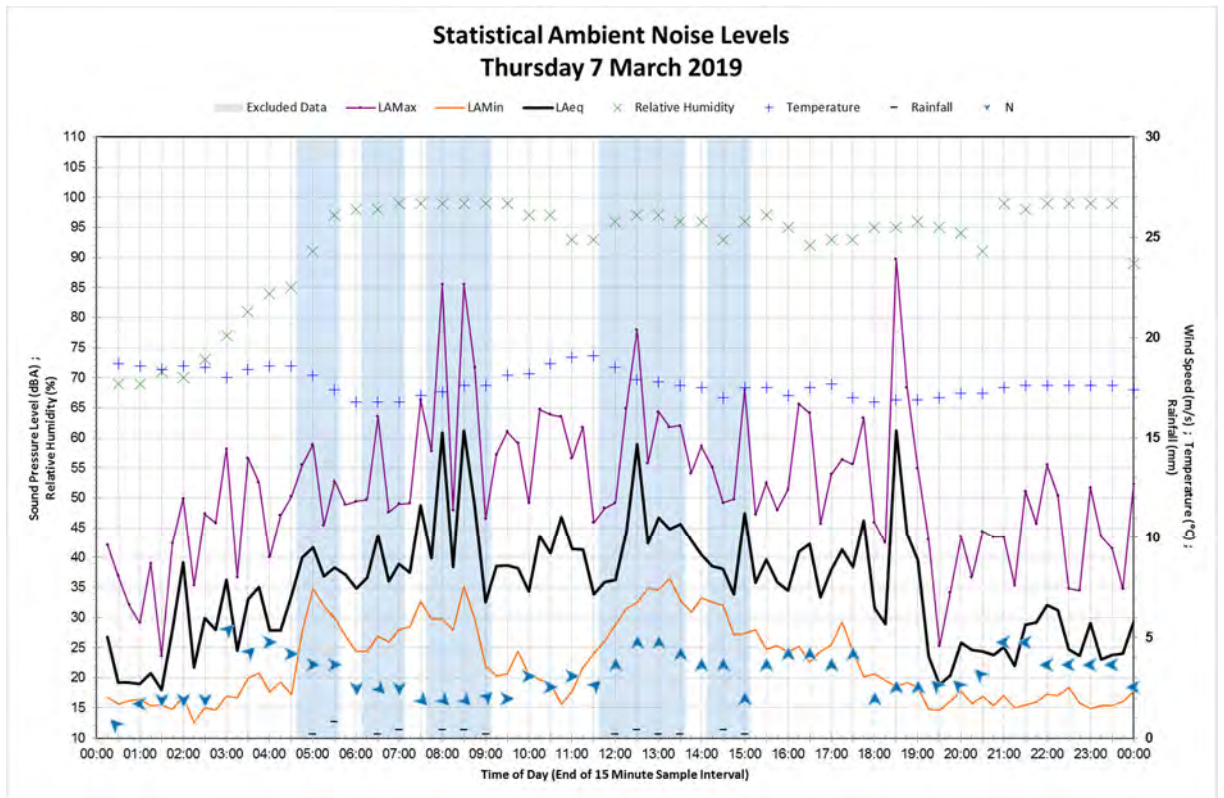


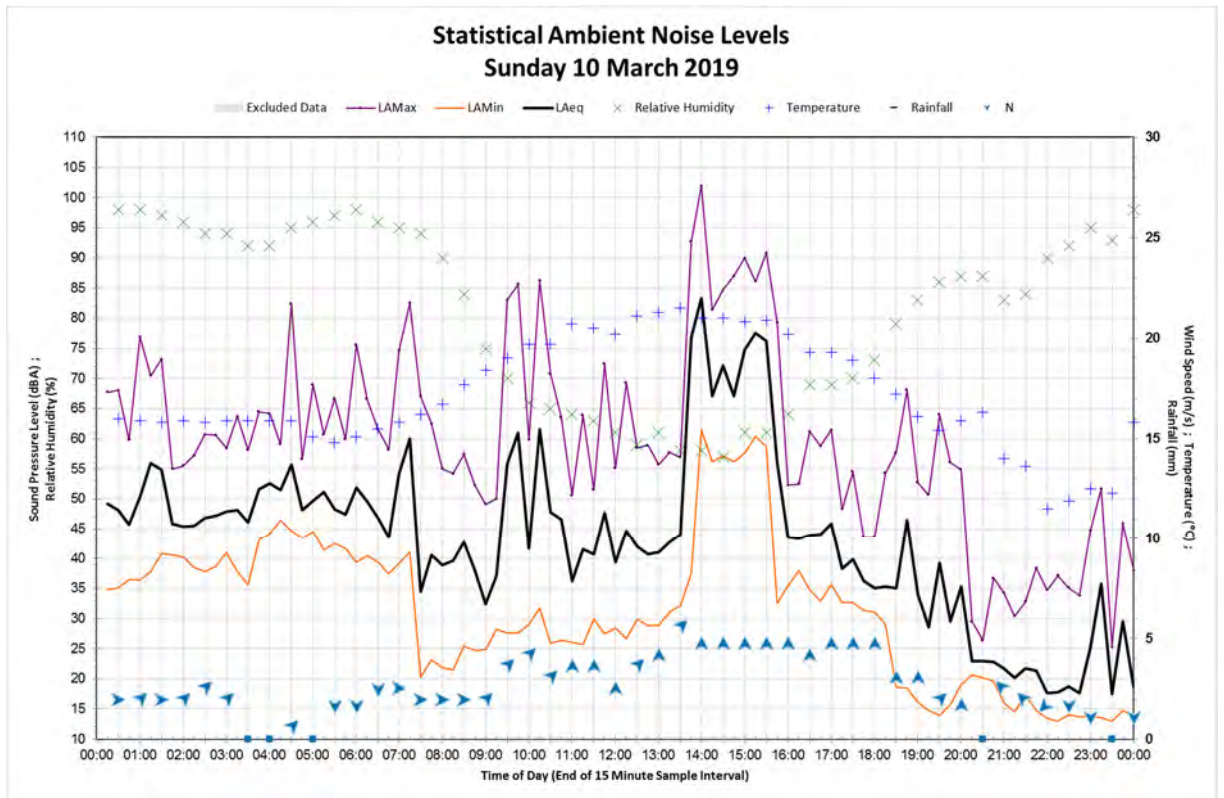
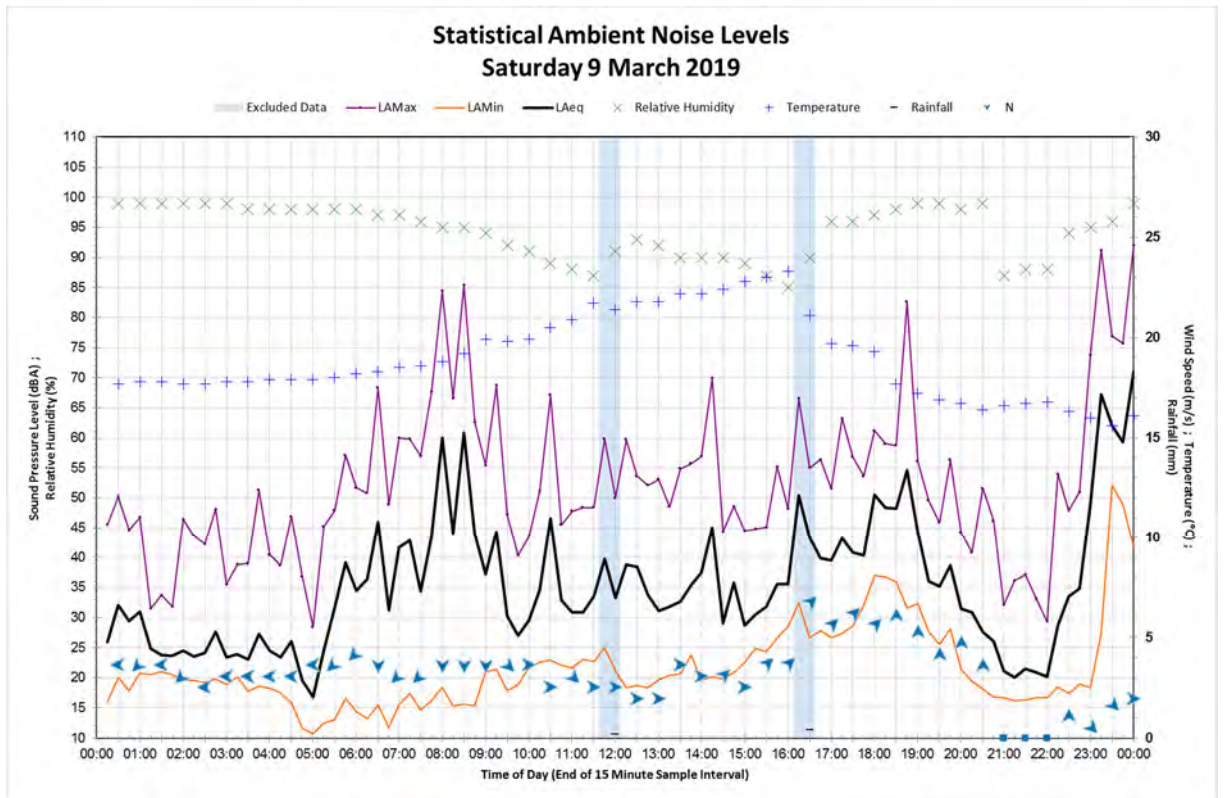




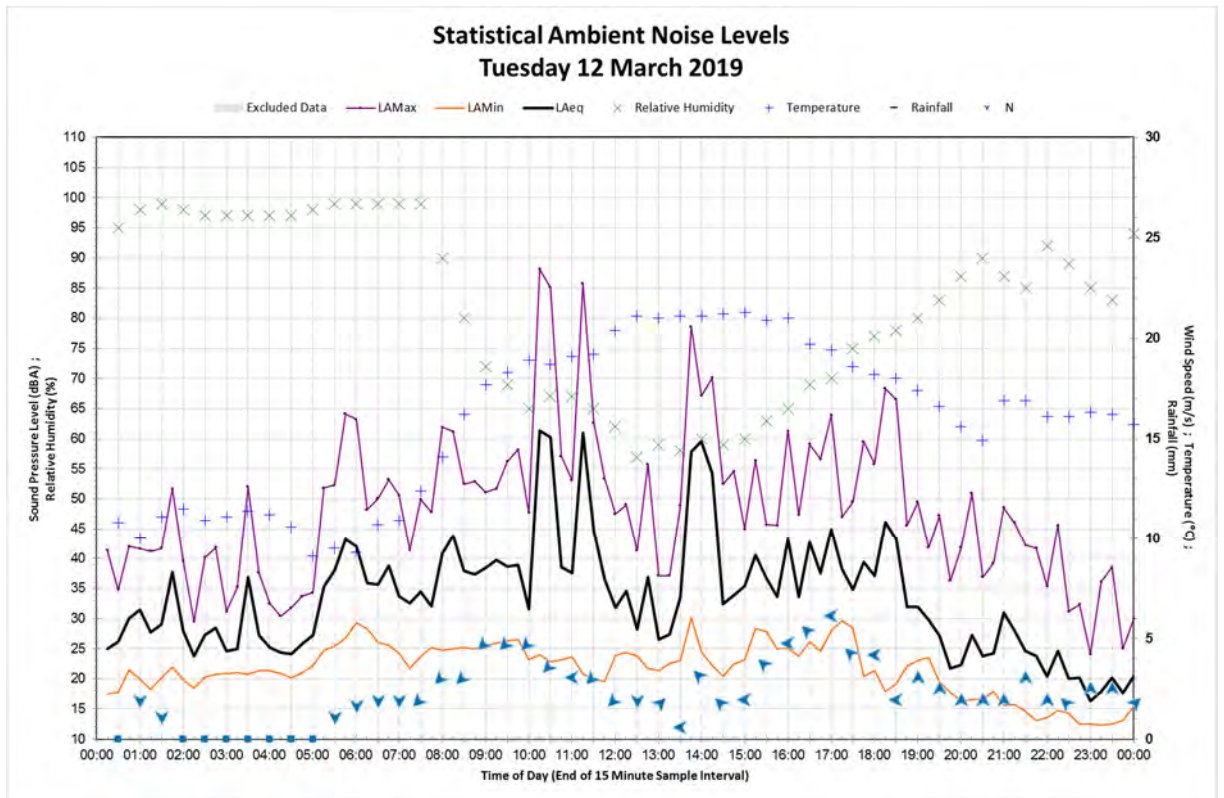
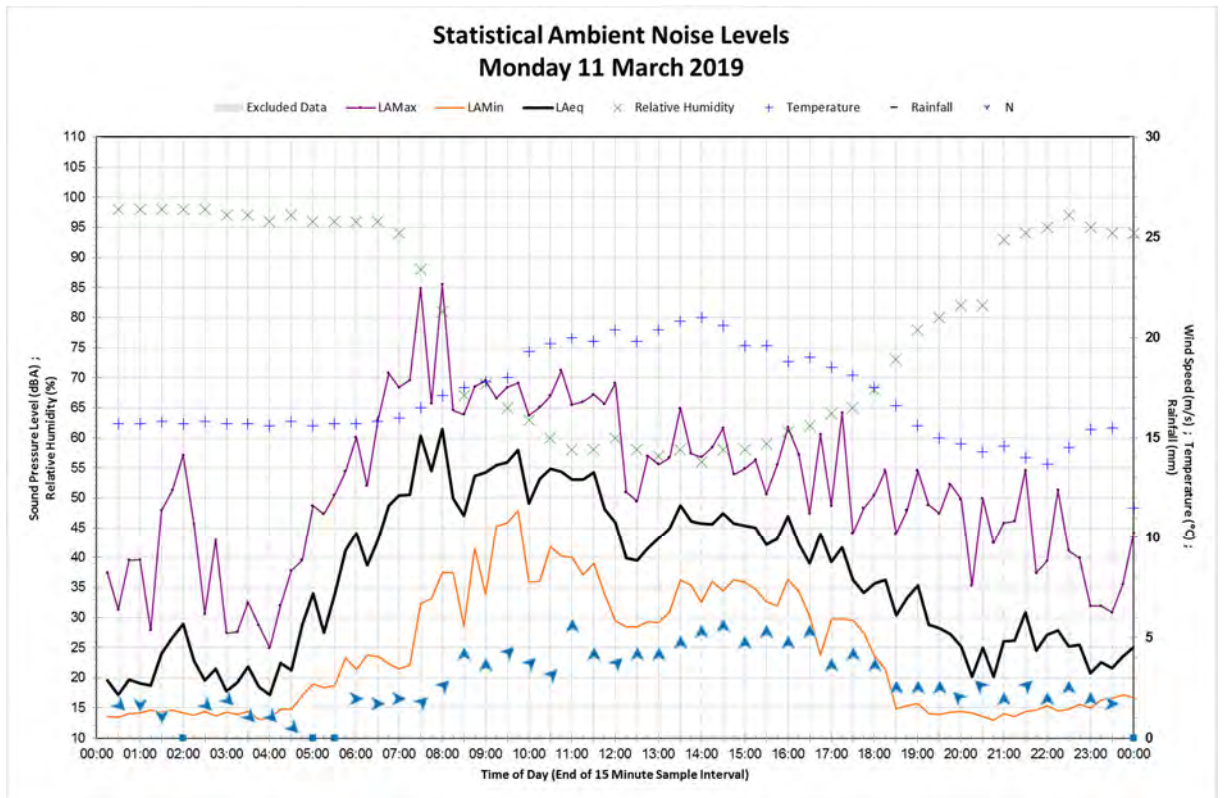
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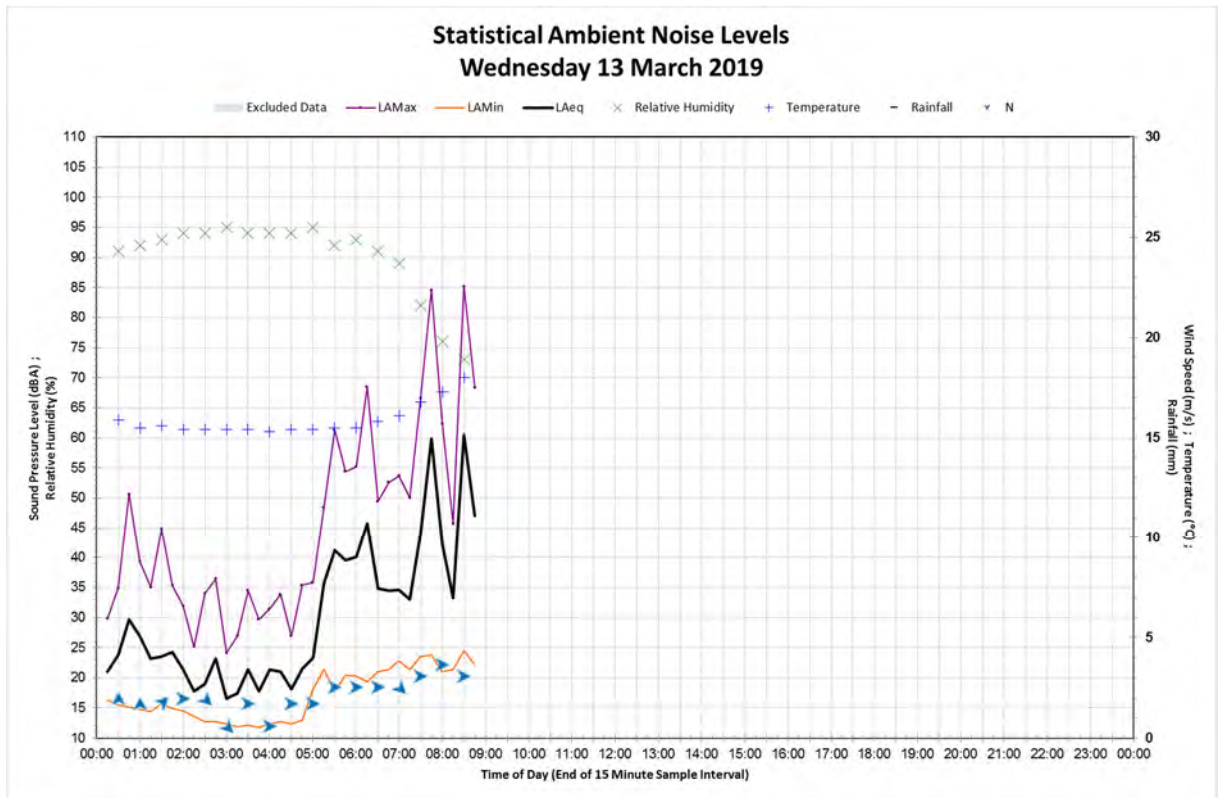




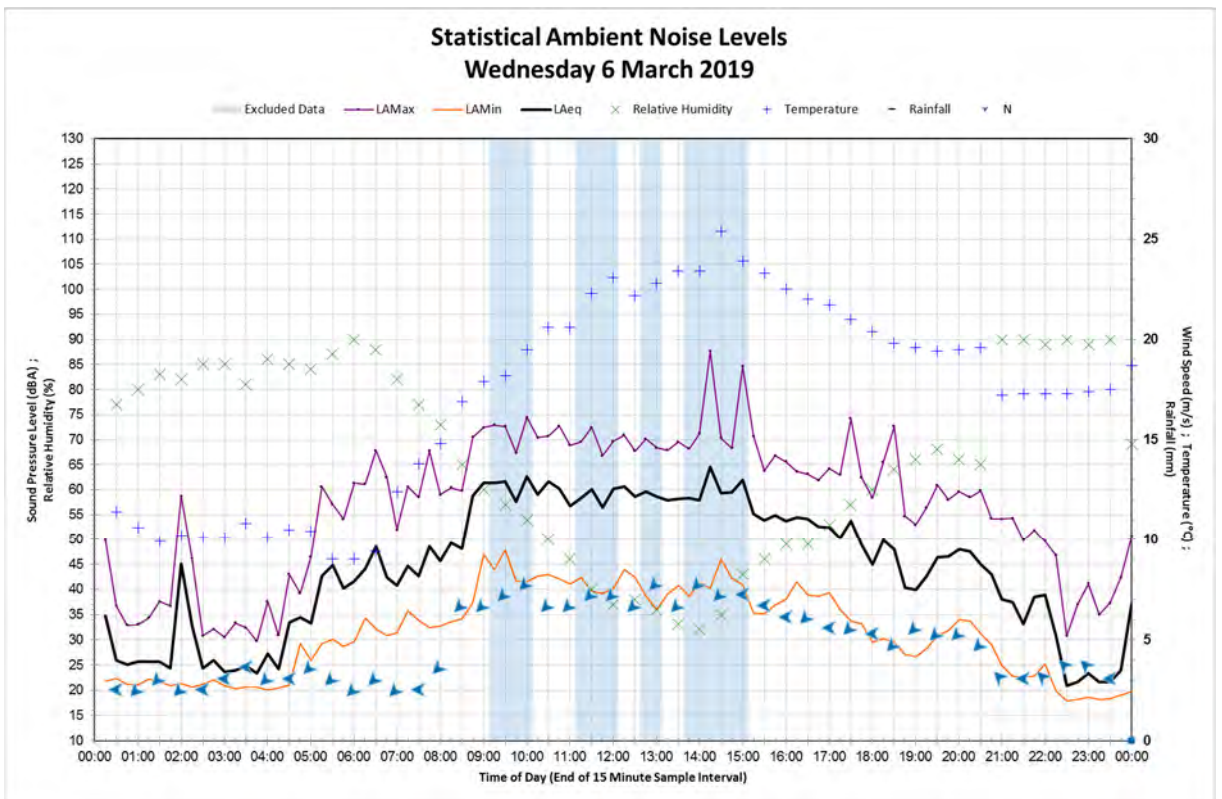
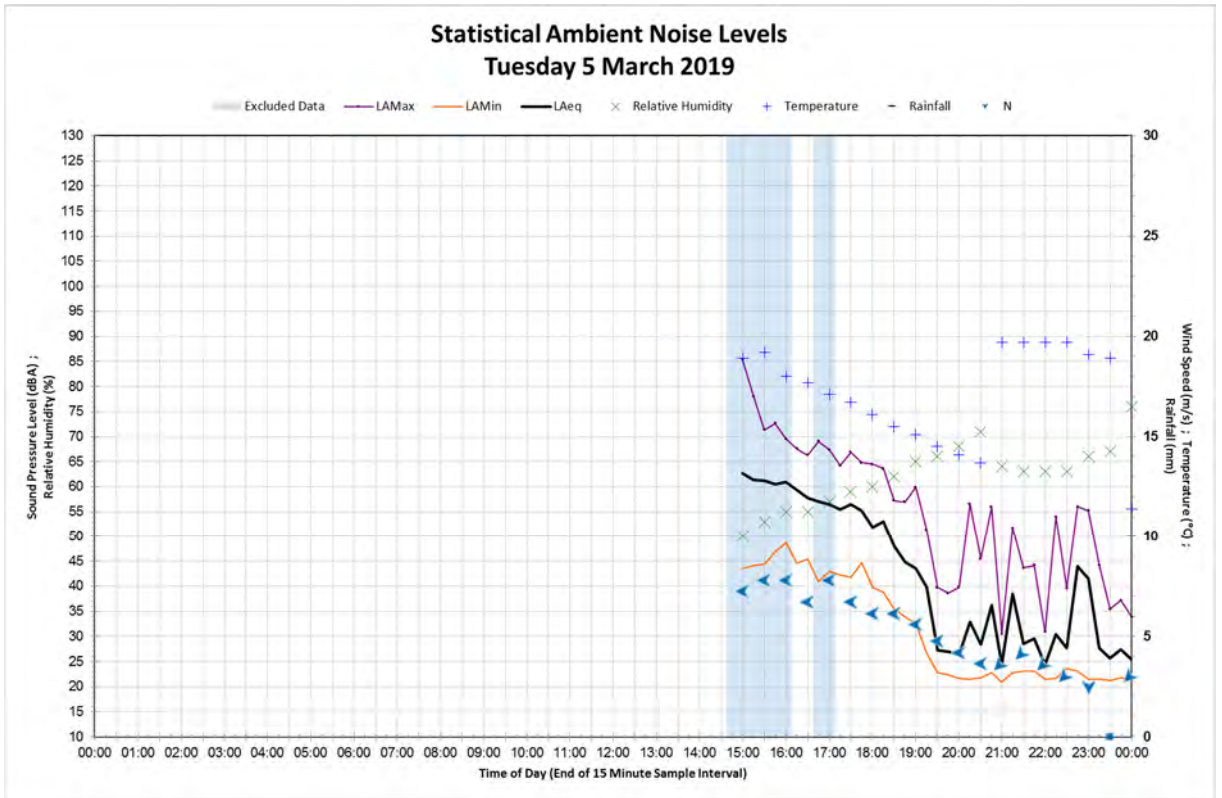


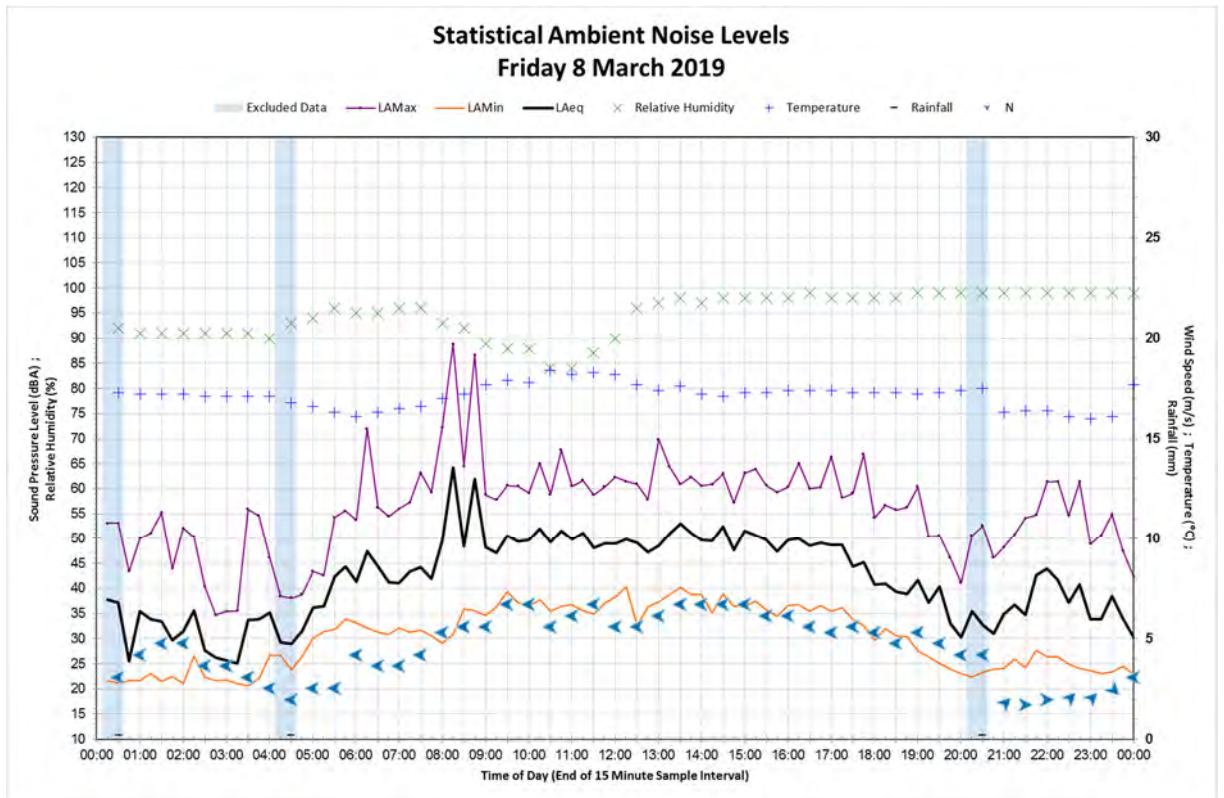
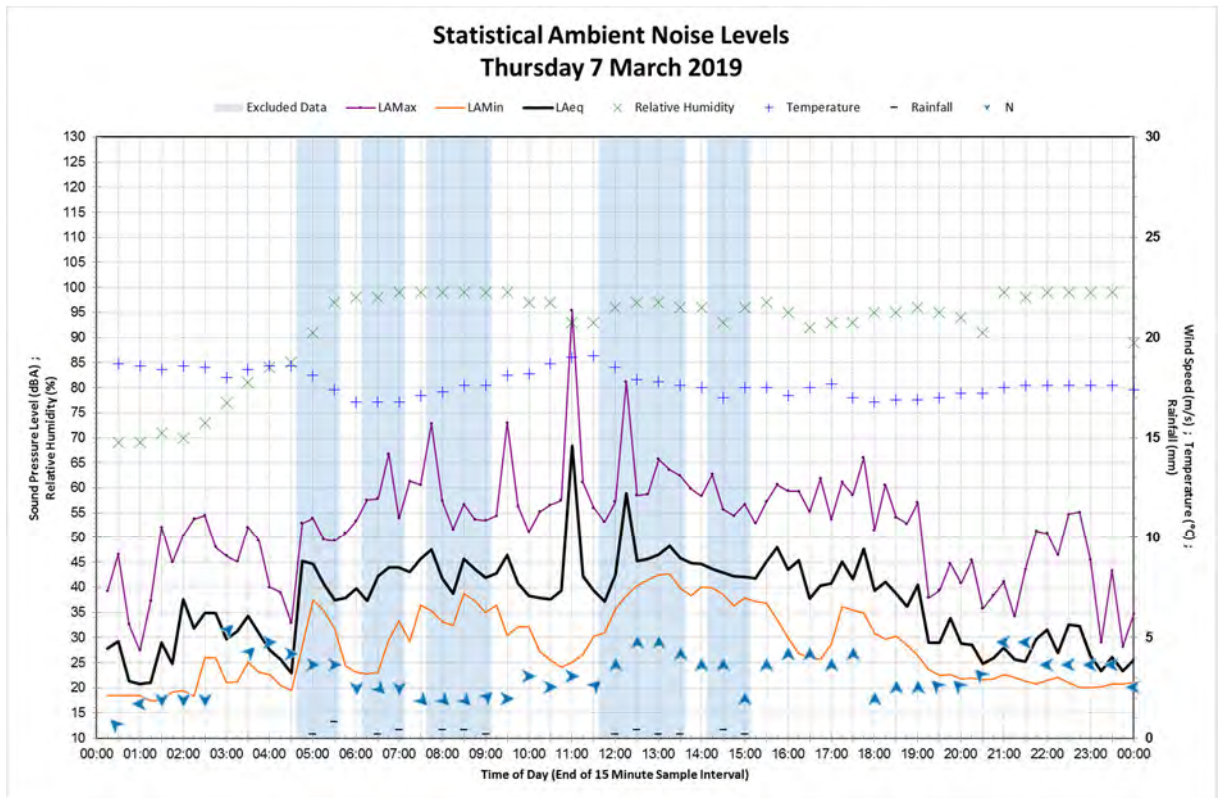


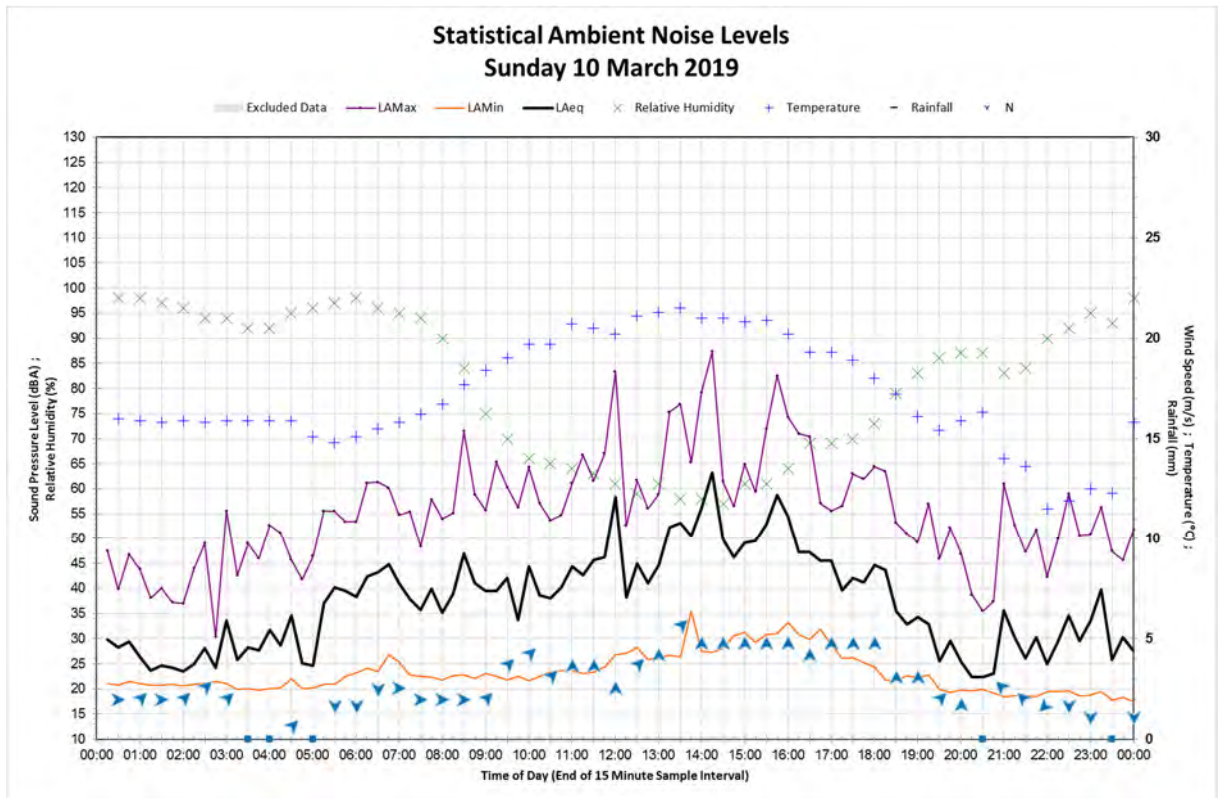
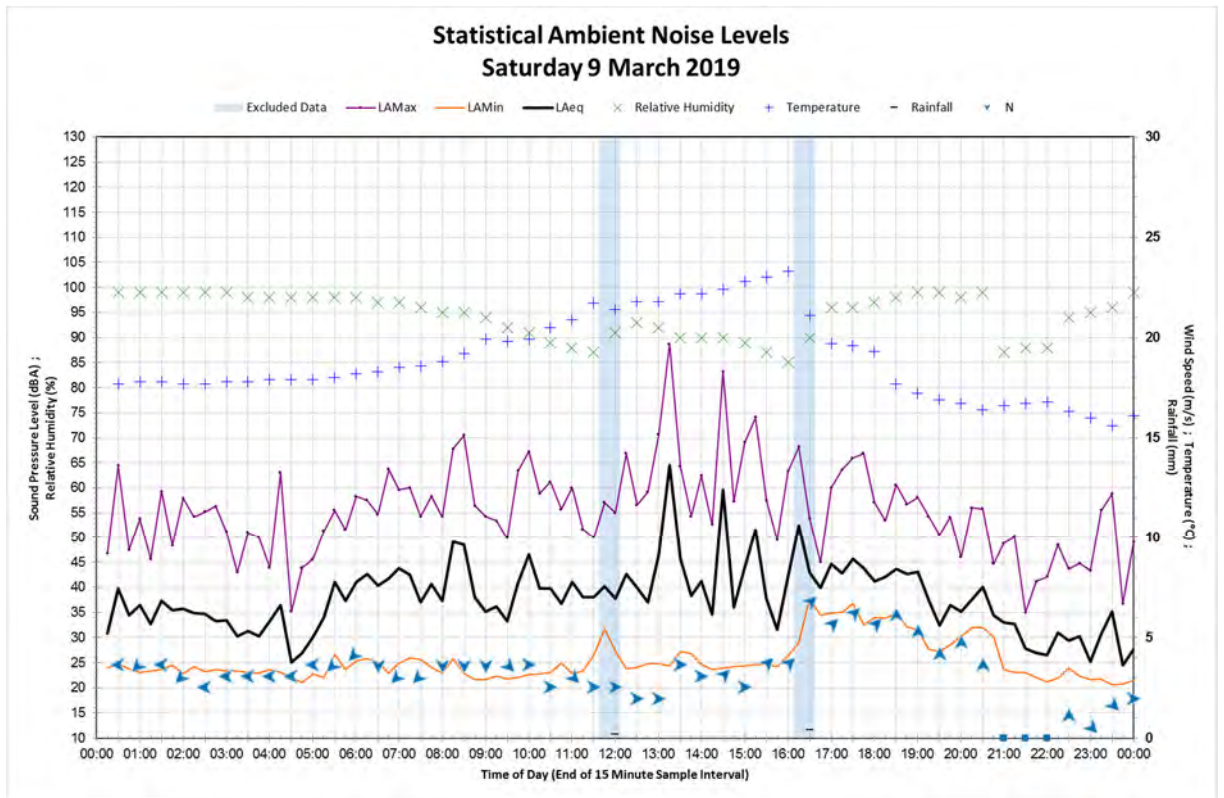


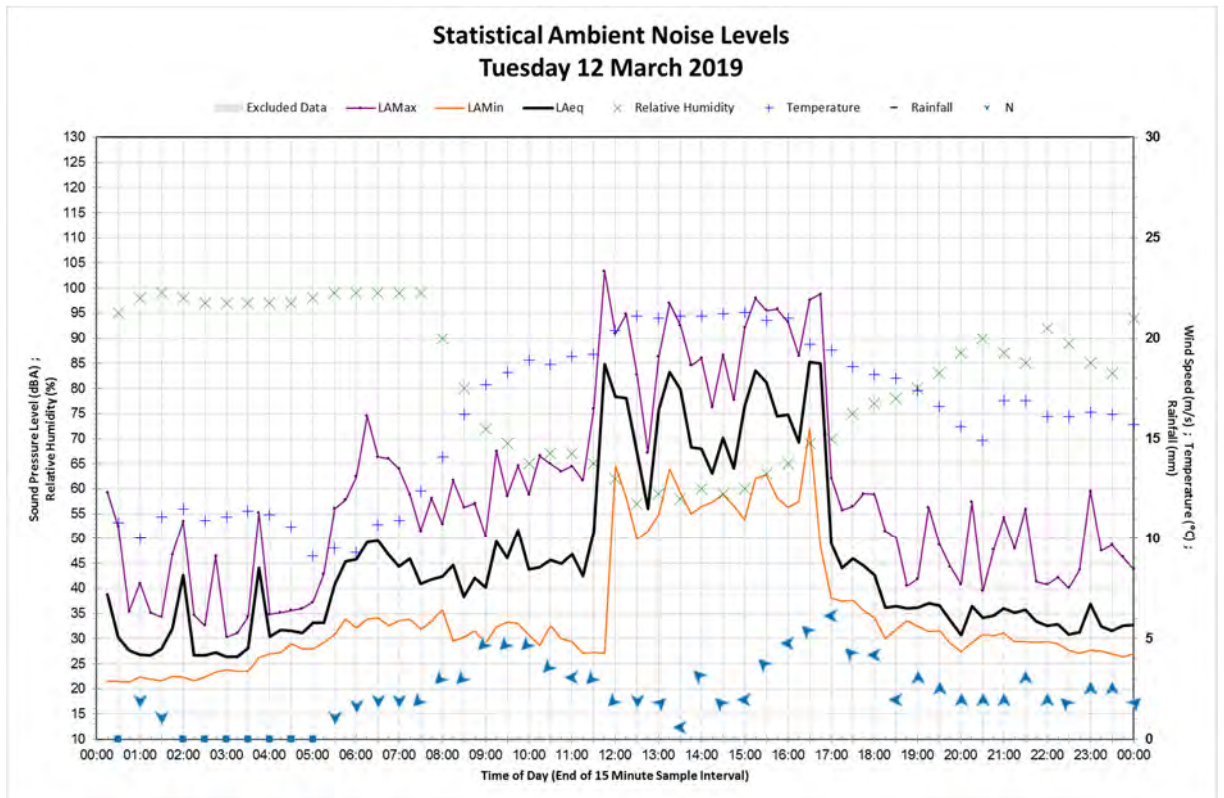
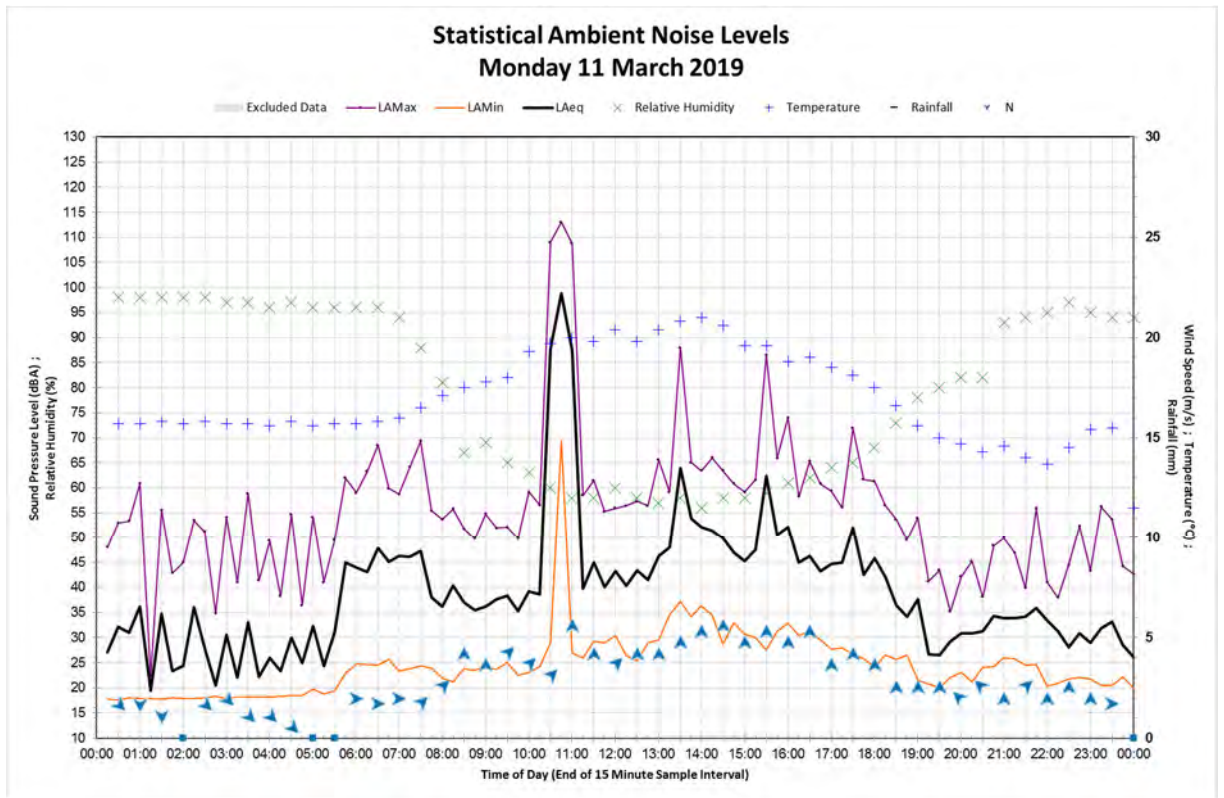


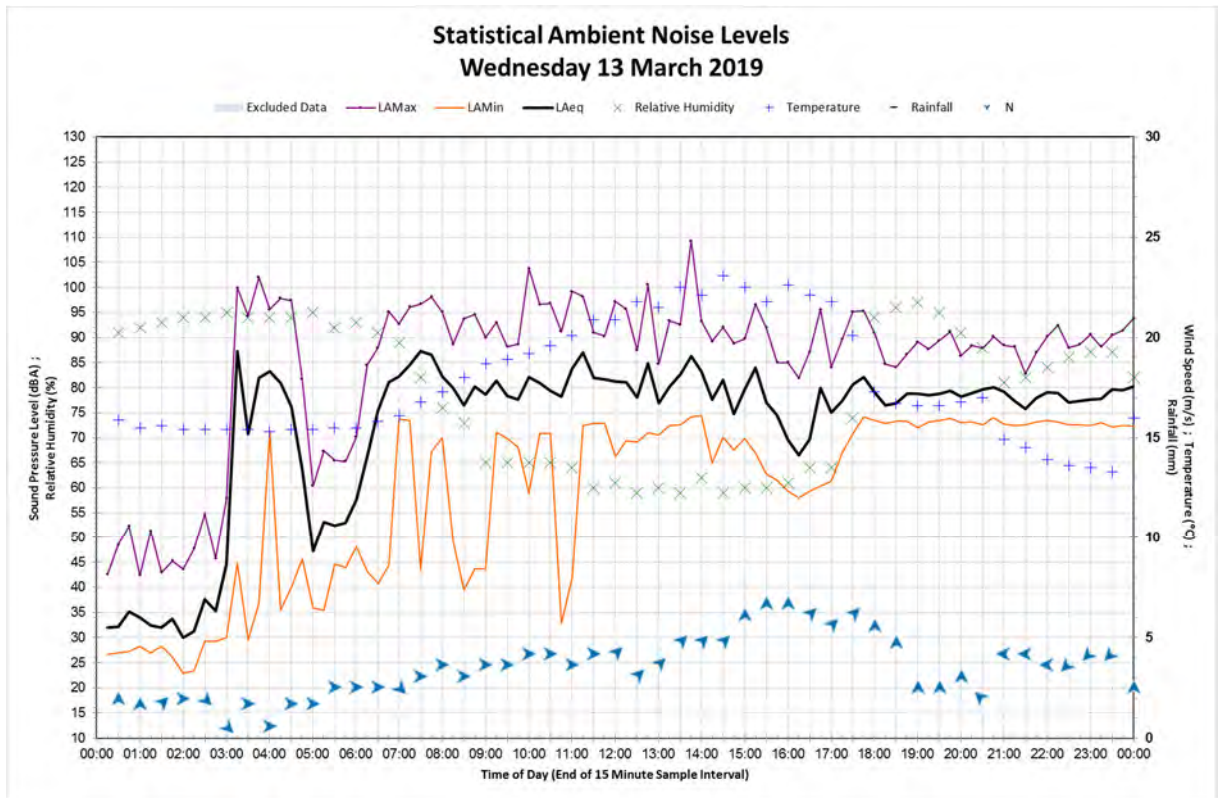
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## Appendix C – Example Noise Management Plan



## GREAT SOUTHERN MOTORPLEX GROUP

### NOISE MANAGEMENT PLAN – ALBANY MOTORSPORT PARK

This noise management plan ('the NMP') has been approved by the Chief Executive Officer (CEO) of the City of Albany ('the CEO') for the purposes of Division 3 of the *Environmental Protection (Noise) Regulations 1997*.

#### 1. VENUE DETAILS

<b>Name of venue</b>	Albany Motorsport Park ('the venue')
<b>Location of venue</b>	Down Road DROME WA
<b>Occupier of venue</b>	Great Southern Motorplex Group ('the occupier')
<b>Affiliations</b>	Confederation of Australian Motor Sports (CAMS) Fédération Internationalé de l'Automobile (FIA) Fédération Internationalé Motocyclisme (FIM) Motorcycling Australia (MA)
<b>Venue maps</b>	<b>Attachment 1</b> – Map of venue showing facilities

#### 2. APPLICATION

The NMP applies:

1. While the occupier is the leaseholder of the venue
2. To racing activities at the venue organised by the occupier.
3. To the emission of noise during a racing activity at the venue.
4. From the date of approval by the CEO until the expiration of the approval.

Regulation 7 of the *Environmental Protection (Noise) Regulations 1997* does not apply to noise emitted from the venue during a racing activity if the activity is conducted in accordance with the NMP.

The occupier must ensure that the conditions and ancillary measures designated as such in the CEO's approval notice are implemented.

#### 3. TYPES OF RACING ACTIVITIES AND CLASSES OF VEHICLES

##### 3.1 Types of racing activities covered by the NMP

- Car test and tune days
- Car speed events (Club, State and National)
- Supercars event (National)
- Bike test and tune days
- Bike speed events (Club, State and National)
- Motocross training

- Motocross events (Club and State)
- Drifting days (Club and State)
- Motorkhana events (Club)
- Special events

### 3.2 Classes of vehicles

The following classes of vehicles may compete in events at this venue:

- Various classes of cars including street cars, Formula Vee, Formula Classic, Formula Ford, HQ Holden sedans, saloon cars, sports sedans, production sports cars and marque sports cars, historic touring cars, improved production cars, Formula 1000 and Excel Cup.
- Various drift cars
- Various classes of motorcycles including historic, 125 cc, 250 cc, 500 cc, Grand Prix, Superbikes, solo and sidecar bikes
- Various classes of motocross bikes including junior, senior, 65 cc, 85 cc, 125 cc
- Special exhibition vehicles
- Various other vehicles of smaller engine capacity, including road registered vehicles

## 4. LIMITATIONS ON RACING ACTIVITIES

### 4.1 Scheduled race meetings and practice sessions

The following limits apply to scheduled race meetings and practice sessions at the venue:

1. Motorsport racing and practice may occur year round, within the limitations established by this noise management plan.
2. Racing can only take place at a race meeting or practice session.
3. Racing vehicles are not to be operated at the venue at any time other than a race meeting, practice session or tuning day.
4. No more than XX race meetings are to be held during a year.
5. In addition to the XX race meetings per season, a preliminary meeting may be held to conduct tests on racing vehicles to establish their compliance with this Noise Management Plan.
6. Races at a race meeting can only take place within a eight hour period on any one day.
7. The eight hour period must be between 8:00 am to 6:00 pm, Monday to Saturday, 9:00 am to 6:00 pm on Sunday and public holidays. No evening (after 7:00 pm) or night (after 10:00 pm) events will be scheduled.

### 4.2 Special events

Where a special event that is to be open to the public is proposed to be held at the venue, but the event cannot be conducted within the limits for scheduled race meetings and practice sessions, the occupier is to apply to the CEO for approval of the event under Regulation 18.

## 5. MEASURES TO CONTROL NOISE EMISSIONS

### 5.1 Access to race track

In order to prevent noise emissions due to unauthorised use of the race track by racing vehicles, the gates to the race track are to remain locked at all times other than:

1. In preparation for and during race meetings, practice sessions and special events approved by the CEO.
2. During maintenance or improvement of venue facilities.

### 5.2 Certification of racing vehicles

Each <<vehicle type>> that is to race at a race meeting at the venue must have a current certificate indicating that its noise level does not exceed a noise limit of  $L_{A\ slow}$  95 dBA ('noise limit') when tested in accordance with the noise test procedure.

For all other class of vehicle that is to race at a race meeting at the venue must have a current certificate indicating that its noise level does not exceed a noise limit of  $L_{A\ slow}$  90 dBA ('noise limit') when tested in accordance with the noise test procedure.

The noise level for a racing vehicle is to be obtained at or before the first meeting of the season at which that racing vehicle is entered to race.

Vehicles that have been measured in accordance with accepted measurement procedures (Section 5.3) at another racing venue are deemed to have complied with the requirement for certification and testing for noise emissions providing the measurements have been conducted by a competent person.

If the exhaust system or engine of a racing vehicle is modified or replaced after the level of noise emitted by the vehicle had been measured, the occupier is to ensure that the level of noise emitted by the vehicle is measured again and the vehicle complies before the vehicle is raced at an event.

Certification is valid for 12 months only.

Information provided in the certificate shall include:

1. Engine and chassis identification number
2. Exhaust type
3. Owner of vehicle
4. Date and location of testing
5. Individual and average measured sound pressure level

### 5.3 Noise test procedure

#### *5.3.1 Measuring individual racing vehicles*

The level of noise emitted by a racing vehicle (the tested vehicle) is to be measured while the tested vehicle completes three consecutive laps of the venue within a period that is not greater than four times the average lap time record.

Average lap times are to be calculated during the previous racing season for races at the speedway in the class of racing vehicle to which the vehicle belongs.

1. The measurements shall be made at a point that is:

## REPORT ITEM DIS245 REFERS

- Inside the inner boundary of the venue track in use by the vehicle racing
  - Not less than 29 metres and not more than 31 metres from the inner boundary
  - On, or as close as practicable to, the shorter axis of the track
2. With the measuring microphone not less than 1.2 m or more than 1.4 m above the ground plane.

### *5.3.2 Calculation of average noise level*

The level of noise emitted by a racing vehicle is taken to be the level obtained by:

1. Adding together the maximum level of noise measured for the vehicle on each of the laps referred to in Section 5.3.1.
2. Dividing the total resulting from that addition by three

### *5.3.3 Instruments*

Instruments used to measure noise emissions shall:

1. Be calibrated in accordance with and otherwise comply with Schedule 4 of the *Environmental Protection (Noise) Regulations 1997*
2. Be operated by a person who is approved by the CEO
3. Preferably be a Type 1, although Type 2 instruments are acceptable provided allowance is made for their measurement tolerances.
4. Copies of the calibration certificates must be provided to the CEO on request.

### 5.4 Responsibility for noise measurement and certification

The Venue Manager will ensure that only competent persons utilising equipment conforming to the requirements of Section 5.3.3 are engaged as required to assess compliance. Also, that all noise measurements, calculation, certification and testing requirements are met for venue events under the control of occupier to the requirements of the CEO.

### 5.5 Record of tests

The operator is to record all results from tests carried and retain those results in a form that shows (for each test):

1. Details of the racing vehicle tested, including engine and chassis identification number and exhaust type
2. The racing vehicle's owner
3. The date and location of the test
4. The calculated lap time
5. The actual time for the three laps of the test
6. The point of measurement
7. The measured noise levels
8. The signature of the noise test operator

Records of tests are to be provided to the CEO on request.

### 5.6 Scrutiny of racing vehicles

1. A Chief Steward shall be designated for the duration of a race meeting and practice session to verify noise certificates and to evaluate noise emissions from race vehicles.
2. The Chief Steward may reject a certificate and require a new test if not satisfied with the noise test on which the certificate is based or if he considers that a racing vehicle has been modified to the extent that the certificate is no longer representative of noise emission from the vehicle.
3. If a racing vehicle at the speedway emits a level of noise that is conspicuously louder than that of the other racing vehicles in the same class at the meeting, the Chief Steward may require that vehicle to immediately cease racing and may prevent that vehicle from further racing at the speedway until that vehicle's noise level has been shown to comply with the noise limit.

### 5.7 Public address system noise

The public address (PA) system consists of loudspeaker towers placed around the track, facing towards the track and angled down towards the track.

The loudspeakers are not to be moved or adjusted by any person without the approval of the Chief Steward.

Noise emissions from the public address system at the venue are to be under the control of the Chief Steward, who is to designate persons who are authorised to use the system.

The public address system controls are to be set to provide a suitable audience sound level during the preliminary meeting each year, with the assistance of such persons as the Chief Steward requires, ensuring the minimum practicable 'spill' of sound into nearby noise sensitive areas.

The public address cabinet is to be locked for access only by the Chief Steward and his authorised assistants at all other times.

The public address system will only be used during race meetings; it is not to be used during practice sessions or at any other time except in the case of an emergency.

### 5.8 Review of racing activities in response to noise complaint

If complaints are made during a racing activity the occupier will review racing activities to reduce noise where practicable for the remainder of that event.

### 5.9 Written instruction to members

The club management committee shall provide all club members with a written instruction explaining the noise issues and the members' responsibility to maintain the noise limitation requirements.

### 6. NOTICE OF RACING ACTIVITIES

Notice of the program for racing activities for a season is to be published and distributed to members of the public as follows:

1. The notice is to be published in the local newspaper, showing proposed dates of racing activities (where known) for the coming season and the telephone number for noise complaints.
2. In addition to (1), the notice is to be delivered to the address of each noise sensitive premises at locations within 5 km of the venue.
3. The notice is to be published and delivered during the month of the year in which the season starts.
4. A change to the racing program is to be published in the local newspaper and a notice provided in accordance with (2) above within four weeks before the changed meeting is to occur.
5. Notice of a special event approved by the CEO is to be given in accordance with the conditions of the approval.

### 7. COMPLAINT PROCEDURE

1. A designated telephone line will be manned during racing activities for the receipt of noise complaints.
2. A complaint received will be recorded on the noise complaint form.
3. All complaints will be treated with due consideration and investigated and responded to as appropriate.
4. The occupier will as far as practicable provide advice to the complainant within 48 hours as to the outcomes of the investigation and where appropriate, any proposed modifications to operations.
5. The results of complaint investigations, details of measures taken or considered to reduce noise emissions under Measure 5.5 and an outline of the responses given to the complainant shall be recorded on the noise complaint form.
6. Completed noise complaint forms will be retained at the motorsport park for the period of the approval and made available to the CEO on request.
7. Noise complaint details are to be provided to the City of Albany on the next business day following receipt of the complaint.

### 8. RECORDS

#### 8.1 Record of vehicle tests

The occupier is to retain records of all tests of race vehicles under Measure 5.2 for a period of two years.

#### 8.2 Record of loud racing vehicles

## REPORT ITEM DIS245 REFERS

The occupier is to make a record of all racing vehicles that have been required to cease racing by the steward under Measure 5.4 (Item 3) and retain that record for two years in a form that shows:

1. Details of the racing vehicle required to cease racing.
2. The racing vehicle's owner.
3. The date and time at which the request to cease racing occurred.
4. The action taken by the driver of the racing vehicle following the request.
5. The action taken by the owner of the racing vehicle to remedy the excessive noise emissions.

### 8.3 Records to be forwarded on request

If requested to do so in writing by the CEO, the occupier is to forward a copy of all or any of the records made under Measure 8.2 within 21 days of the request.

## 9. RESPONSIBILITIES

Club Committee:	Appointment of Chief Steward Development of program for scheduled race meetings
Chief Steward:	Implementation of this Noise Management Plan Designation and training of stewards Control of public address system
Head Scrutineer:	Scrutiny of racing vehicles

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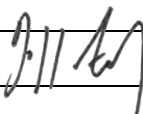
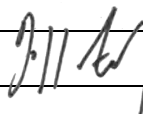
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[https://projects.ghd.com/oc/WesternAustralia1/albanymotorsportspar/Delivery/Documents/613733101-REP\\_AlbanymotorsportPark\\_NoiseAssessment\\_23Sept2020.docx](https://projects.ghd.com/oc/WesternAustralia1/albanymotorsportspar/Delivery/Documents/613733101-REP_AlbanymotorsportPark_NoiseAssessment_23Sept2020.docx)

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Rev0	J Forrest	J Foley		J Foley		13/5/2019
Rev1	J Forrest	J Foley		J Foley		18/12/2019
Rev2	J Forrest	J Foley		J Foley		10/8/2020
Rev3	J Forrest	J Foley		J Foley		24/9/2020



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Appendix I – Agricultural Land Capability  
Assessment (Mar. 2019)

# AGRICULTURAL LAND CAPABILITY ASSESSMENT

Lot 5780, 54 Down Road South, Drome,  
City of Albany

Prepared for

**CITY OF ALBANY**

by

**Land Assessment Pty Ltd**



LA Report No 1902  
11 March 2019

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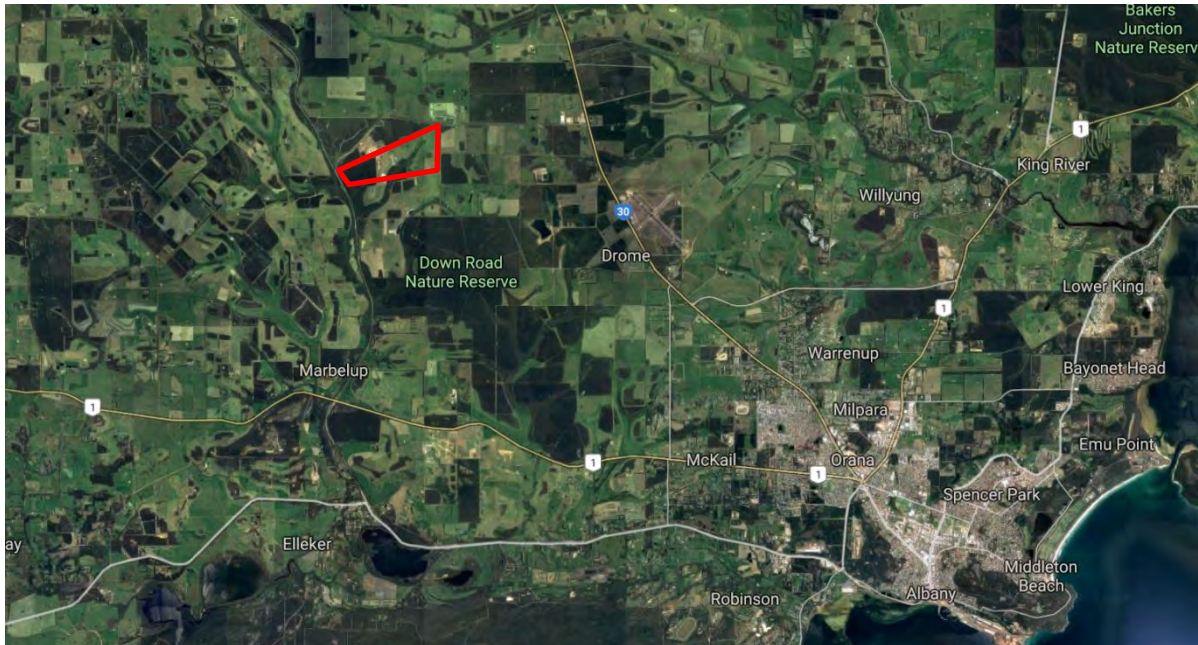
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## 1.0 BACKGROUND

In cooperation with the Great Southern Motorplex Group Inc. (GSMG) and the Department of Local Government, Sport and Cultural Industries (DLGSCI), the City of Albany is currently supporting the development of a proposed multi-use Albany Motorsport Park (AMP) near the Mirambeena timber processing precinct on Down Road. The subject land, Lot 5780 Down Road South, is 192.34 ha in area and located approximately 20 km to the north-west of the Albany CBD (Figure 1).



**Figure 1: LOCATION PLAN**

The City of Albany has completed a technical site feasibility assessment for the Albany Motorsport Park (GHD, 2018) that identified a number of matters requiring further investigation. These matters included the fact that under Local Planning Scheme No 1 (LPS 1) the subject land is currently zoned 'Priority Agriculture' and a motorsport park would not be a permissible use under that zoning category.

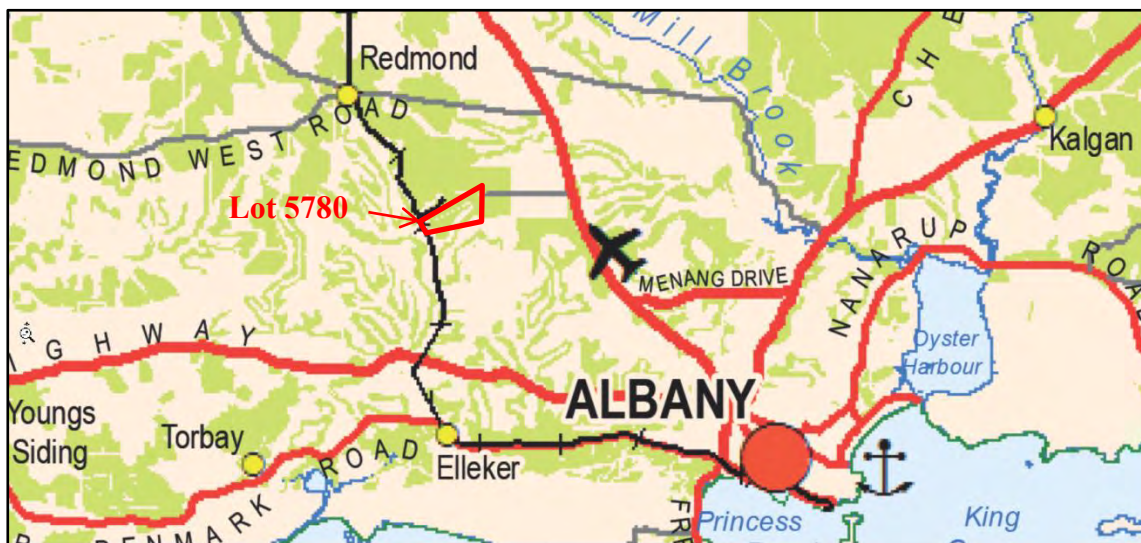
In accordance with State Planning Policy (SPP) 2.5 'Rural Planning', a 'Priority Agriculture' zone identifies land considered to be of local, State and /or regional significance for agricultural production. The objectives for the Priority Agriculture zone within LPS1 include; *Prevent land uses and development within the zone that may adversely impact on the continued use of the zone for a diversity of agricultural purposes.*

In light of the above, a Scheme Amendment is to be prepared in order to rezone the land to "Special Use" and facilitate the proposed AMP development.

Associated with the Scheme Amendment process, the City of Albany engaged Land Assessment Pty Ltd to prepare an Agricultural Land Capability Assessment (ALCA) for the subject land in accordance with the requirements of the Department of Primary Industries and Regional Development (DPIRD) and van Gool *et al.* (2005). The latter reference is a document outlining the Department's current methodology for determining land capability.

This consultant has had discussions with DPIRD (Mr Timothy Overheu) in relation to the identification of 'Priority Agricultural Land' within the planning system, and its requirements for an Agricultural Land Capability Assessment for the subject land.

As part of its input to the Lower Great Southern Strategy (WAPC 2016) DPIRD identified Priority Agricultural Land 'PAL' based on an interpretation of its regional scale mapping of soil-landscapes and their capability to support agricultural land uses. The PAL interpretations are irrespective of considerations of location, lot size, water availability or existing land use. The result is depicted within the relevant portion of the regional map of Priority Agricultural Land (Figure 2).

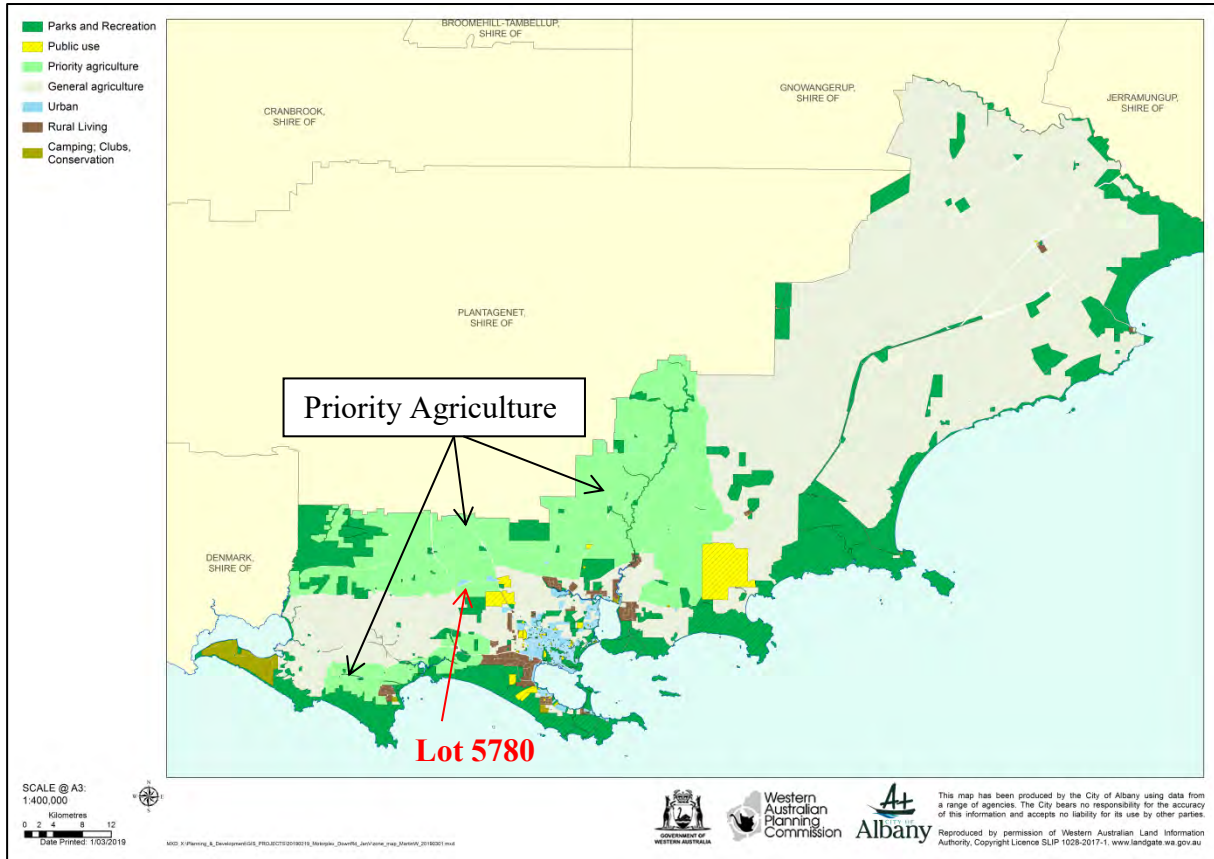


**Figure 2: PRIORITY AGRICULTURAL LAND (of State or Regional Significance)**

Source: Lower Great Southern Strategy (WAPC 2016) – enlargement of its Figure 3.

In accordance with SPP 2.5, regionally defined areas of priority agricultural land should be rationalised to cadastral boundaries and, where appropriate, reflected as a 'Priority Agriculture' zone within Local Planning Schemes. Additional areas considered to be of 'local agricultural significance' based on factors other than just soil qualities can also be identified. Restrictions on subdivision and non-agricultural land use activity within the 'Priority Agriculture' zone can then be administered through the Scheme.

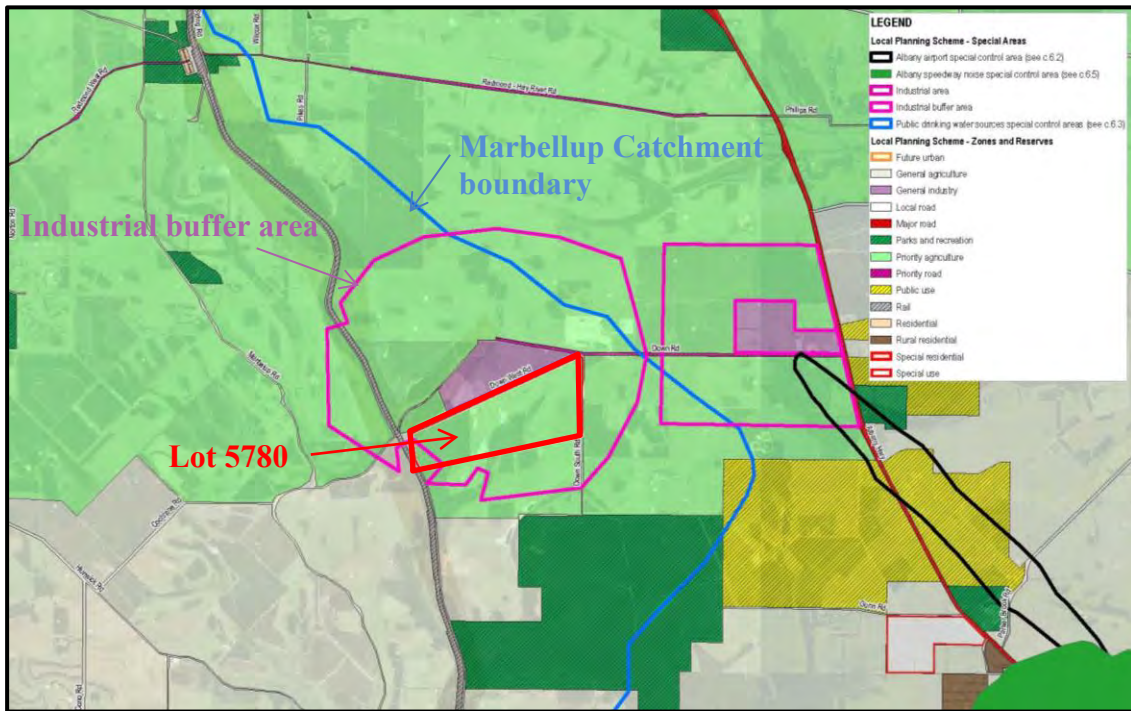
The City of Albany's Local Planning Scheme (LPS 1) shows 74.5 5% of this local government area is designated agricultural land, with approximately 26% (83,855 ha) zoned 'Priority Agriculture' and the remaining 74% (237,540 ha) zoned 'General Agriculture' (Figure 3).



**Figure 3: LOCAL PLANNING SCHEME (OVERVIEW)**

Figures 3 and 4 (overleaf) show Lot 5780 occurs at the southern edge of the most extensive portion of the City of Albany's Priority Agriculture Land, which extends inland and towards Mount Barker within the adjoining Shire of Plantagenet.





**Figure 4: LOCAL PLANNING SCHEME – (DETAIL)**

Source: City of Albany - Albany Motorsport Park Site Feasibility Study (GHD 2018)

The focus of the Department of Primary Industries and Regional Development (DPIRD) in relation to land use planning matters is on preserving large agricultural lots to facilitate continued access and investment in more intensive food production (T Overheu pers comm).

Given the broad scale of the soil-landscape mapping on which the DPIRD assessment of the best quality agricultural land is based (see Figure 2), the Department generally recommends that proponents of specific developments have an independent land evaluation report compiled discussing the capability of the subject land.

Furthermore, in relation to Lot 5780, and as part of a pre-fieldwork discussion between this consultant and Mr Timothy Overheu of DPIRD, it was concluded that the Agricultural Land Capability Assessment should particularly address the uniqueness' or otherwise' of the subject land within the context of the City's supply of land zoned 'Priority Agriculture'.

## 2.0 NATURE OF THE LAND

### 2.1 Current Use and Surroundings

The central to eastern portion of Lot 5780 extends over approximately 140 ha and is currently leased to a local farmer, Mr L Black. This land is predominantly used for cattle grazing although some sand extraction activity has occurred in areas which are now subject to varying stages of rehabilitation. A small (1.6 ha) portion of Lot 5780 is leased to Plantation Energy Australia Pty Ltd for the purpose of maintaining a drainage detention basin.

The western portion of the property, covering an additional 52 ha is bordered by the Avon-Albany railway line reserve and remains under remnant native vegetation. A further 22 ha of remnant vegetation occurs within the currently leased 140 ha central to eastern portion. Outside of the areas of remnant vegetation, and subject to seasonal conditions, the remaining 118 ha of cleared land with established pasture supports up to 80 cattle (breeders) and receives about 200 kg of potash super each year (pers comm L Black). There are no areas of cropping within Lot 5780.

In common with Lot 5780, land to the south and east is also zoned 'Priority Agriculture' and used for livestock grazing, but with some cropping in the more extensive flatter terrain.

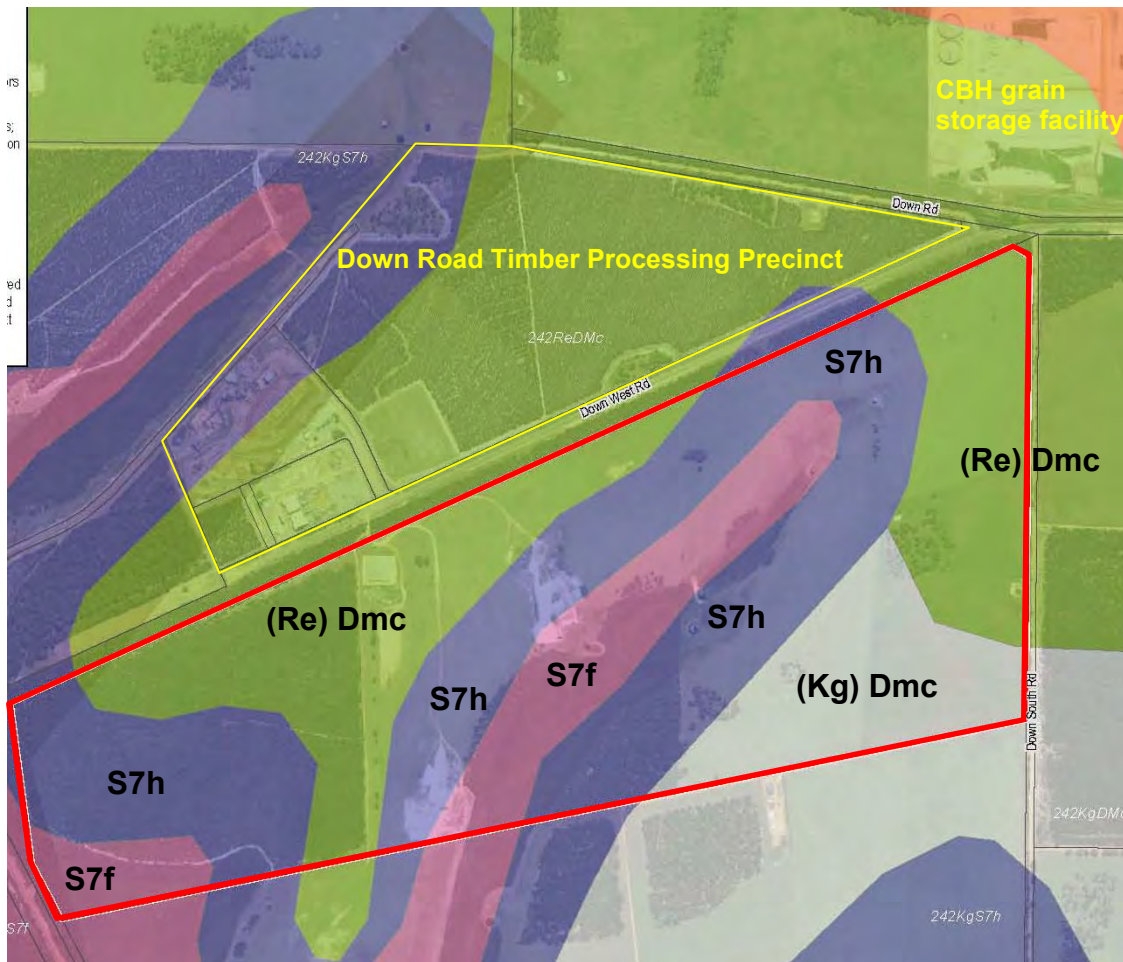
The Down Road Timber Processing Precinct, occurring directly north of Lot 5780, is zoned for general industrial purposes and includes a tree plantation and processing facilities of the Albany Plantation Forest Company and the Albany Plantation Export Company. To the east of the Timber Processing Precinct, and directly north of the intersection of Down Road and Down South Road, the CBH Mirambeena grain storage facility occurs within land zoned 'Priority Agriculture'.

### 2.2 Landforms and Soils

#### 2.2.1 Broad-scale mapping

DPIRD's agricultural capability interpretations for the Albany area are based on soil - landscape mapping initially surveyed by CSIRO (Churchward et al 1988) at a publication scale of 1:100,000.

Figure 5 overleaf depicts the relevant enlarged portion of that mapping with map units then described in Table 1.



**Figure 5: SOIL-LANDSCAPE MAPPING**

**Source:** Adapted from *City of Albany – Albany Motorsport Park Site Feasibility Study* (GHD 2018) and based on original mapping from *Landforms and Soils of the South Coast and Hinterland, Western Australia*. (Churchward et al 1988) as depicted within Shared Land Information Platform (SLIP) <http://spatial.agric.wa.gov.au/slip>

Figure 5 shows the subject land encompasses the upper portion of a shallowly incised, minor valley (S7) occurring between flat to very gently inclined upland lateritic terrain (DMc).

The Dempster crest, map unit has mainly gravelly duplex soils, and occurs as part of either the Redmond (Re) or King (Kg) soil-landscape systems.

The minor valley (S7), which is also part of the King soil-landscape system, has component sideslopes (S7h) with pale sands and deep sandy duplex soils, leading to a valley floor (S7f) with predominantly wet and semi wet soils.

**Table 1: BROAD-SCALE MAPPING UNITS**

<b>REDMOND SYSTEM (242Re)</b>	
<i>Undulating plateau with scattered depressions, in the east of the Albany Sandplain Zone. Sandy gravel, pale deep sand, non-saline wet soils and grey sandy duplex. Marri-jarrah forest, swamp yate-paperbark-sheoak woodland and heath.</i>	
<b>DMc</b>	<b>Dempster crest phase*</b> (61.7 ha or 32 % of Lot 5780)
	Sands and laterite on elongate crests; Duplex sandy gravels, Grey deep sandy duplexes, Pale deep sands and Shallow gravels.
<b>KING SYSTEM (242 Kg)</b>	
<i>Dissected siltstone and sandstone terrain, on the southern edge of the Albany Sandplain Zone, with shallow gravel, sandy gravel, grey sandy duplex and pale deep sand. Jarrah-marri-sheoak woodland and mallee-heath.</i>	
<b>DMc</b>	<b>Dempster crest phase*</b> (23.8 ha or 12 % of Lot 5780)
	Sands and laterite on elongate crests; Duplex sandy gravels, Grey deep sandy duplexes, Pale deep sands and Shallow gravels.
<b>S7h</b>	<b>Minor Valleys S7 slope phase</b> (78.6 ha or 41 % of Lot 5780)
	Sideslopes of minor valleys in sedimentary rocks; Pale deep sands and Grey deep sandy duplexes.
<b>S7f</b>	<b>Minor Valleys S7 floor phase</b> (28.1 ha or 15 % of Lot 5780)
	Footslopes and swampy valley floors of minor valleys in sedimentary rocks; Wet and Semi-wet soils, Pale deep sands and Grey deep sandy duplexes.

\* In relation to the Dempster crest (DMc) map unit occurrence in both the Redmond and King systems, there is no significant difference in the component soils and their agricultural capability. The Redmond and King land systems generally differ only in the degree of landscape dissection, however within an intergrade area such as around Lot 5780, the landform is consistent over both occurrences of map unit DMc.

The broad-scale map units encompassed within Lot 5780 occur widely throughout the rural areas of the City of Albany. Data analysis by the City's GIS technical staff show the upland lateritic areas, Dempster crest DMc map unit, occupy 20,624 ha or 24.6 % of the City's Priority Agriculture zone, and a further 13,362 ha or 5.6 % of the General Agriculture zone. Likewise, the sideslopes of the minor valley, S7h map unit, are well represented and occur within 7,606 ha (9 %) of the Priority Agriculture zone and a further 4,408 ha (2 %) of the General Agriculture zone.

### 2.2.2 More-detailed land unit mapping

Given the broad scale of soil-landscape mapping in Figure 5, some 'on-ground' variation can be expected in soil and landform conditions. More detailed mapping, or 'ground truthing' of the conditions described in the earlier mapping was therefore undertaken as a basis for the 'property-specific' assessment of agricultural capability for Lot 5780.

Soil and landform conditions were examined through aerial photo interpretation and field survey work conducted on 21 February. Soils were examined at twenty five 'soil auger observation sites' and classified in accordance with the WA Soil Group nomenclature (Schoknecht and Pathan 2013).

Attachment A contains a site location figure, site results summary, and representative photographs of land units. Additional soils data, included in Attachment B, was provided by interpretation and classification of bore log records associated with the installation of shallow groundwater monitoring bores (Biodiverse Solutions 2018).

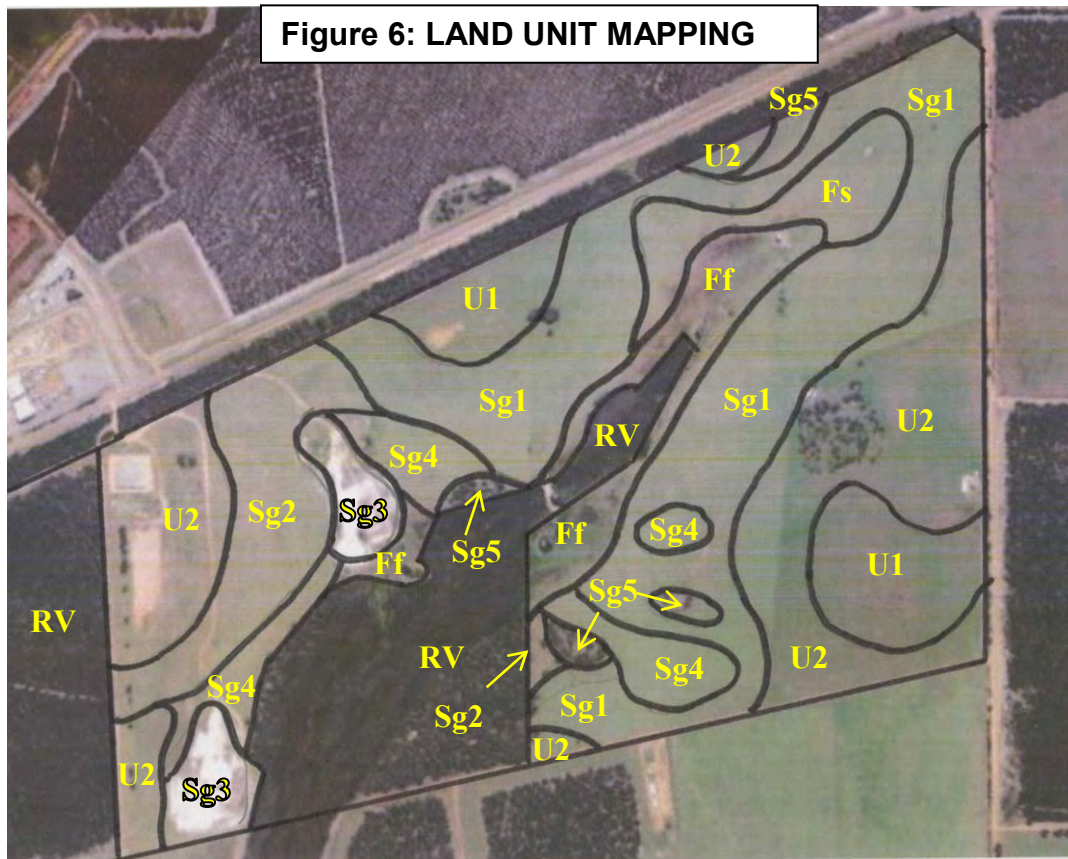
The resulting mapping of land units within the subject land is shown overleaf in Figure 6, with descriptions of each land unit (soil-landform type) provided in subsequent Tables 2 and 3.

## 2.3 **Vegetation**

The original native vegetation is a Marri-jarrah forest, swamp yate-paperbark-sheoak woodland and heath within areas of the Redmond soil-landscape system, and a Jarrah-marri-sheoak woodland and mallee-heath within areas of the King soil-landscape system.

The western portion of the property, covering approximately 52 ha remains under remnant vegetation and a further 22 ha occurs within the currently leased 140 ha central to eastern portion. Much of the latter 22 ha vegetated area is associated with the lower portions of the minor valley (unit S7f in Figure 5) and is a Conservation Class wetland (cited in GHD 2018).

The presence of a Conservation Class wetland, coupled with location of Lot 5780 within the Marbellup Brook Catchment (a public drinking water source area – see Section 2.4) suggest that approval for any further clearing of vegetation to facilitate agriculture would be unlikely.



Note: Image above excludes the far western portion of the property which remains under remnant vegetation and has not been mapped into land units.

**Table 2: ABBREVIATED LEGEND AND AREAS**

Land Unit	Simplified Description (see also Table 3 overleaf)	Area (ha)	Approx % of mapped	% of Lot
<b>Upland lateritic terrain</b>				
U1	Duplex sandy gravels	11	8	6
U2	Sandy duplex soils (with gravel) and shallow gravel	32	23	17
<b>Side-slopes of valley</b>				
Sg1	Sandy duplex soil or pale shallow sand; gravel at > 30 cm.	34	24	18
Sg2	Sandy duplex soil or pale shallow sand; gravel at < 30 cm.	10	7	5
Sg3	Disturbed areas; shallow sandy duplex or pale shallow sand	6	4	3
Sg4	Pale deep sands	8	6	4
Sg5	Shallow gravel and surface laterite	3	2	2
<b>Floor of valley</b>				
Fs	Pale deep sands	6	4	3
Ff	Semi-wet soils	8	6	4
3RV	<b>Remnant Vegetation</b>			
	- within mapped area	22	16	11
	- within remaining unmapped western portion	52	-	27
<b>TOTAL</b>		192	100	100

**TABLE 3. LAND UNIT DESCRIPTIONS**

<b>Upland lateritic terrain of broad crests and adjacent slopes with less than 5% gradient. (U)</b> – equivalent to DMc; Dempster crest phase.	
U1	Moderately well drained duplex sandy gravels (with brown gravelly loamy sand to sandy loam topsoil).
U2	Moderately well to well drained grey deep sandy duplex soils (with gravel above clay layer) and less commonly shallow gravel or gravelly pale deep sands; minor surface laterite.
<b>Side-slopes of concave valley associated with the un-named tributary of Marbelup Brook (S)</b> - equivalent to S7h; Minor valley – slope phase.	
Sg	Slopes with predominantly gentle gradients (5 -10%) and;
Sg1	well drained, grey deep sandy duplex soil (with gravel) or pale shallow sand (over gravel). Gravel layer at more than 30 cm depth.
Sg2	moderately well drained, grey deep sandy duplex soil (with gravel) or pale shallow sand (over gravel). Gravel layer at less than 30 cm).
Sg3	moderately well drained, grey shallow sandy duplex soil or pale shallow sand (over gravel) within disturbed / rehabilitated areas).
Sg4	rapidly drained, pale deep sands.
Sg5	well drained shallow gravel and scattered areas of surface laterite.
<b>Floor of valley associated with the un-named tributary of Marbelup Brook (F)</b> - equivalent to S7f; Minor valley – floor phase.	
Fs	Footslopes with very gentle gradients (1 – 3 %) and well drained, pale deep sand.
Ff	Flat terrain within valley headwater area or margins of lower-lying remnant vegetation encompassing the tributary stream, with imperfect to poorly drained semi wet soils (sands or humic sands).
<b>Remnant Vegetation (RV)</b> – occurring within the wettest portions of the valley floor and also uncleared portions of upland terrain and valley side-slopes within the western portion of Lot 5780 Downs Road – soils not mapped or assessed for agricultural capability as part of this study.	

## 2.4 Water Resources

### 2.4.1 Water for Agricultural Activity On-site

The site location figure within Attachment A shows the location of a number of small dams or soaks within Lot 5780. Most of these are associated with the un-named watercourse traversing the property, and are used for stock watering apart from the dam closest to Down West Road within the area leased to Plantation Energy Australia Pty Ltd for the purpose of maintaining a drainage detention basin.

Whilst sufficient to support the watering of up to 80 head of cattle, the existing dams within Lot 5780 are of insufficient size to provide a potential source of water for the irrigation of horticultural crops. Furthermore GHD (2018) report that groundwater salinity in the local area is in the range of 500 – 1000 mg/L which is considered to be marginal for productive uses.

### 2.4.2 Catchment Perspective

The central to eastern portion of Lot 5780 encompasses an un-named watercourse, a tributary of Marbellup Brook which ultimately drains to Lake Powell and forms part of the wider Torbay Inlet Catchment. Both the Lake Powell and Torbay Inlet wetlands are nutrient enriched due to a range of factors including the leaching of nutrients from pale sands in areas of the catchment used for extensive agriculture (grazing). These wetlands are the subject of a restoration plan termed '*Watershed Torbay*' (Department of Water 2006).

As shown in Figure 4, Lot 5780 is also located within a Priority 2 (P2) public drinking water sources special control area within the Marbellup Brook Catchment Area (DoPLH, 2014). This public drinking water source area (PDWSA) is not currently used but has been identified as a potential future water source option in the *Great Southern Regional Water Supply Strategy 2014* (DoW, 2014).

In the context of the agricultural capability of Lot 5780, the *Marbellup Brook Catchment Area Drinking Water Source Protection Plan* (DoW, 2007) notes that low density grazing already covers a large portion of the catchment and there are several existing horticulture enterprises. The Plan recommends that any future expansion or intensification of horticultural operations be assessed by the Department of Water and is unlikely to be supported unless it can be demonstrated that the risk to water quality is reduced. Accordingly, in relation to water protection objectives, within the P2 areas perennial forms of horticulture (such as orchards and vineyards) are designated 'Compatible with conditions' and annual forms of horticulture (such as market gardens) are designated 'Incompatible'.



### 3.0 AGRICULTURAL CAPABILITY

#### 3.1 Overview-Agriculture within Albany

The City of Albany's Draft Local Planning Strategy (CoA 2019) reports;

- The Great Southern is the second largest food producing region in the State with the main commodities being grain and livestock, although horticulture and viticulture are emerging as significant contributors.
- Within the City of Albany agriculture is the third largest industry when measured in value added terms. Approximately 55% of the total value of agricultural production is derived from either broad acre crops or horticulture with the remaining 45% being derived from livestock or livestock products.
- Under LPS1 all farm related land uses are permissible or discretionary in both the 'General Agriculture' and 'Priority Agriculture' zones.
- With its relatively cooler temperate climate, the Albany hinterland area is considered to have strong potential for agricultural expansion.
- The Department of Primary Industries and Regional Development have undertaken an investigation into potential locations for horticulture development in the Lower Great Southern, with priority areas for irrigated agriculture precincts within or near the City of Albany being identified at Manypeaks, and Redmond/Narrikup (i.e. not affecting the subject land).

#### 3.2 Capability Assessment Methodology and Determining PAL

'Land capability' is a term used to express the ability of land to support a proposed use with minimal risk of degradation to its soil and water resources. A general methodology for capability assessment has been developed by the (now) Department of Primary Industries and Regional Development (Wells and King 1989, and more recently by van Gool et al 2005) and forms the basis for the land use evaluations in both this report and the earlier DPIRD input to the *Lower Great Southern Strategy* (WAPC 2016).

Specific land use rating tables are used to compare soil and landform qualities of relatively homogeneous mapped areas (mapping units) against the optimal desired requirements of that form of land use. Using data from the best available soil-landscape or land unit mapping, factors considered in the rating tables include rooting depth, soil water storage and drainage, and risks associated with nutrient export, erosion and waterlogging. Based on the 'degree of fit', mapping units are assigned a capability class ranging from 'very high' capability (class one) to 'very low' capability (class five).







The capability classes are described in Table 4. At a specific property level, land unit mapping (such as that shown in Figure 6) delineates sufficiently homogeneous areas to allow the assessment to be expressed in terms of the simple five class system.

**Table 4: LAND CAPABILITY CLASSES**

Capability class	General description
1 Very high	Very few physical limitations present and easily overcome. Risk of land degradation is negligible.
2 High	Minor physical limitations affecting either productive land use and/or risk of degradation. Limitations overcome by careful planning.
3 Fair	Moderate physical limitations significantly affecting productive land use and/or risk of degradation. Careful planning and conservation measures required.
4 Low	High degree of physical limitation not easily overcome by standard development techniques and/or resulting in high risk of degradation. Extensive conservation measures required.
5 Very low	Severe limitations. Use is usually prohibitive in terms of development costs or the associated risk of degradation.

The simple five class system works well for expressing land capability when the field survey work is intensive and detailed land units can be mapped. However, there is inevitably a greater degree of variability of landform and soil conditions within broad-scale soil-landscape mapping units such as those used for the Department's inputs to the *Lower Great Southern Strategy* (WAPC 2016). For agricultural capability assessments based on broad-scale mapping, the concept of 'proportional capability codes' is used (Table 5).

**Table 5: PROPORTIONAL CAPABILITY CODES**

Category A land: Generally high capability	
 <b>A1</b>	>70% of the area has high capability (is Class 1 or 2)
 <b>A2</b>	50-70% of the area has high capability (is Class 1 or 2)
Category B land: Generally fair or moderate capability	
 <b>B1</b>	>70% of the area has moderate to high capability (is Class 1, 2 or 3)
 <b>B2</b>	50-70% of the area has moderate to high capability (is Class 1, 2 or 3)
Category C land: Generally low capability	
 <b>C1</b>	50-70% of the area has low capability (is Class 4 or 5)
 <b>C2</b>	>70% of the area has low capability (is Class 4 or 5)

Instead of assigning a single specific (high, moderate or low) capability rating to all areas of a particular broad-scale map unit, the proportional capability codes are used

to more conservatively express the capability as a range (e.g. 50-70%) of the total area expected to contain land of a certain capability rating.

For priority agricultural land (PAL), DPIRD identified areas of agricultural land considered to be of ‘State and Regional’ significance as part of its input to the Lower Great Southern Strategy (WAPC 2016). These areas extend into Lot 5780 as shown in Figure 2 where they correspond to the broad-scale soil-landscape mapping units (Re) DMc and (Kg) S7h.

Based on consideration of other locally determined factors, these areas of PAL have been extended to include agricultural land considered to be of ‘Local’ significance and are reflected as the ‘Priority Agriculture’ zone within the Local Planning Scheme (DoPLH, 2014).

### 3.3 Broad-scale Assessment

DPIRD’s agricultural land use capability interpretations for the broad-scale map units shown earlier in Figure 5 are summarised in Table 6.

**Table 6: BROAD-SCALE AGRICULTURAL CAPABILITY ASSESSMENT**

Soil-Landscape Map Unit	Area within Lot 5780	Perennial Horticulture	Annual Horticulture	Grazing	Dryland Cropping
<b>DMc</b> Dempster – crest phase*	85.6 ha (44.5 %)	B1	B1	B2	B2
<b>S7h</b> Minor valley - slope phase	78.6 ha (40.9%)	A2	B1	B1	B1
<b>S7f</b> Minor valley - floor phase	28.1 ha (14.6 %)	C1	B2	B2	C1

\* Capability codes are the same for occurrence of DMc within both Kg and Re systems

#### Codes

A1 = >70% of land has high capability; A2 = 50-70% high capability;  
B1 = >70% moderate to high capability; B2 = 50-70% moderate to high capability;  
C1 = 50-70% low capability; and C2 = >70% low capability land.

Source for Table 6 and Figures 7a and 7b-: Shared Land Information Platform (SLIP) <http://spatial.agric.wa.gov.au/slip> based on interpretations by DPIRD (land unit database) current from 12 March 2018.

Figures 7a and 7b illustrate the agricultural capability for two of these agricultural land uses, grazing and perennial horticulture. Dryland cropping and annual horticulture are not considered further in this report for the cleared portions of Lot 5780. This is because cropping is restricted to much larger areas due to economies of scale, and annual horticulture (e.g. vegetable growing) is not permitted within the proclaimed Marbellup Brook Public Drinking Water Supply Area (refer section 2.4.2).

### FIGURE 7. BROAD-SCALE AGRICULTURAL CAPABILITY ASSESSMENTS



FIGURE 7a. LAND CAPABILITY FOR GRAZING

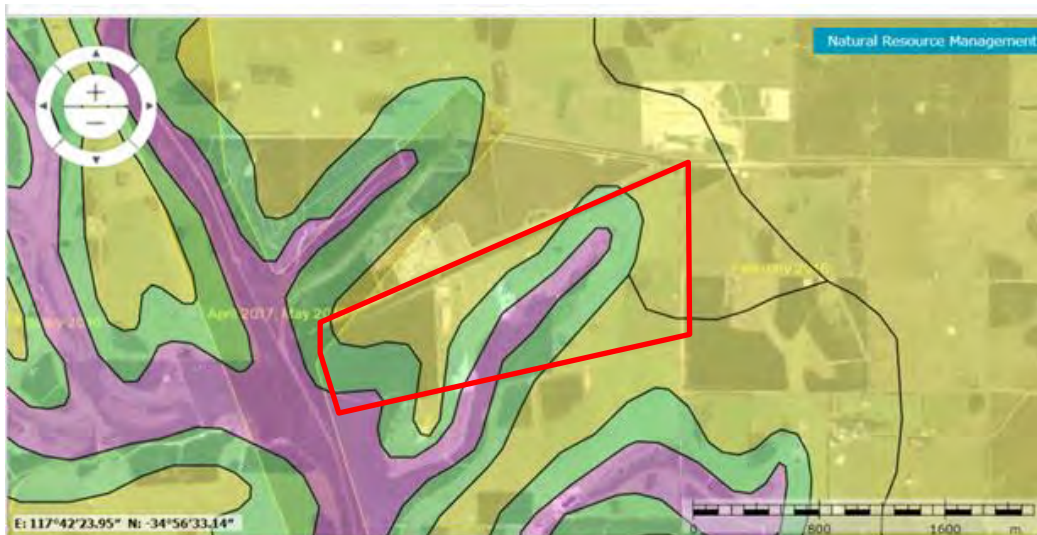


FIGURE 7b. LAND CAPABILITY FOR PERENNIAL HORTICULTURE\*

(\***Note** Horticultural capability ratings are based on consideration of landform and soil factors only. Availability of water supply for irrigation needs to be considered separately. DPIRD also provide a generally more favourable assessment for viticulture, which is a form of perennial horticulture).

### 3.4 Site-Specific Assessment

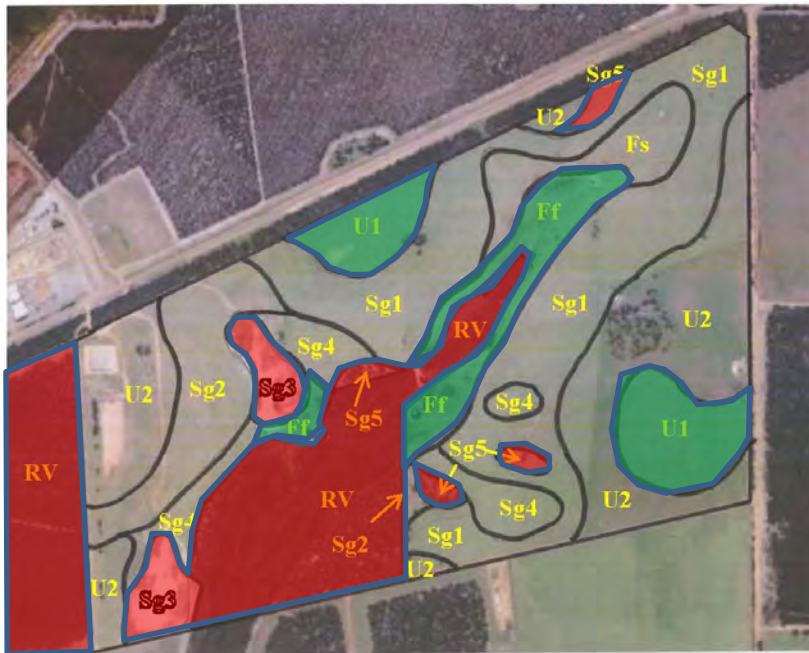
This consultant's agricultural land use capability interpretations for the more detailed land unit mapping shown earlier in Figure 6, and based on site-specific data (Attachment A), are summarised in Table 7.

**TABLE 7. SITE-SPECIFIC AGRICULTURAL CAPABILITY RATINGS**

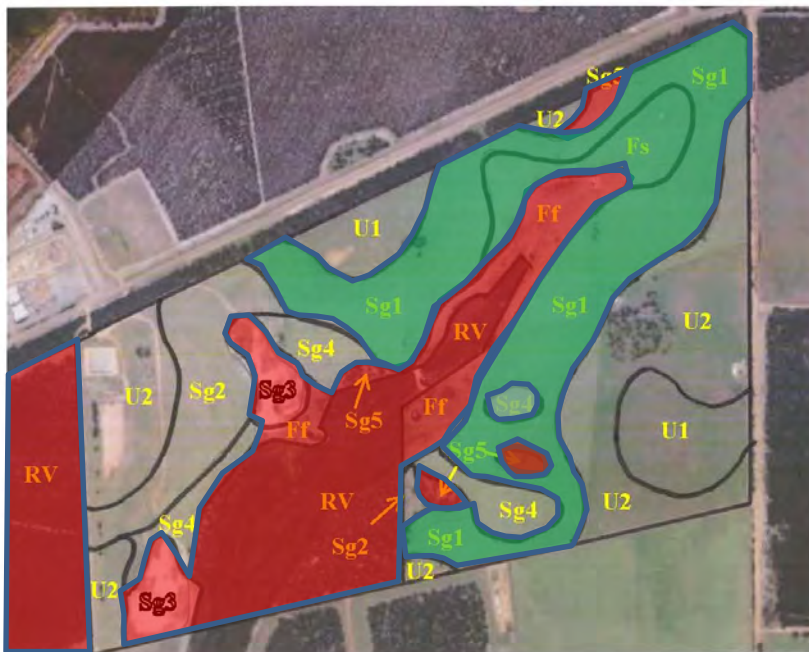
Land Unit	Area in Lot 5780	Grazing	Perennial Horticulture	Comments
<b>U1</b>	11 ha (6 %)	Fair - High	Fair	Relatively good nutrient retention ability within topsoil and generally not subject to erosion, but limited rooting depth and possible susceptibility to waterlogging where lateritic layer and underlying clay are more competent.
<b>U2</b>	32 ha (17 %)	Fair	Fair	More variable than U1 and grey sandy topsoils generally less retentive of nutrients.
<b>Sg1</b>	34 ha (18 %)	Fair	Fair - High	Minor areas subject to gully erosion. Grey sandy topsoils generally low ability to retain moisture and nutrients. Better rooting depth and less susceptible to waterlogging than upland areas.
<b>Sg2</b>	10 ha (5 %)	Fair	Fair	Similar to Sg1 but lesser rooting depth.
<b>Sg3</b>	6 ha (3 %)	Low	Low	Most of these areas have been subject to sand extraction and limited land rehabilitation. Limited rooting depth and sandy topsoils have low ability to retain moisture and nutrients.
<b>Sg4</b>	8 ha (4 %)	Fair	Fair	Minor areas subject to gully erosion and potential wind erosion if depleted of vegetative cover. Sands have good rooting depth, and are not susceptible to waterlogging but a poor ability to retain nutrients and moisture.
<b>Sg5</b>	3 ha (2 %)	Low	Low	Limited rooting depth and difficult for cultivation. Scattered tree cover over parts.
<b>Fs</b>	6 ha (3 %)	Fair	Fair - High	Lesser gradient and closer to watertable than Sg4. Sands have poor ability to retain nutrients and moisture.
<b>Ff</b>	8 ha (4 %)	Fair - High	Low	Winter-wet flats are susceptible to subsoil waterlogging but provide good seasonal (summer) pasture for grazing livestock. Horticultural activity likely to require drainage and sandy subsoils present a high risk of nutrient export to the nearby tributary of Marbelup Brook.
<b>RV</b>	74 ha (38 %)	Not Assessed	Not Assessed	Encompasses areas within valley floor as well as side-slopes and upland terrain, but unlikely to obtain approval for land clearing and therefore not relevant in terms of agricultural potential or capability.

Figures 8a and 8b illustrate the agricultural capability for grazing and perennial horticulture based on the site-specific land unit mapping.

**Figure 8: SITE-SPECIFIC AGRICULTURAL CAPABILITY ASSESSMENTS**



**Figure 8a: LAND CAPABILITY FOR GRAZING**



**Figure 8b: LAND CAPABILITY FOR PERENNIAL HORTICULTURE\***

**Red** = Low capability **Green** = Fair to High capability **Remainder** = Fair capability

(\***Note** Horticultural capability ratings are based on consideration of landform and soil factors only. Availability of water supply for irrigation needs to be considered separately. Water resource information (section 2.4) indicates conditions for a suitable water supply to support commercial scale irrigation are unfavourable).

### 3.5 Comparison of Broad-scale and Site-specific Assessments

In order to consider the relative uniqueness or otherwise of Lot 5780 in terms of its agricultural capability, Table 8 presents a comparison of the assessment based on the site-specific land unit mapping, with that based on the broad-scale soil-landscape mapping which extends over all rural areas of the City of Albany.

To provide a common base for comparison, the assessment results from both studies (Tables 6 and 7) have been simplified into three code categories, A, B and C.

- Category A land (grouping A1 and A2 proportional capability codes from Table 5) represents land of generally 'high' capability, and includes the 'fair to high' rating in Table 7 from the site-specific study.
- Category B land (grouping B1 and B2 proportional capability codes from Table 5) represents land of generally 'fair or moderate' capability, and includes the 'fair' rating in Table 7 from the site-specific study.
- Category C land (grouping C1 and C2 proportional capability codes from Table 5) represents land of generally 'low' capability, and includes the 'low' and 'not assessed' ratings in Table 7 from the site-specific study.

**TABLE 8: AGRICULTURAL CAPABILITY COMPARISON (Broad-scale vs Site-Specific)**

CAPABILITY CODE GROUP	AGRICULTURAL CAPABILITY RATING* for;			
	GRAZING		PERENNIAL HORTICULTURE	
	Broad-scale Assessment	Site-specific Assessment	Broad-scale Assessment	Site-specific Assessment
<b>Category A land:</b> Generally high capability	Nil	10 % (19.2 ha)	40.9 % (78.6 ha)	21 % (40.4 ha)
<b>Category B land:</b> Generally fair or moderate capability	100 % (192.3 ha)	47 % (90.4 ha)	44.5 % (85.6 ha)	32 % (61.5 ha)
<b>Category C land:</b> Generally low capability	Nil	43 % (82.7ha)	14.6 % (28.1 ha)	47 % (90.4 ha)

\* Capability assessment focuses on soil and landform conditions and does not directly consider water availability, conservation value of any area, and required set-backs from water bodies.

It should be noted that for the site-specific study, areas of remnant vegetation (RV) were designated as 'not assessed' in terms of their agricultural capability. This is because regardless of the underlying soil and landform conditions, regulatory approval for clearing it is highly unlikely to be granted and hence these areas are effectively not capable of being used for agricultural production.

For the capability assessment based on the broad-scale soil-landscape mapping, areas of remnant vegetation were not separated out (see Figures 7a and 7b). This is because for the purpose of a broad-scale comparison of Lot 5780 with all other areas of the 'Priority Agriculture' zone within the City of Albany it is not practical to take vegetation cover into consideration.

#### In relation to Grazing

The earlier agricultural capability assessment based on broad-scale mapping indicates all of the land is of Category B 'fair' capability for grazing.

The site-specific study shows however that while the total property contains about 10 % Category A 'high' capability land for this form of agriculture, the remainder is comprised of roughly equal portions of land with Category B 'fair' or Category C 'low' capability, with the latter being significantly constrained for grazing, primarily due to remnant vegetation

#### In relation to Perennial Horticulture

The earlier agricultural capability assessment based on broad-scale mapping indicates about 40% of Lot 5780 is Category A 'high' capability and about 45 % is Category B 'fair' capability land for perennial horticulture.

Setting aside the question of a water supply for irrigation, the site-specific study shows Lot 5780 contains a lesser amount, about 20 %, of Category A 'high' capability land and roughly 30 % Category B 'fair' capability land for this form of intensive agriculture. The remaining roughly 50% of Lot 5780 is Category C 'low' capability land and is significantly constrained for horticulture (including viticulture). This is not only due to the extent of remnant vegetation but also the poor ability of grey sandy soils within lower parts of the landscape to retain nutrients against losses to drainage (and hence ultimately into Marbellup Brook).



## 4.0 CONCLUSIONS

In accordance with State Planning Policy 2.5, the Priority Agriculture zoning extending over Lot 5780 designates land considered to be of State, regional or local significance for food production purposes due to its comparative advantage in terms of soils, climate, water (rain or irrigation) and access to services.

Following on from DPIRD's recommendation for an independent site-specific agricultural capability evaluation of Lot 5780 in the context of its proposed rezoning to "Special Use" to facilitate the proposed Albany Motorsport Park, the following points address the uniqueness (or otherwise) of the land;

- The soil and landform conditions within Lot 5780 are generally consistent with the range and variations described by the earlier, broad-scale CSIRO mapping, apart from a greater proportion of pale sands on the valley sideslopes.
- Within the existing cleared portions of the property the capability of the land to support grazing is predominantly 'fair' and consistent with the earlier assessment by DPIRD based on its broad-scale soil-landscape mapping.
- Within the existing cleared portions of the property the capability of the land to support perennial horticulture (including viticulture) is a mix of 'fair', 'fair - high' and some 'low' capability land. Whilst generally consistent with the earlier assessment by DPIRD there is a greater percentage of low capability due to the poor ability of pale sands within lower parts of the landscape to retain nutrients against losses to drainage.
- The extent of remnant vegetation (approximately 38 % of Lot 5780) is a significant constraint to the agricultural capability of the total property.
- As shown in Figures 3 and 4, Lot 5780 occurs near the southern edge of the most extensive portion of Priority Agriculture zoned land, and is within an industrial buffer zone. It is also within a public drinking water supply area (Marbellup Catchment PWDSA) where there are land use restrictions on horticultural activity.
- The City's Draft Local Planning Strategy (CoA 2019?) indicates the intent for Priority Agriculture land is to protect better quality rural land for potential agricultural diversification, particularly for intensive agriculture where a suitable supply of water is available. GHD (2018) report however that groundwater salinity in the local area is in the range of 500 – 1000 mg/L which is considered to be marginal for productive uses.

- Lot 5780 is 192.4 ha in area and this represents just 0.23 % of the total Priority Agriculture zoned land within the City of Albany.
- The lateritic uplands and minor valley sideslopes (DMc and S7h broad-scale map units) encompassed within Lot 5780 occur widely throughout the rural areas of the City of Albany and together cover 28,229 ha (or 33.7 %) of its Priority Agriculture zone.

In terms of the nature of its soils and landforms, and hence its agricultural capability, Lot 5780 is therefore not unique, and its potential removal from the City's Priority Agriculture zone is considered to have no significant effect on the agricultural land protection objectives under State Planning Policy 2.5 (WAPC 2016) or the City of Albany's Local Planning Scheme (DoPLH 2014).

## 5.0 REFERENCES

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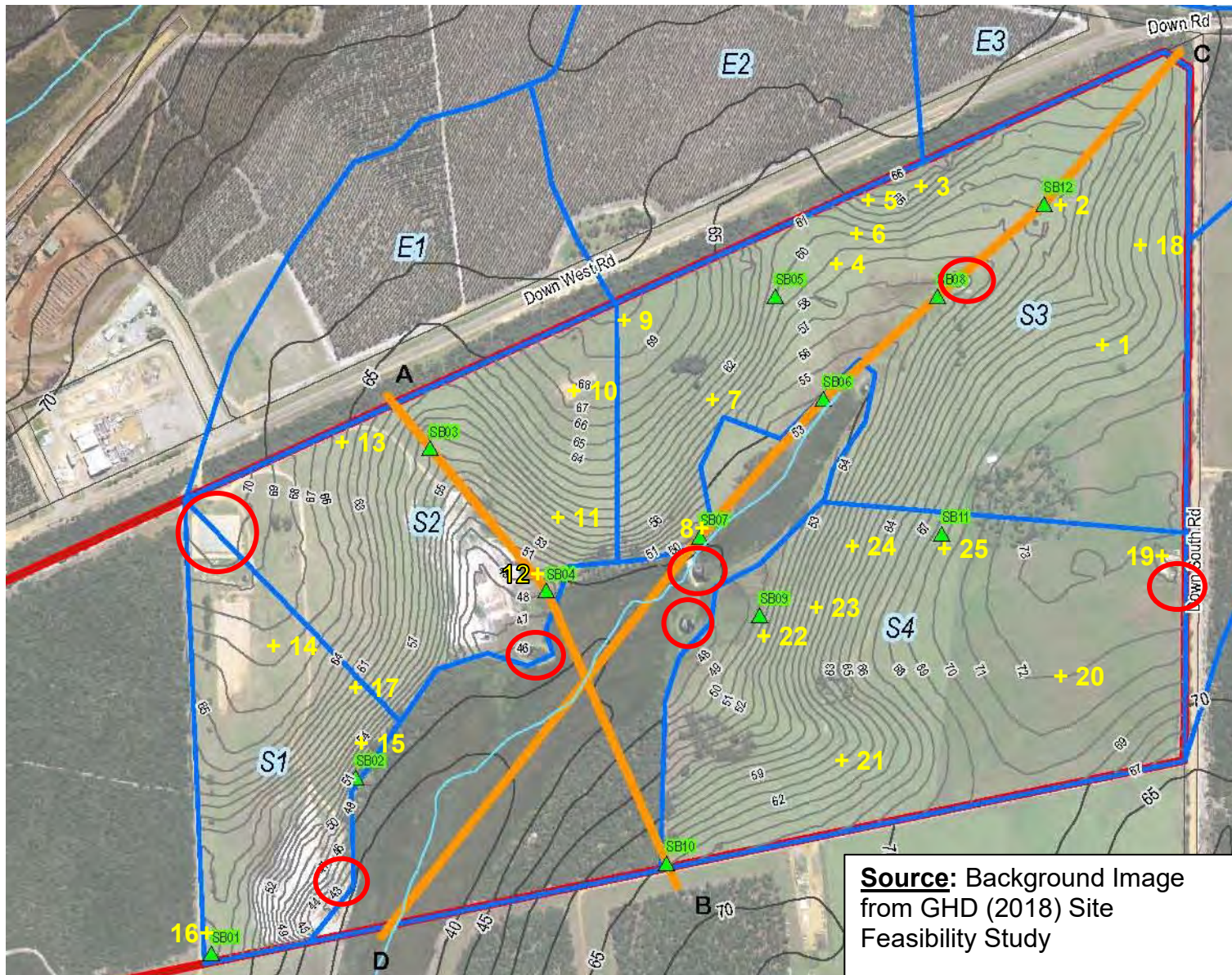
Western Australian Planning Commission (2016) *Lower Great Southern Strategy*

Western Australian Planning Commission (2016) *Rural Planning State Planning Policy 2.5*

## **ATTACHMENT A**

### **Site location figure, results summary and representative photographs**

SITE LOCATION FIGURE



- **Dam or Soak**
- **Internal Catchment Boundary**  
(See GHD 2018 Site Feasibility Study)
- **Cross section**  
(See GHD 2018 Site Feasibility Study)
- + 20 **Land Assessment Site** (This Study)
- + SB10 **BioDiverse Solutions Site** (See GHD 2018 Site Feasibility Study)

**Source:** Background Image from GHD (2018) Site Feasibility Study

SITE RESULTS SUMMARY

LA Site	BDS Site	Broadscale mapping	Site Drainage status	Landform	WA Soil Group*	Land unit
1		ReDMc	Well	Gentle mid slope 5 - 7%	Grey deep sandy duplex (with gravel above texture contrast/ clay layer) OR Pale shallow sand (over lateritic gravel at 50 cm).	Sg1
2	SB12	KgS7h	Well	Very gently sloping drainage headwater 2%	Pale deep sand (over lateritic gravel at 180 cm)	Fs
3		ReDMc	Well	Upper slope 8 - 10 %	Shallow (brown) gravel and scattered areas of Bare rock	Sg5
4		KgS7h	Well - Rapid	Gentle lower slope 3 %	Pale deep sand	Fs
5		KgS7h	Well	Gentle crest 0 - 4 %	Shallow (brown) gravel and scattered areas of Bare rock	U2
6		KgS7h	Well	Gentle mid slope 8%	Pale shallow sand (over lateritic gravel at 65-90 cm).	Sg1
7		KgS7h	Well	Gentle mid slope 9%	Grey deep sandy duplex (with gravel above texture contrast/ clay layer) OR Pale shallow sand (over lateritic gravel at 45 cm).	Sg1
8	SB7	KgS7f	Imperfect to poor	Margin of drainage area	Semi wet soil (pale deep sand with watertable at 64 cm – Feb 27 2018 - refer Attachment C).	Ff
9		ReDMc	Moderately well	Crest 0 - 2 % gradient	Duplex sandy gravel (brownish loamy sand to sandy loam gravelly topsoil above laterite at 20 cm and then clay at greater depth).	U1
10		ReDMc	Moderately well	Upper slope 4-5%	Duplex sandy gravel (as above, with laterite at 40 cm)*.	U1
11		KgS7h	Well - Rapid	Gentle mid slope 5%	Pale deep sand	Sg4
12	SB4	KgS7f	Imperfect	Lower slope 2 - 3%, Margin of drainage area	Semi wet soil (pale deep sand - no watertable within 2 m but slightly moist beyond 1 m – Feb 27 2018- refer Attachment C).	Ff
13		ReDMc	Moderately well	Gentle mid to upper slope 6%	Grey deep sandy duplex (with gravel above texture contrast / clay layer) OR Pale shallow sand (over lateritic gravel at 25cm).	Sg2
14		ReDMc	Moderately well	Broad crest 0 - 2 %	Grey deep sandy duplex (with lateritic gravel at 18 cm above clay at greater depth).	U2
15	SB2	KgS7h	Well - Rapid	Gentle to mod slope 10% at edge of valley.	Pale deep sand - no watertable within 2m – Feb 27 2018 - refer Attachment C	Sg4
16	SB1	ReDMc	Moderately well	Gently undulating crest 0 - 3 %.	Gravelly pale deep sand (gravel layer at 30 cm, over laterite then more gravel until clay at 150 cm - refer Attachment C).	U2
17		KgS7h	Moderately well	Gentle mid slope 7%	Grey deep sandy duplex (with gravel above texture contrast / clay layer) OR Pale shallow sand (over lateritic gravel at 15cm).	Sg2
18		ReDMc	Well	Very gentle upper slope 2% gradient.	Shallow (brown) gravel	U2

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LA Site	BDS Site	Broadscale mapping	Site Drainage status	Landform	WA Soil Group*	Land unit
19		ReDMc	Moderately well	Broad crest 0 - 2 %.	Grey deep sandy duplex (with lateritic gravel layer at 20 cm above clay at greater depth).	U2
20		KgDMc	Moderately well	Broad crest 0 - 2 %.	Duplex sandy gravel (as for sites 9 and 10 above, with laterite at 20 cm).	U1
21		KgDMc	Well - Rapid	Gentle mid slope 4 - 5%	Pale deep sand	Sg4
22	SB9	KgS7h	Well	Gentle lower slope 4 - 5% at edge of valley floor	Semi wet soil OR Pale shallow sand (over lateritic gravel at 70 cm). Watertable at 66 cm – Feb 27 2018 -. refer Attachment C)	Sg1/Ff
23		KgS7h	Well - Rapid	Gentle mid slope 10%	Pale deep sand	Sg4
24		KgS7h/DMc	Well	Gentle mid slope 10%	Grey deep sandy duplex (with gravel above texture contrast/ clay layer) OR Pale shallow sand (over lateritic gravel at 40 cm).	Sg1
25	SB11	KgDMc	Moderately well	Gentle upper slope 3%	Grey deep sandy duplex (with lateritic gravel at 30 cm above clay at greater depth - refer Attachment C).	U2
	SB3	ReDMc		Gentle lower slope at edge of valley	Deep sandy gravel (light brown to brown) - refer Attachment C	Sg2
	SB5	KgS7h		Gentle midslope	Gravelly pale deep sand (gravel layer at 70 cm, then sand below). - refer Attachment C	Sg1
	SB6	KgS7f		Edge of valley floor	Semi wet soil (grey deep sand) with watertable at 87 cm – Feb 27 2018 - refer Attachment C.	Ff
	SB8	KgS7f/S7h		Valley floor headwater area	Grey sand (Semi wet?) moist, although no watertable within 2 m - Feb 27 2018 - refer Attachment C).	Ff
	SB9	KgS7h		Gentle lower slope	Semi wet soil (grey deep sand with gravel at 60 cm then laterite and watertable at 66 cm – Feb 27 2018 -refer Attachment C).	Ff
	SB10	KgDMc		Very gentle upper slope 2%	Shallow (brown) gravel (over laterite and then cemented siltstone / sandstone)- refer Attachment C.	U2

\* WA Soil Groups as per Schoknect and Pathan (2013). Depth of hand auger borings at Land Assessment (LA) sites within the property was often restricted by a lateritic gravel or stone layer, however roadside exposures along Down Road show the gravel / laterite layer (with a sandy or sandy loam matrix) is approximately 30 cm thick and occurs over clay. Soils initially identified as Pale shallow sand (over lateritic gravel) were therefore generally classified as deep grey sandy duplexes unless field test bore logs from the installation of shallow bores (Biodiverse Solutions – BDS sites SB1 – SB12 – refer Attachment C) provided data indicating different (non-clayey) soil conditions below the gravel / laterite layer.

LOT 5780



1 Overview of property, looking westwards from near site 1.



3. Land unit U1 – looking northwards from site 20.



2. Overview of property, looking south east from near site 17.



4. Land unit U2 – looking northwards from near site 14





5. Land unit Sg1 – view east from near site 1.



7. Land unit Sg3 – view south-east from between sites 13 and 17.



6. Land unit Sg2 – view east from near site 7.



8. Land unit Sg3. - view east over terrain between sites 15 and 16.



9. Land unit Sg4 – site 21.



11. Land unit Sg5 – west of site 21



10. Land unit Sg4 – near site 21



12. Land unit Fs – near site 2 and SB12



13. Land unit Ff – near sites 22 and SB9.



15. Dam within Land unit U2 – site 19



14. Land unit Ff – near sites 8 and SB7.



16. Exposed soil profile – edge of dam at site 19 showing subsoil clay beneath laterite boulder layer within upland terrain land unit U2.



**17. Exposed soil profile** – roadside cutting along Down Road showing subsoil clay below gravel / laterite layer within upland terrain (U) land units.



**19. Pale deep sands** – within land units Sg4 and Fs.



**18. Grey deep sandy duplex soil (with gravel layer above clay) OR Pale shallow sand over gravel** – typical of much of valley sideslope areas.



**20. Dam / soakage area** - within land unit Ff near site 8.

## **ATTACHMENT B**

### **Field Test Bore Logs**

Source: Biodiverse Solutions – Appendix D of Albany  
Motorsport Park Site Feasibility Study (GHD 2018).

**Soil Profile Sampling**



**Location:** Lot 5780 Down Road

**Date tested:** 27/02/2018

**Sampled by:** Kathryn Kinnear

**Weather:** Windy, cool 21 degrees Overcast

<b>Location</b>	<b>Site description</b>	<b>Depth of profile (mm)</b>	<b>Soil Description</b>
SB1	South west corner Open Paddock	0-150 150-300 300-500  500-1200 1200-1500  1500-2000	Dark grey sandy top soil, veg matter. Grey silty sand. Orange, light brown sandy gravel pebbles 10-30mm. Laterite rock . Light brown pebbles 10-30mm, orange sandy silty gravel. Light brown sandy clay, slightly moist. No WT.
SB02	Paddock near creek west side Jarrah/Cas/Marri Forrest adjacent	0-50 50-200 200-800 800-1200 1200-1500 1500-2000  2000-2500	Dark grey sandy top soil, veg matter. Grey sandy silt. Light grey sandy silt, slightly moist. Cream sandy silt, slightly moist Laterite rock. Moist light brown orange sandy silt gravel, pebbles 10-30mm, minor clay. Light grey silty sand. No WT.
SB03	Open paddock North in minor Drainage swale	0-50 50-500 500-1000 1000-1200 1200-1600 1600-1800 1800-2000	Light brown slightly moist silty sand top soil, veg matter. Light brown silty gravel, pebbles 5-10mm. Brown silty gravel pebbles 20-30mm. Dark brown gravelly silt pebbles 20-30mm. Grey silty sand. Light grey moist silty sand. Light brown/orange silty sand, gravel pebbles 10-30mm. No WT.
SB04	Paddock near Creek in Depression area.	0-50 50-200 700-900 900-1300  1300-1500 1500-1800 1800-2000	Dark brown peaty organic matter. Dark grey silty sand slightly moist. Light grey silty sand moist. Laterite rock, moist dark brown gravelly silt (coffee rock) mottled orange. Light brown silty clay wet. Light grey moist clay. White clay not wet. No WT.
SB05	North paddock Area	0-50 50-200 200-700 700-900 900-1500  1500-1800 1800-1900 1900-2000	Slightly moist dark brown peaty sandy silt top soil, veg matter. Dry dark grey silty sand. Dry light grey silty sand. Dry gravelly silty sand orange pebbles. Dry cream quartz gravelly silty sand pebbles 30-50mm. Pink/orange silty sand gravel, cemented compacted gavel pebbles 10-30mm. Moist dark clayey sand. Dry compacted silty gravel orange/pink. No WT.

## REPORT ITEM DIS245 REFERS

<u>Location</u>	<u>Site description</u>	<u>Depth of profile (mm)</u>	<u>Soil Description</u>
SB06	Near creek North side In reed beds	0-100 100-400 400-700 700-1800 1800-2000	Dark brown peaty organic matter moist. Dark grey silty sand moist. Grey silty sand moist. Light grey silty sand wet (smell). Wet brown silty sand (smell) WT 870mm BGL
SB07	Near creek Crossing North side	0-200 200-400 400-600 600-1800 1800-2000	Dark brown/black peaty moist. Black/dark grey peaty sand moist. Dark grey silty sand moist. Light brown silty sand smell. Cream wet silty sand smell. WT 640mm BGL
SB08	Mid creek near dam	0-50 50-200 200-500 500-900 900-1200 1200-1400 1400-1800 1800-2000	Slightly moist dark brown peaty silt, veg matter. Dark brown sandy peaty silt moist. Dark grey silty sand moist. Grey slightly moist silty sand. Dark brown cemented silt, coffee rock. Dark grey moist to wet silty sand. Grey silty sand wet. Dark brown silt minor pebbles 10mm. No WT.
SB09	South side of creek	0-50 50-200 200-600 600-700 700-1100 1100-1300 1300-2000	Dark brown peaty organic matter moist. Dark grey silty sand. Grey silty sand. Light brown gravelly silt. Laterite rock. Wet silt pebbles 30-40mm. White moist clayey silt. WT 660mm BGL
SB010	South boundary east of bush line in paddock	0-50 50-300  300-500  500-1200  1200-2000	Brown silty sand organic matter dry. Brown silty sand gravels 40-50mm, boulders 200mm Laterite, dry. Brown/orange silty sandy gravel cemented Laterite. Light brown/orange cemented silt. White mottles sandstone dry. Light brown/orange cemented silt. White mottles sandstone dry. No WT.
SB011	Mid paddock, top of hill eastern side of site	0-50 50-300 300-400 400-1200 1200-1800 1800-2000	Dark brown silty sand dry. Grey silty sand dry. Light brown silty gravel pebble 30-50mm. Light brown cemented silt Laterite. Light brown, mottles pink * white clay dry. Orange mottled red dry clay. No WT.
SB012		0-400 400-1000 1000-1500 1500-1800  1800-2000	Grey sandy silt organic matter dry. Light grey silty sand. Cream silty sand slightly moist. Dark brown sandy silt, slightly moist gravel minor pebbles. Light brown silty clayey slightly moist boulder Laterite gravels 40mm. No WT.

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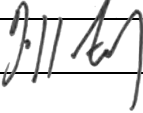
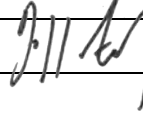
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6136995-3429

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	B Benjamin	C Thompson	On file	J Foley	On file	10/05/2019
1	B Benjamin	J Foley		J Foley		10/08/2020





City of Albany  
Albany Motorsports Park  
Local Water Management Strategy

January 2020

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- Appendix B – Shallow soil profile description
- Appendix C – Deep bore log
- Appendix D – Revegetation species list
- Appendix E – Potential water users
- Appendix F – AMP risk assessment

# Glossary

(C)EMP	(Construction) environmental management plan
4WD	Four wheel drive
AEP	Annual exceedance probability
AMP	Albany Motorsport Park
ANDRA	Australian National Drag Racing Association
ANZECC	Australian and New Zealand Environment and Conservation Council
APEC	Albany Plantation Export Company
ARI	Average recurrence interval
ARR	Australian Rainfall and Runoff
ARVS	Albany Regional Vegetation Survey
ASS	Acid sulfate soils
ATV	All-terrain vehicle
BMP	Best Management Practices
BoM	Bureau of Meteorology
CAMS	Confederation of Australian Motor Sport
CBD	Central business district
CCW	Conservation Category Wetland
CoA	City of Albany
DBCA	Department of Biodiversity, Conservation and Attractions
DEE	Department of the Environment and Energy
DoP	Department of Planning
DoW	Department of Water
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESA	Environmentally Sensitive Area
EY	Exceedance year
FIA	Federation Internationale de l'Automobile
FIM	Federation Internationale Motocyclisme
GoWA	Government of Western Australia
GSMG	Great Southern Motorsports Group
GSMG	Great Southern Motorsports Group
HV	High voltage

## REPORT ITEM DIS245 REFERS

IECA	International Erosion Control Association
LGSTWSS	Lower Great Southern Towns Water Supply Scheme
LGSTWSS	Lower Great Southern Towns Water Supply Scheme
LWMS	Local Water Management Strategy
MA	Motorcycling Australia
mAHD	metres Australian Height Datum
PDWSA	Public drinking water source area
PMST	Protected Matters Search Tool
RIWI Act	<i>Rights in Water and Irrigation Act 1914</i>
SWAA	Surface Water Allocation Area
SWASA	Surface Water Allocation Sub Area
TN	Total nitrogen
TP	Total phosphorus
TPP	Timber processing precinct (Mirambeena)
TSS	Total suspended solids
UV	Ultraviolet
WAPC	Western Australian Planning Commission
WIN	Water Information Network/Reporting
WoNS	Weeds of National Significance
WQPN	Water quality protection note
WSUD	Water sensitive urban design
WWTP	Wastewater treatment plant

# 1. Introduction

## 1.1 Background

GHD was commissioned by the City of Albany to prepare a Local Water Management Strategy (LWMS) for the Albany Motorsports Park (the Project Site).

The Project Site is located approximately 20 km to the north of the Albany CBD, at Lot 5780, Down Road South, Drome within the City of Albany municipality. It covers 192.34 ha in total, of which approximately 52 ha at the western end is covered with well-established vegetation and not considered available for development. Under the City of Albany Local Planning Scheme No. 1 the Project Site is currently zoned as 'Priority Agriculture' and is located within an Industrial Buffer Area (IA4BA) surrounding the Mirambeena Timber Processing Precinct (TPP – i.e. Albany Plantation Export Company (APEC) and Plantation Energy) to the north of Down Road West.

### 1.1.1 Planning context

This LWMS has been prepared in accordance with *State Planning Policy 2.9: Water Resources* (WAPC, 2006) and *Better Urban Water Management* (WAPC, 2008). The planning framework for land and water planning is illustrated in Figure 1-1.

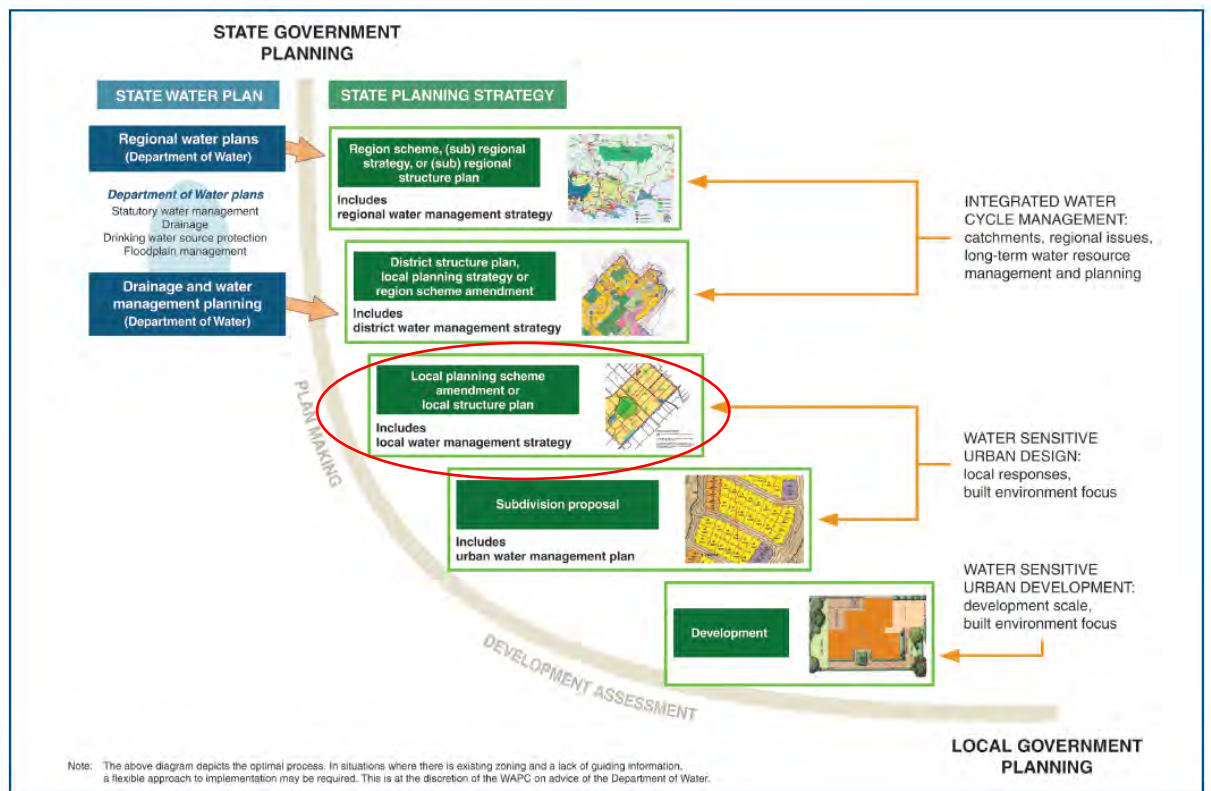


Figure 1-1: Integrated land and water planning processes

SOURCE: *Better Urban Water Management* (WAPC, 2008)

## 1.2 Purpose of this report

This LWMS has been prepared to support development of the proposed Albany Motorsport Park at Lot 5780 Down Road South, Drome (the Project Site) (Figure 1-2). The strategy provides background to characteristics of the project site, and identifies key principles, design criteria and development requirements, and additional guidance to support development within the Project Site.

## 1.3 Scope and limitations

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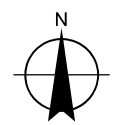
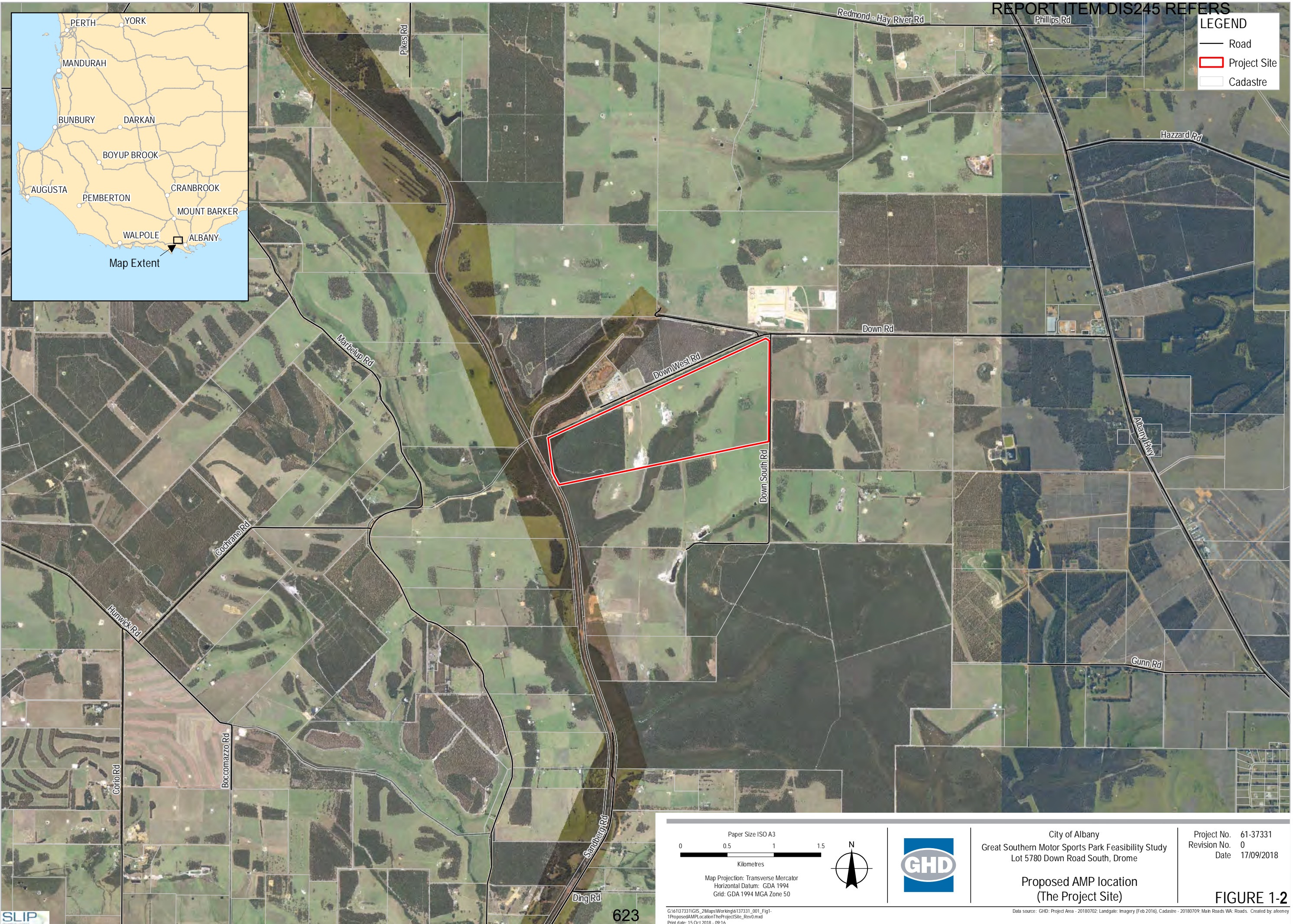
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**LEGEND**

-  Road
-  Project Site
-  Cadastre



Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 50



City of Albany  
Great Southern Motor Sports Park Feasibility Study  
Lot 5780 Down Road South, Drome

Project No. 61-37331  
Revision No. 0  
Date 17/09/2018

Proposed AMP location  
(The Project Site)

FIGURE 1-2

## 1.4 Previous studies

Numerous studies and investigations have been undertaken to support development planning for the Albany Motorsports Complex. A summary of key documents of relevance to integrated water management of the Site is provided below.

### 1.4.1 Albany Motorsport Park Site Feasibility Study – Lot 5780 Down Road South, Drome (GHD, 2018)

A site feasibility assessment was completed as part of preliminary planning investigations for the proposed Albany Motorsports Park. The feasibility assessment included a range of desktop technical investigations including review of servicing requirements and traffic impact assessment, and desktop geotechnical, hydrogeological, noise and water management planning.

The feasibility assessment further included a preliminary risk assessment of the key issues identified, and identified a suite of recommended remedial actions based on a hierarchy of controls. A number of recommended remedial and control actions were outlined to provide guidance for the various stages of the development.

### 1.4.2 Albany hinterland prospective groundwater resources map; Explanatory notes (DWER, 2017)

Hydrogeological report and map for the Albany hinterland developed by the Department of Water and Environmental Regulation (DWER) as part of the *Royalties for Regions South Coast Groundwater Investigation project*.

The Albany hinterland area in the South Coast is known as an important resource for water supply in the Great Southern region. In 2013, DWER undertook some hydrogeological (surface water and groundwater) investigations (as part of South Coast groundwater investigation by Western Australian Government on groundwater availability) and mapped prospective groundwater resources in the Albany hinterland region in order to support regional developments.

This was used as a guide to further investigate and develop a conceptual hydrogeological model for the AMP Project Site as part of this Local Water Management Strategy, in order to understand the groundwater and surface water sources and pathways.

### 1.4.3 Motorplex Development, Down Road Surface and Groundwater Monitoring 2018 Summary Report (Bio Diverse Solutions 2018)

Bio Diverse Solutions have undertaken groundwater monitoring of shallow groundwater bores installed across the Site commencing in February 2018. The 2018 report summarises preliminary results for the 2018 monitoring period, with additional monitoring completed up to November 2019 which has been reviewed for inclusion in the LWMS.

### 1.4.4 Proposed Motorsport Park, Lot 5780 Down Road, Drome Reconnaissance Flora and Level 1 Fauna Survey Report (Bio Diverse Solutions 2019)

Bio Diverse Solutions completed a desktop assessment and reconnaissance flora survey and Level 1 Fauna survey of the Project Site in Spring 2018. The survey included identification of habitat trees and threatened fauna dependent hollows, and mapping of vegetation communities (GIS mapping, vegetation condition mapping, fauna habitat types and condition).

## 2. Proposed development

### 2.1 Location

The Project Site is located approximately 20 km to the north of the Albany CBD, at Lot 5780, Down Road South, Drome, within the City of Albany municipality (refer Figure 1-2).

The Project Site is bounded by:

- Down Road West to the north,
- Down Road South to the east,
- Lot 5781, Down Road South to the south (private owner), and
- A local road reserve and the Avon-Albany rail reserve to the west.

Lot 5780 is 192.34 ha in size, of which approximately 52 ha at the western end is covered with well-established vegetation and not considered available for development. A small area in the north-west corner of the cleared site is sub-leased by Plantation Energy, for a stormwater retention basin and woodchip storage.

### 2.2 Current zoning

Under the City of Albany Local Planning Scheme No. 1 the Project Site is currently zoned as '*Priority Agriculture*' and is located within an Industrial Buffer Area (IA4BA) surrounding the Mirambeena Timber Processing Precinct (TPP – i.e. Albany Plantation Export Company (APEC) and Plantation Energy) to the north of Down Road West (1) (DoP, 2014).

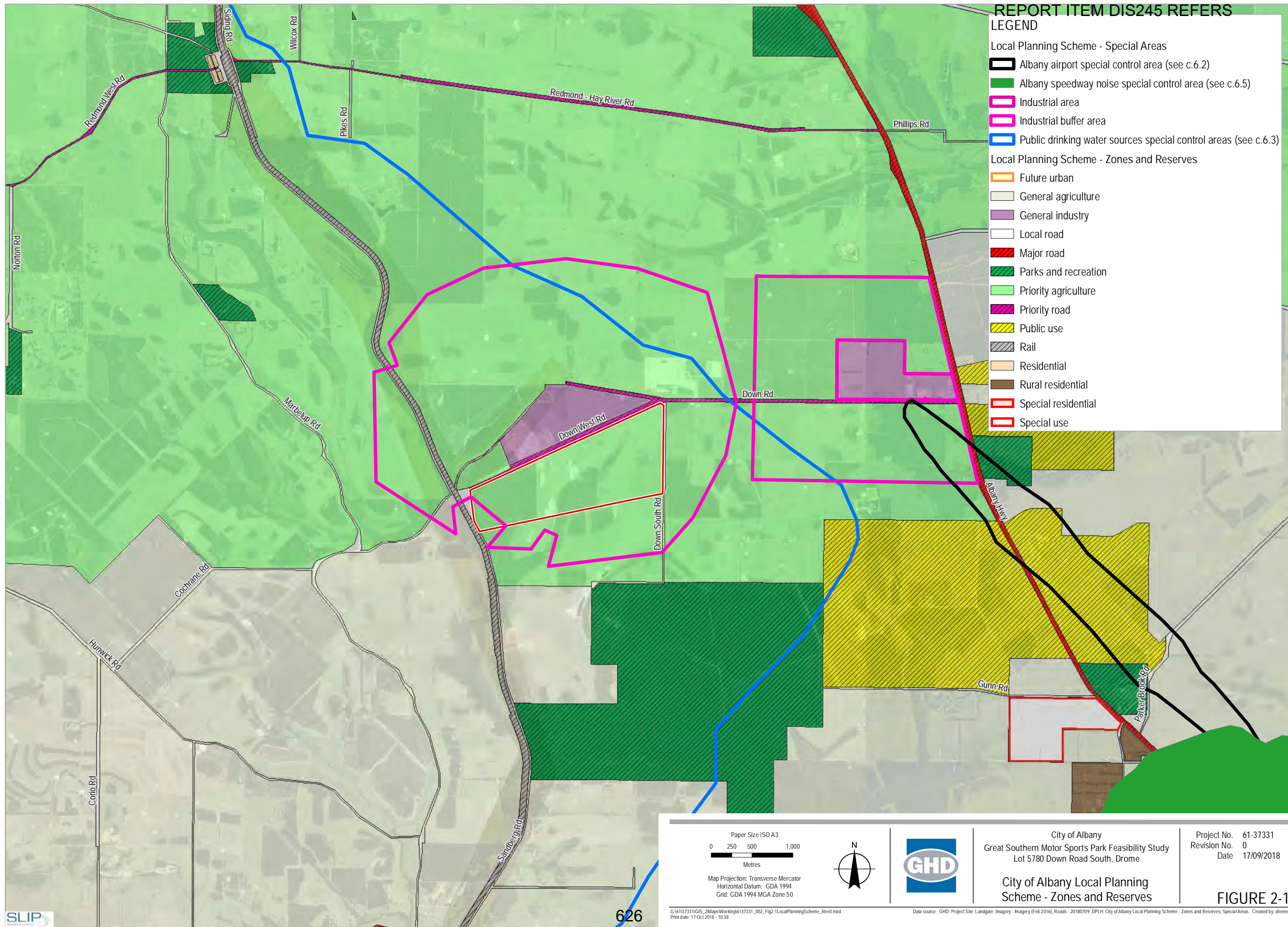
The land immediately adjacent to the Project Site is also predominantly zoned '*Priority Agriculture*' with the exception of the Albany Plantation Export Company (APEC) wood chip mill and Plantation Energy wood pellet production facility, which are zoned '*General Industry*'. The western boundary of the Project Site lies adjacent to a local road reserve and railway line which is zoned '*Major road, Rail*'. Land to the south-west of the railway is zoned '*General Agriculture*' (DPLH, 2018).

The Down Road Nature Reserve (Lot 7388 on P091191 and Lot 7676 on P217695) located approximately 900 m to the south of the Project Site, is zoned '*Parks and Recreation*' (DPLH, 2018).

### 2.3 Surrounding land uses

The immediately surrounding land uses include a railway to the west of the Project Site, APEC and Plantation Energy wood chip processing facility to the north of Down Road West and '*Priority Agriculture*' to the south and east used for livestock grazing. The CBH Mirambeena grain storage facility is also north of the site, on Down Road.

Further afield land uses are also largely '*Priority Agriculture*', or '*General Agriculture*'. The Down Road Nature Reserve is located approximately 900 m to the south; and the Water Corporation's Gunn Road tree plantation is located approximately 2,500 m to the east. The Mirambeena Strategic Industrial Area (SIA) is located approximately 2,000 m to the east on Albany Highway.



**REPORT ITEM DIS245 REFERS LEGEND**

**Local Planning Scheme - Special Areas**

- Albany airport special control area (see c.6.2)
- Albany speedway noise special control area (see c.6.5)
- Industrial area
- Industrial buffer area
- Public drinking water sources special control areas (see c.6.3)

**Local Planning Scheme - Zones and Reserves**

- Future urban
- General agriculture
- General industry
- Local road
- Major road
- Parks and recreation
- Priority agriculture
- Priority road
- Public use
- Rail
- Residential
- Rural residential
- Special residential
- Special use

<p>Paper Size ISO A3</p> <p>0 250 500 1,000</p> <p>Metres</p> <p>Map Projection: Transverse Mercator Horizontal Datum: GDA 1994 Grid: GDA 1994 MGA Zone 50</p>			<p>City of Albany</p> <p>Great Southern Motor Sports Park Feasibility Study Lot 5780 Down Road South, Drome</p>	<p>Project No. 61-37331</p> <p>Revision No. 0</p> <p>Date 17/09/2018</p>
			<p>City of Albany Local Planning Scheme - Zones and Reserves</p>	<p><b>FIGURE 2-1</b></p>

2.4 Existing land-use

The perimeter of the Project Site is entirely fenced and is currently used for the primary purpose of cattle grazing. Historically the Project Site is likely to also have been used solely for the purpose of agriculture. The western end of the property consists of 52 ha of native vegetation that will be retained. An unnamed creek line runs from the north-east corner of the property through to the south-west corner, from where it joins into Marbelup Brook. A number of small dams are located across the property for stock watering. These will be retained and maintained for the AMP.

The Plantation Energy sub-leased area consists of a small retention basin, connected to their site drainage system on the other side of Down Road West. The sub-lease area is powered, and Plantation Energy operates a pump from the retention basin. This area is unfenced, although there is a locked access gate on the site perimeter fence, off Down Road West.

Adjacent to the Plantation Energy retention basin, there is presently a significant amount of rubbish (comprising of what appears to be decommissioned process vessels, oil drums, scrap metal, electrical cable, plastic, chemical containers, etc.) . The GSMG understand that this area will need to be cleared and made good prior to the sale of the property.

Mr Lindsay Black also has a current Planning Consent over two locations on this site for the purpose of extracting sand. Both sand pits are covered under the same Consent (No. P275225), which was approved on 14 September 2007. Access is via Down Road West, using the same gate as the Plantation Energy sub-lease area. The GSMG understand the Mr Black has ceased the quarrying activities and made good the affected area (as required under the conditions of the Planning Consent).



Figure 2-2: Images of Plantation Energy sub-lease area

## 2.5 Proposed landuse and zoning

### 2.5.1 Scheme amendment

The City of Albany (GHD, 2019) has lodged a scheme amendment with the West Australian Planning Commission (WAPC) to rezone Lot 5780 Down Road South, Drome from *Priority Agriculture* to *Special Use*, with appropriate land use and development provisions proposed to be included in Schedule 4 of the LPS1 to guide future development.

The proposed Precinct plan is shown in Figure 2-4.

### 2.5.2 Layout and facilities

The concept design for the Albany Motorsport Park (AMP) has been developed by the non-for-profit Great Southern Motorplex Group (GSMG) and Roberts Gardiner Architects. The concept design is shown in Figure 2-3 and described below:

#### Albany Motorsport Park concept design

The proposed AMP will consist of:

1. Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with CAMS' *Track Operator's Safety Guide* (CAMS 2012) and Motorcycling Australia (MA) *Track Guidelines* (MA, 2011), and
  - To be licensed by Confederation of Australian Motor Sport (CAMS) for FIA Grade 2 and FIM Grade B (i.e. up to second-tier international motor racing).
2. A motocross circuit:
  - Designed and constructed in association with MA guidelines.
3. A 1,000 ft drag racing strip:
  - Designed and constructed in accordance with FIA specifications for drag strips and in association with Australian National Drag Racing Association (ANDRA).
4. A 1,300 m<sup>2</sup> burnout area,
5. An off-road four wheel drive (4WD) and all-terrain vehicle (ATV) training area,

At full development, the AMP will also include associated facilities, such as:

- Toilets,
- Medical / first aid station,
- Manager's office,
- Meeting / briefing room
- Kitchen / canteen,
- Storage / grounds maintenance workshop,
- Vehicle scrutineers' workshop,
- Control tower,
- Spectators viewing areas,
- Spectators parking,
- Competitors parking, and
- Grassed spectators' picnic area with shade and BBQs,

## Events and usage

For the purposes of sizing facilities and infrastructure GSMG have provided conceptual usage of the AMP, with a typical /frequent site attendance of 500 persons assumed (i.e. competitors + officials + spectators). This was determined through discussion with the GSMG on the nature and size of expected typical events. For special events that anticipate a greater number of site attendees, additional water servicing management measures will need to be implemented (e.g. drinking water carts, port-a-loos).

### 2.5.3 Landscape concept

Landscaping of the Site will seek to retain existing vegetation where possible, and where additional planting is required it will be undertaken with native vegetation species that have been identified in the Albany Regional Vegetation Survey Extent (Sandiford and Barrett, 2010), and identified within the wetland area on-site. Revegetation with native species will occur within the wetland buffer (refer 5.2.5) with targeted revegetation of degraded land areas where these do not inhibit the proposed use of the Site.

Further detail of the landscaping will be provided at detailed design.

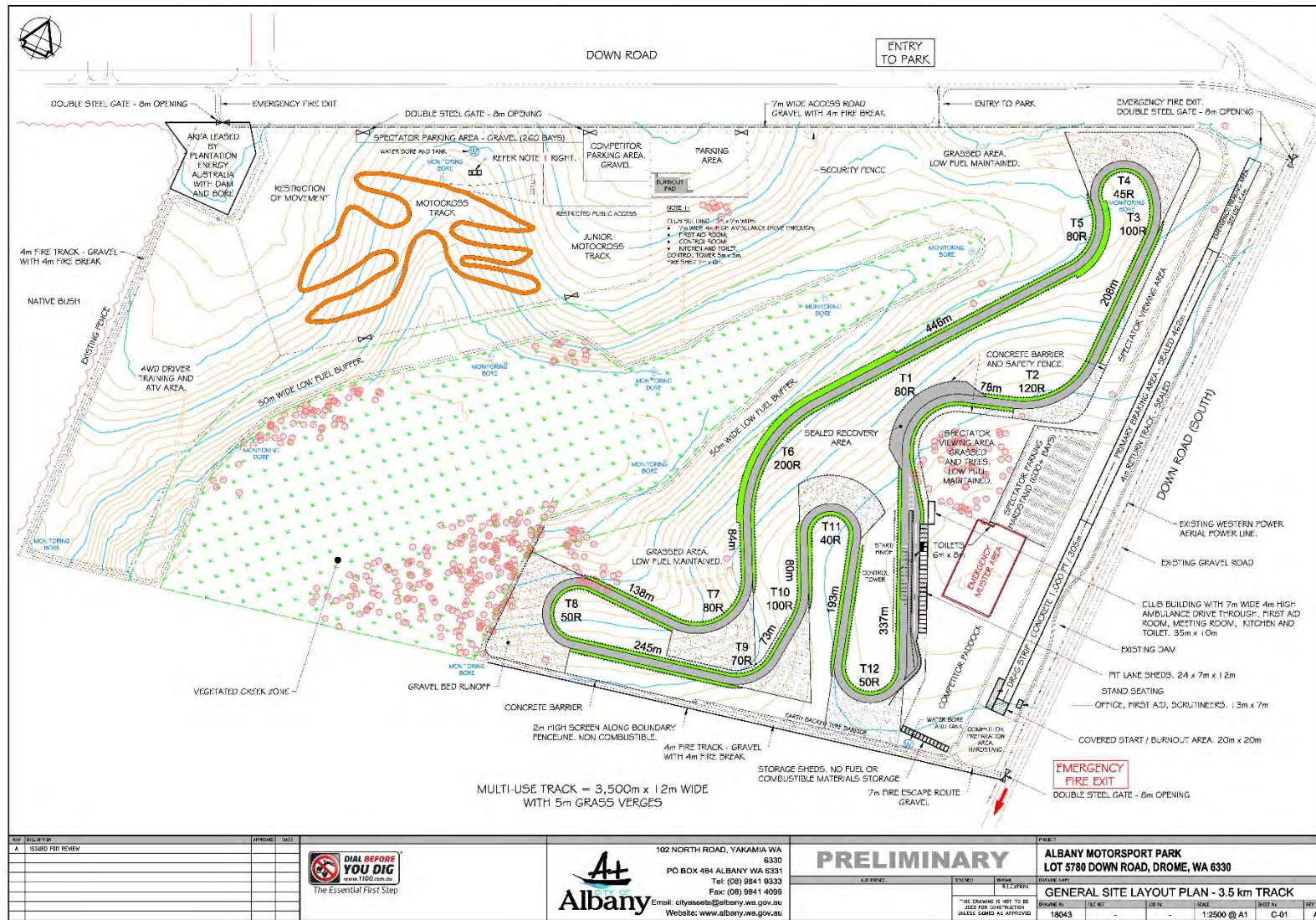
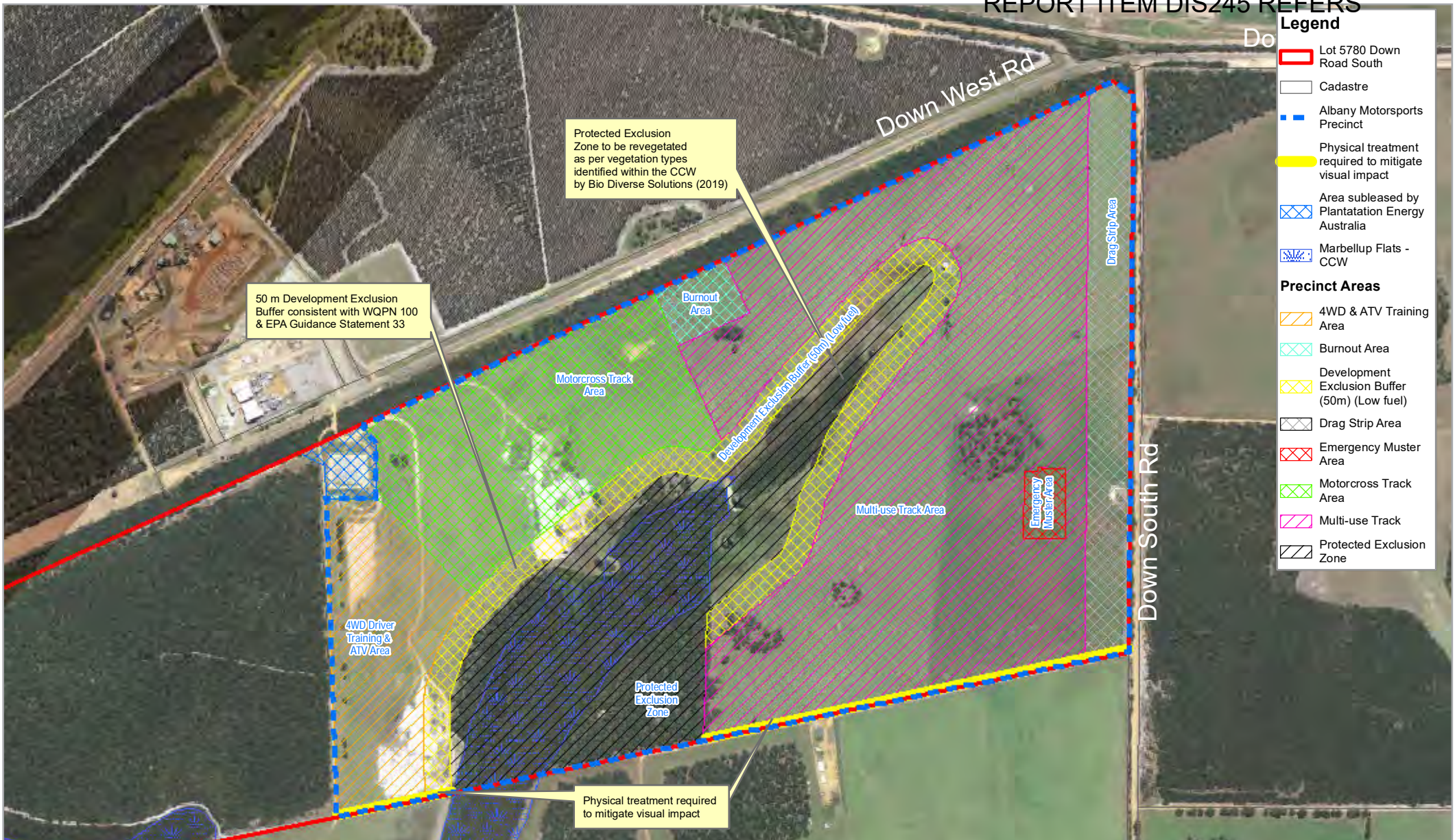


Figure 2-3: AMP concept site layout





**Legend**

- Lot 5780 Down Road South
- Cadastre
- Albany Motorsports Precinct
- Physical treatment required to mitigate visual impact
- Area subleased by Plantation Energy Australia
- Marbellup Flats - CCW

**Precinct Areas**

- 4WD & ATV Training Area
- Burnout Area
- Development Exclusion Buffer (50m) (Low fuel)
- Drag Strip Area
- Emergency Muster Area
- Motorcross Track Area
- Multi-use Track
- Protected Exclusion Zone

<p>Paper Size ISO A4</p> <p>0 50 100 150 200</p> <p>Meters</p> <p>Map Projection: Transverse Mercator Horizontal Datum: GDA 1994 Grid: GDA 1994 MGA Zone 50</p>			<p>City of Albany Albany Motor Sports Park Lot 5780 Down Road South, Drome</p> <p><b>PRECINCT PLAN</b></p>	<p>Project No. 61-37331 Revision No. 0 Date 23/07/2019</p>
<p>631</p>		<p><b>FIGURE 2-4</b></p>		

Data source: GHD: Lot 5780 Down Road South, Albany Motorsports Precinct 20190503, Precinct Areas 20190412, Area subleased by Plantation Energy 20190503, Physical treatments 20190412; Landgate: Aerial - WA Now, Cadastre 20180709; DBCA: South Coast Significant Wetlands. Created by: v.davies



## 3. Site characteristics

### 3.1 Climate

Albany is located on the south coast of Western Australia and the climate is broadly described as Mediterranean, with warm dry summers and mild wet winters. The nearest Bureau of Meteorology (BoM) official recording station is Albany Airport (Station No. 9741). A summary of climatic data for this station is provided in Table 3-1 (BoM, 2019).

Table 3-1: Climatic data for the Albany Airport (Station No. 9741) for years 1960 to 2014 (BoM 2019)

Climatic variable	Statistic
Mean annual maximum temperature range	15.8°C in July to 24.9°C in February
Mean annual minimum temperature range	7.5°C in July to 14.5°C in February
Mean annual rainfall	798.1 mm
Mean annual rain days per year	83.1

### 3.2 Geotechnical conditions

#### 3.2.1 Topography

The surface elevation of the Project Site ranges from approximately 41 m AHD to 73 m AHD. The lowest elevation is on the southern boundary and extends through the centre of the Project Site within a gully (a tributary to Marbelup Brook) that lies in a north-easterly direction. The highest elevation occurs on the eastern boundary of the Project Site.

#### 3.2.2 Soils and geology

Regional geology is described with reference to the 1:50,000 Environmental Geology series map (Albany sheet) and the 1:250,000 Geological Series map (Mt Barker – Albany sheet). These indicate the Project Site is underlain by Cainozoic sand of colluvial origin – “Qc: Colluvium – Sand, silt and clay” on the slopes and within the low lying areas of the Marbelup Brook “QA – Clay, silt, sand and gravel in watercourses” (Allen & Sofoulis, 1984).

The sand is described as pale grey, fine to coarse, angular to sub-rounded quartz that is loose and moderately sorted and contains occasional pebbles of laterite. The thickness of the sand unit is not indicated on the maps, however the 1:250,000 map sheet indicates sand unit generally overlays laterite.

The local geology is further delineated by DPIRD Soil Landscape Mapping identified in Table 3-2 and illustrated in Figure 3-1.

GHD has an appreciation for the general site context in the surrounds, having undertaken previous studies in the Mirambeena Strategic Industrial Area and to the north of Lot 5780. A geotechnical study was undertaken in 2014 and 2015 for CBH Mirambeena grain storage facility to the north (shown on Figure 3-1).

Table 3-2: Soil map units within the Project Site (GoWA, 2018)

Map unit symbol	Name	Landform	Geology	Soil
242KgDMc	Dempster Crest phase	Broad convex crests of sandy and lateritic spurs and ridges	Deeply weathered siltstone	Duplex sandy gravels; Grey deep sandy duplexes; Pale deep sand; Shallow gravels
242KgS7f	Minor Valleys S7 floor phase	Foot slopes and swampy valley floors of minor valleys	Colluvial and alluvial deposits over weathered sedimentary rocks	Wet and semi-wet soils; Pale deep sands; Grey deep sandy duplexes
242KgS7h	Minor Valleys S7 slope phase	Side slopes of minor valleys	Colluvium sedimentary rocks	Pale deep sands; Grey deep sandy duplexes
242ReDMc	Dempster Crest phase	Elongate crests	No information recorded	Sands and laterite

### 3.2.3 Acid sulfate soils risk mapping

The Project Site has been overlaid onto the DWER ASS risk mapping for the Albany-Torbay region (GoWA 2018) and is presented as Figure 3-2. The DWER ASS risk mapping provides the following mapped ASS risk categories:

- “high to moderate risk” of Actual ASS (AASS) and Potential ASS (PASS) occurring within 3m from the natural soil surface
- “moderate to low risk” of AASS and PASS occurring within 3m from the natural soil surface but high to moderate risk of ASS occurrence beyond 3m of the natural soils surface
- areas that are not mapped are considered to have no known ASS risk

A review of the DWER ASS risk mapping indicates the Project Site is located outside of the boundary extent of the mapped areas. However, given that tributaries of Marbelup Brook located approximately 750 m to the south of the Project Site are mapped as “Moderate to Low Risk” of ASS occurring, GHD has inferred that where these tributaries of Marbelup Brook extend into the Project Site that they would also be considered to represent the same level of ASS risk. This is also consistent with the more broadly mapped risk areas where there are obvious low lying drainage lines, creeks and tributaries.

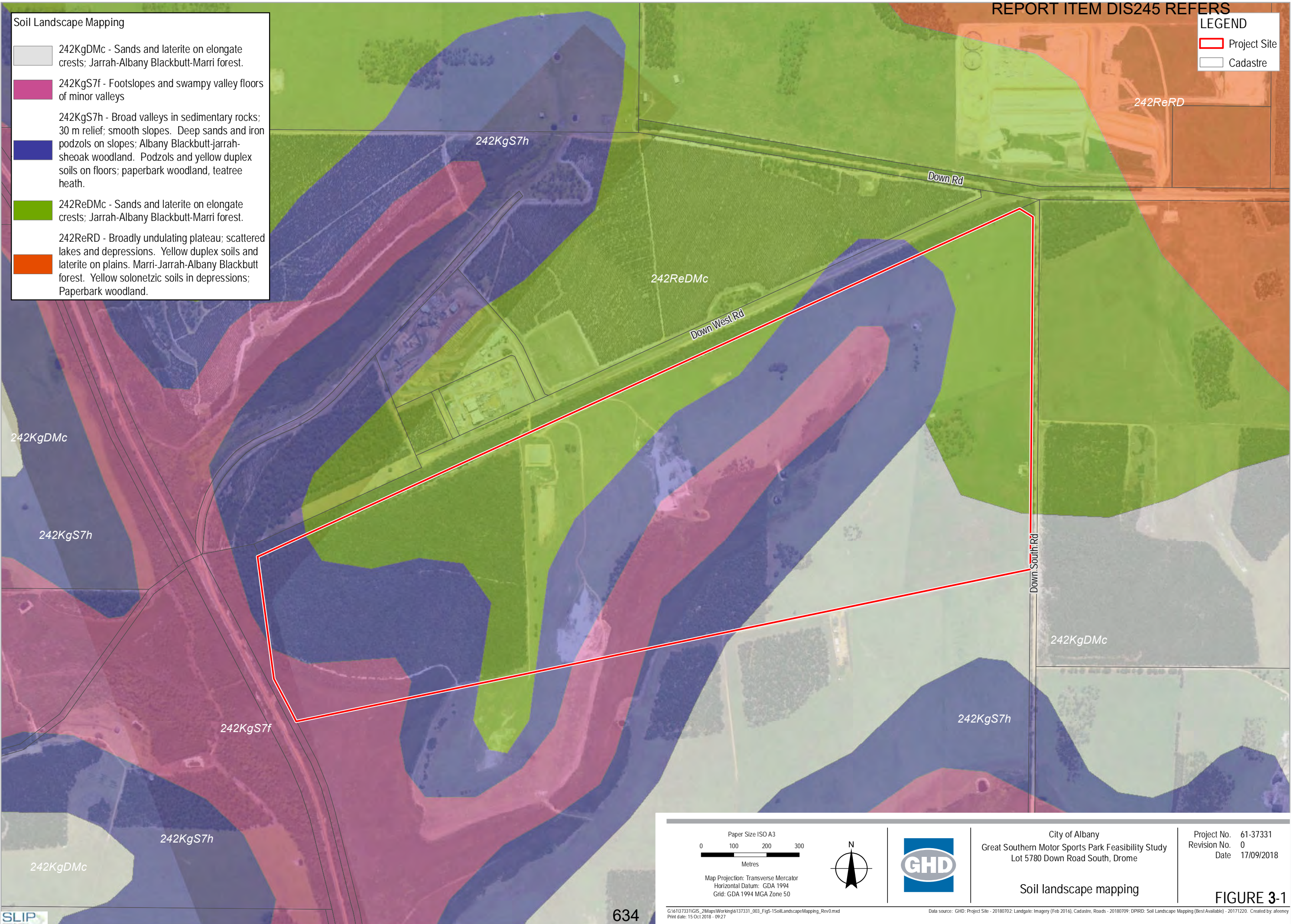
No “High to moderate ASS risk” areas appear to be mapped within the broader site setting further supporting the expected ASS risk onsite.

Soil Landscape Mapping

- 242KgDMc - Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri forest.
- 242KgS7f - Footholds and swampy valley floors of minor valleys
- 242KgS7h - Broad valleys in sedimentary rocks; 30 m relief; smooth slopes. Deep sands and iron podzols on slopes; Albany Blackbutt-jarrah-sheoak woodland. Podzols and yellow duplex soils on floors; paperbark woodland, teatree heath.
- 242ReDMc - Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri forest.
- 242ReRD - Broadly undulating plateau; scattered lakes and depressions. Yellow duplex soils and laterite on plains. Marri-Jarrah-Albany Blackbutt forest. Yellow solonetzic soils in depressions; Paperbark woodland.

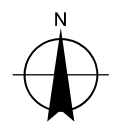
LEGEND

- Project Site
- Cadastre



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 Metres

Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 50



City of Albany  
 Great Southern Motor Sports Park Feasibility Study  
 Lot 5780 Down Road South, Drome

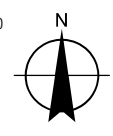
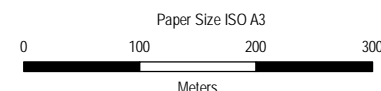
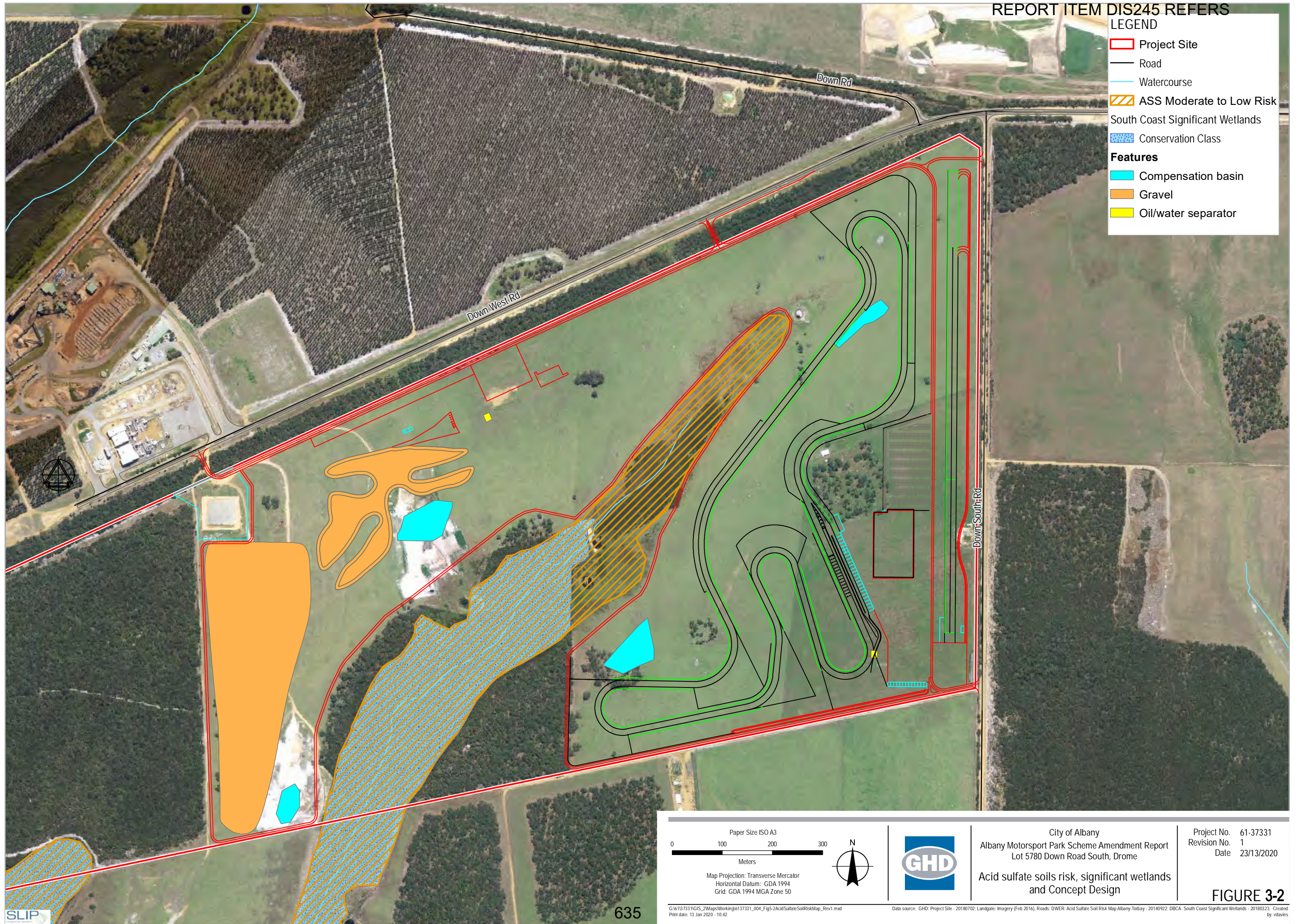
Project No. 61-37331  
 Revision No. 0  
 Date 17/09/2018

Soil landscape mapping

FIGURE 3-1

LEGEND

- Project Site
  - Road
  - Watercourse
  - ASS Moderate to Low Risk
  - South Coast Significant Wetlands
  - Conservation Class
- Features**
- Compensation basin
  - Gravel
  - Oil/water separator



Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 50



City of Albany  
 Albany Motorsport Park Scheme Amendment Report  
 Lot 5780 Down Road South, Drome  
 Acid sulfate soils risk, significant wetlands  
 and Concept Design

Project No. 61-37331  
 Revision No. 1  
 Date 23/13/2020

FIGURE 3-2

### 3.3 Environmentally sensitive areas

#### 3.3.1 Reserves and conservation areas

Approximately 900 m to the south of the Project Site, the Down Road Nature Reserve (Lot 7388 on P091191 and Lot 7676 on P217695) is zoned '*Parks and Recreation*' (DPLH, 2018).

There are no DBCA Legislated Lands and Waters intercepted by the Project Site. However there are two sites within 5 km of the Project Site including the following (GoWA, 2018):

- Down Road Nature Reserve located approximately 900 m to the south, and
- Phillips Brook Nature Reserve located approximately 4.4 km to the north east.

The unnamed water course located within the Project Site is a tributary of Marbelup Brook and is a Conservation Category wetland (CCW) (Figure 3-2) (GoWA, 2018). As per DWER guidance (DER, 2014), a CCW is "*a defined wetland and the area within 50 m of the wetland*" and is declared to be an Environmentally Sensitive Area (ESA) under the *Environmental Protection Act 1986*.

There is also one mapped ESA located within 5 km; approximately 4.7 km to the north-east of the Project Site (Figure 3-3) (GoWA, 2018).

#### 3.3.2 Fauna

##### ***Fauna diversity***

Searches of the EPBC Act Protected Matters Search Tool (PMST) (DEE, 2018) and DBCA *NatureMap* (DBCA, 2018) databases identified 92 vertebrate fauna species (excluding marine species) that have previously been recorded within a 5 km buffer of the Project Site. This total is comprised of 80 native species and 12 introduced and/or naturalised species, including 70 birds, 12 mammals, six fish, three amphibians, and one reptile.

A Level 1 Fauna Survey was completed for the Project Site in spring 2018 by Bio Diverse Solutions (2019). This survey included targeted assessment for fauna of conservation significance. Forty fauna species were identified during the field survey including eight mammals (five native and three non-native), 29 birds, one reptile and two amphibians (Bio Diverse Solutions, 2019).

##### ***Conservation significant fauna***

Desktop searches, undertaken by Bio Diverse Solutions (2019), of the EPBC Act PMST and DBCA *NatureMap* databases, identified potential presence of 70 conservation significant flora within the Project area. The likelihood of occurrence for each species, undertaken by Bio Diverse Solution (2019), identified 21 species having potentially suitable habitat present within the survey area, including:

- 13 species listed under the EPBC Act and/or the *Biodiversity Conservation Act 2016* (BC Act),
- Two migratory birds protected under international agreement (Schedule 5), and
- Six DBCA Priority listed species.

Four conservation significant species were directly and indirectly observed within the broader survey area by Bio Diverse Solutions (2019), including:

- Baudin's Cockatoo (*Calyptohynchus baudinii*) (Vulnerable, Schedule 2),
- Forest Red-tailed Black Cockatoo (*Calyptohynchus banksia naso*) (Vulnerable, Schedule 3),
- Western Brush Wallaby (*Notamacropus irma*) (Priority 4), and
- Southern Brown Bandicoot, Quenda (*Isodon fusciventer*) (Priority 4).

### **Introduced fauna**

Twelve introduced species were identified in the desktop searches with species or species habitat likely to occur within a 5 km radius of the Project Site.

### 3.3.3 Flora

#### **Flora diversity**

The EPBC Act PMST (DEE, 2018) and DBCA *NatureMap* (DBCA, 2018) database searches identified 108 vascular flora species (including subspecies and varieties) that have been previously recorded or have habitat likely to occur within 5 km of the Project Site. This total is comprised of 99 native species and nine introduced and/or naturalised species.

The flora and vegetation values of Lot 5780 and within road reserves adjacent to Lot 5780 on Down Road West and Down Road South, were assessed in a reconnaissance level flora survey in spring 2018 by Bio Diverse Solutions (2019). BDS recorded 141 flora taxa (including subspecies and varieties), representing 41 families and 105 genera during the field survey of Lot 5780 and vegetation within adjacent road reserves on Down Road West and Down Road South. This total comprised 123 native taxa and 19 introduced taxa.

Dominant families recorded within the wider survey area included:

- Fabaceae (24 taxa including five introduced taxa),
- Proteaceae (15 taxa),
- Myrtaceae (13 taxa),
- Poaceae (nine taxa including eight introduced taxa), and
- Cyperaceae (eight taxa).

#### **Conservation significant flora**

Desktop searches by Bio Diverse Solutions (2019) of the EPBC Act PMST and DBCA *NatureMap* databases, identified potential presence of 58 conservation significant flora within the Project area. The likelihood of occurrence for each species, undertaken by Bio Diverse Solution (2019), identified 36 species having potentially suitable habitat present within the survey area, including:

- 11 BC Act listed species,
- Two Priority 1 species,
- Four Priority 2 species,
- 10 Priority 3 species, and
- Nine Priority 4 species.

The spring survey did not identify any EPBC Act, BC Act or State Priority listed flora species within the survey area (Bio Diverse Solutions, 2019). The AMP proposal is considered unlikely to impact on conservation significant flora species as it has been designed to lie predominantly within previously cleared agricultural land.

**Introduced flora**

Eight Weeds of National Significance (WoNS) were identified in the desktop assessment as having habitat likely to occur within 5 km of the Project Site (DEE, 2018).

**3.4 Hydrology and hydrogeology**

Desktop searches of the DWER hydrology layers were undertaken and are summarised in Table 3-3.

Table 3-3: DWER data queries within the Project Site (GoWA, 2018)

Aspect	Details	Result
Public Drinking Water Source Areas (PDWSA)	PDWSA is a collective term used for the description of Water Reserves, Catchment Areas and Underground Pollution Control Areas declared (gazetted) under the provisions of the Metropolitan Water Supply, Sewage and Drainage Act 1909 or the Country Area Water Supply Act 1947.	Project Site lies within the Priority 2 Marbelup Brook Catchment Area (Figure 3-5).
Groundwater Areas	Groundwater areas proclaimed under the Rights in Water and Irrigation Act 1914 (RIWI).	Project Site lies within Albany Groundwater Area (Figure 3-4).
Surface Water Areas	Surface water areas proclaimed under the RIWI Act 1914.	None present.
Irrigation District	Irrigation Districts proclaimed under the RIWI Act 1914.	None present.
Rivers	Rivers proclaimed under the RIWI Act 1914.	None present.
Waterways Management Areas	Areas proclaimed under the Waterway Conservation Act 1976.	None present within the Project Site, however the Albany Waterways Management Area is located approx. 800 m to the north.
Clearing Control Catchments	Country Area Water Supply Act 1947 Part 2A.	None present.

**3.4.1 Surface water and drainage**

The Project Site lies in the Marbelup Brook sub-catchment which forms part of the wider Torbay Inlet Catchment in the Denmark Coast Basin within the South West Division (GoWA, 2018).

The entire Project Site and surrounds are located within the Marbelup Brook Surface Water Allocation Sub Area (SWASA), which is a sub area of the Albany Coast Surface Water Allocation Area (SWAA) (GoWA, 2018).

An unnamed water course is present within the Project Site, draining from the north-east and centre of the site to the south across the southern boundary to the Marbelup Brook, which ultimately drains to Lake Powell. However the natural drainage of the lower part of Marbelup Brook catchment has been modified which diverts the lower part of Marbelup Brook away from



Lake Powell to the Torbay Inlet (DoW, 2007). Marbelup Brook is located approximately 800 metres west of the site boundary.

During a site visit (June 2018) the watercourse was observed to be in a modified state, with cattle currently having access to the watercourse. Erosion was evident, particularly in the eastern extent of the watercourse. This area was also mostly devoid of native vegetation, with the exception of some sedges (*Juncus* spp) (Plate 3-1). The western section of the watercourse contains native shrubs / sedges and had a defined bed / banks.



Plate 3-1: Eastern extent of the watercourse showing evidence of erosion and cattle access

### 3.4.2 Wetlands and groundwater dependent ecosystems

#### ***International and nationally important wetlands***

Desktop searches identified no internationally important (Ramsar) or Nationally Important listed wetlands within 5 km of the Project Site (GoWA, 2018).

#### ***South Coast Significant Wetlands***

The unnamed water course located within the Project Site is a tributary of Marbelup Brook and is a Conservation Class wetland (Figure 3-2) (GoWA, 2018).

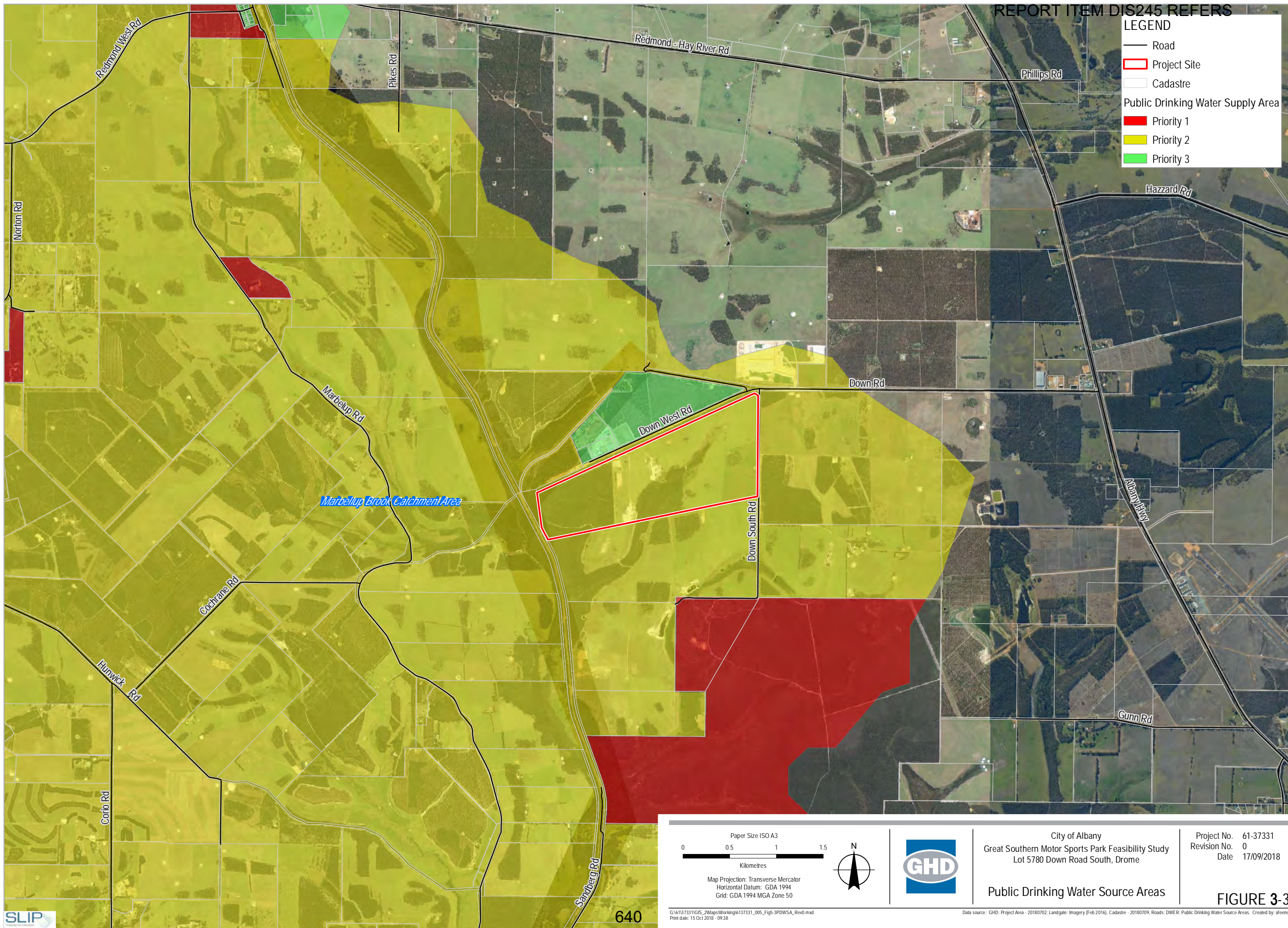
### 3.4.3 Public drinking water supply area

The site is located within a Priority 2 (P2) area of the Marbelup Brook public drinking water source area (PDWSA) (DoP, 2014). This PDWSA is gazetted under the *Country Areas Water Supply Act 1947*, however is currently not used. It has been identified as a potential future water source option in the *Great Southern Regional Water Supply Strategy 2014* (DoW, 2014).

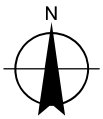
The Minister for Water has formally provided advice to the City of Albany (Kelly, 2018) that while a motorsport facility is incompatible with a P2 PDWSA (DoW, 2016), “there are measures that can be put in place to protect water quality should the City proceed to approve the development”. These measures are further discussed in Section 5 and Section 0.

LEGEND

- Road
- ▭ Project Site
- ▭ Cadastre
- Public Drinking Water Supply Area
- ▭ Priority 1
- ▭ Priority 2
- ▭ Priority 3



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 Kilometres  
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 Grid: GDA 1994 MGA Zone 50







City of Albany  
 Great Southern Motor Sports Park Feasibility Study  
 Lot 5780 Down Road South, Drome

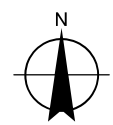
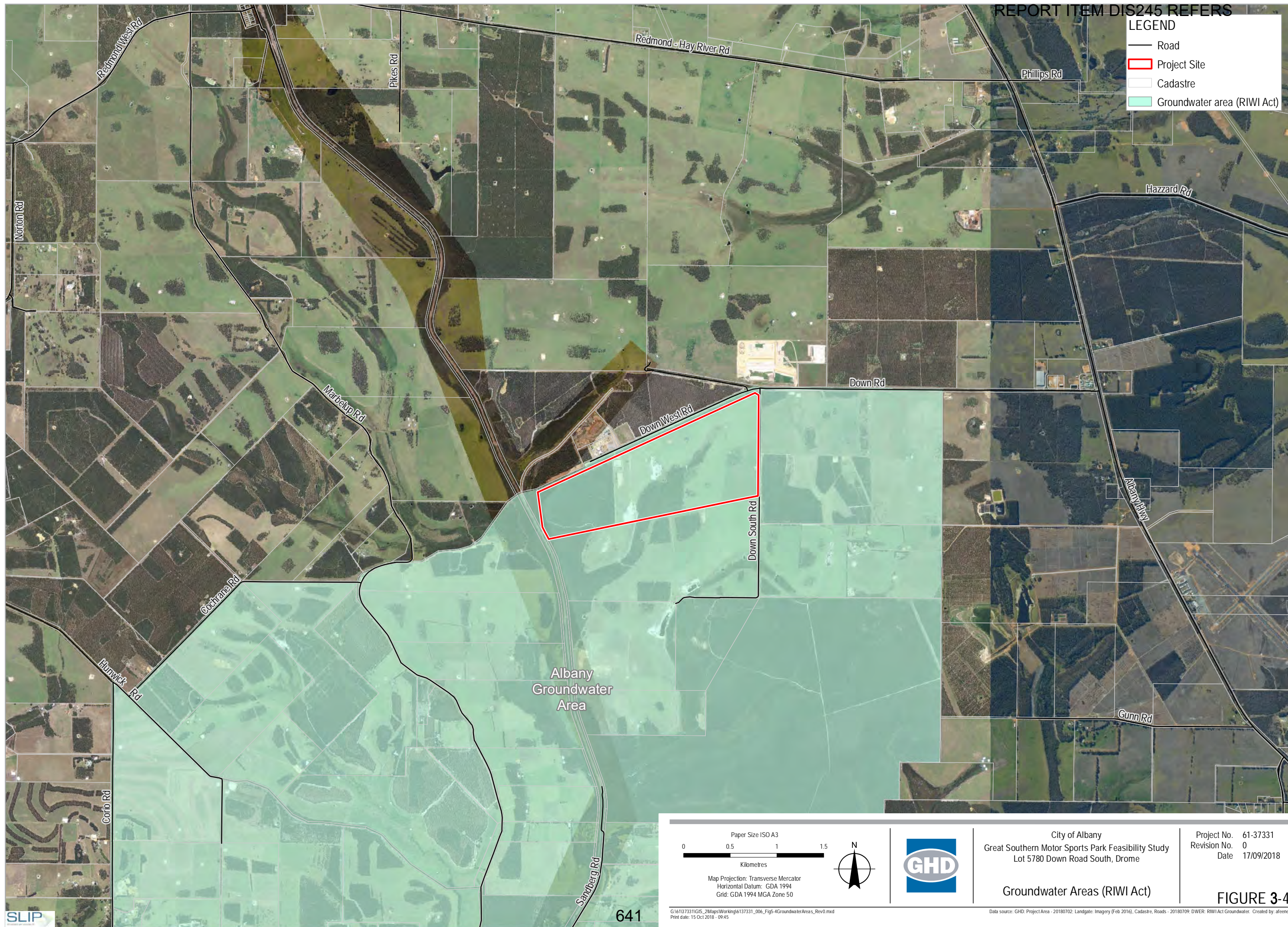
Public Drinking Water Source Areas

Project No. 61-37331  
 Revision No. 0  
 Date 17/09/2018

FIGURE 3-3

LEGEND

-  Road
-  Project Site
-  Cadastral
-  Groundwater area (RIWI Act)



Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 50



City of Albany  
 Great Southern Motor Sports Park Feasibility Study  
 Lot 5780 Down Road South, Drome

Groundwater Areas (RIWI Act)

Project No. 61-37331  
 Revision No. 0  
 Date 17/09/2018

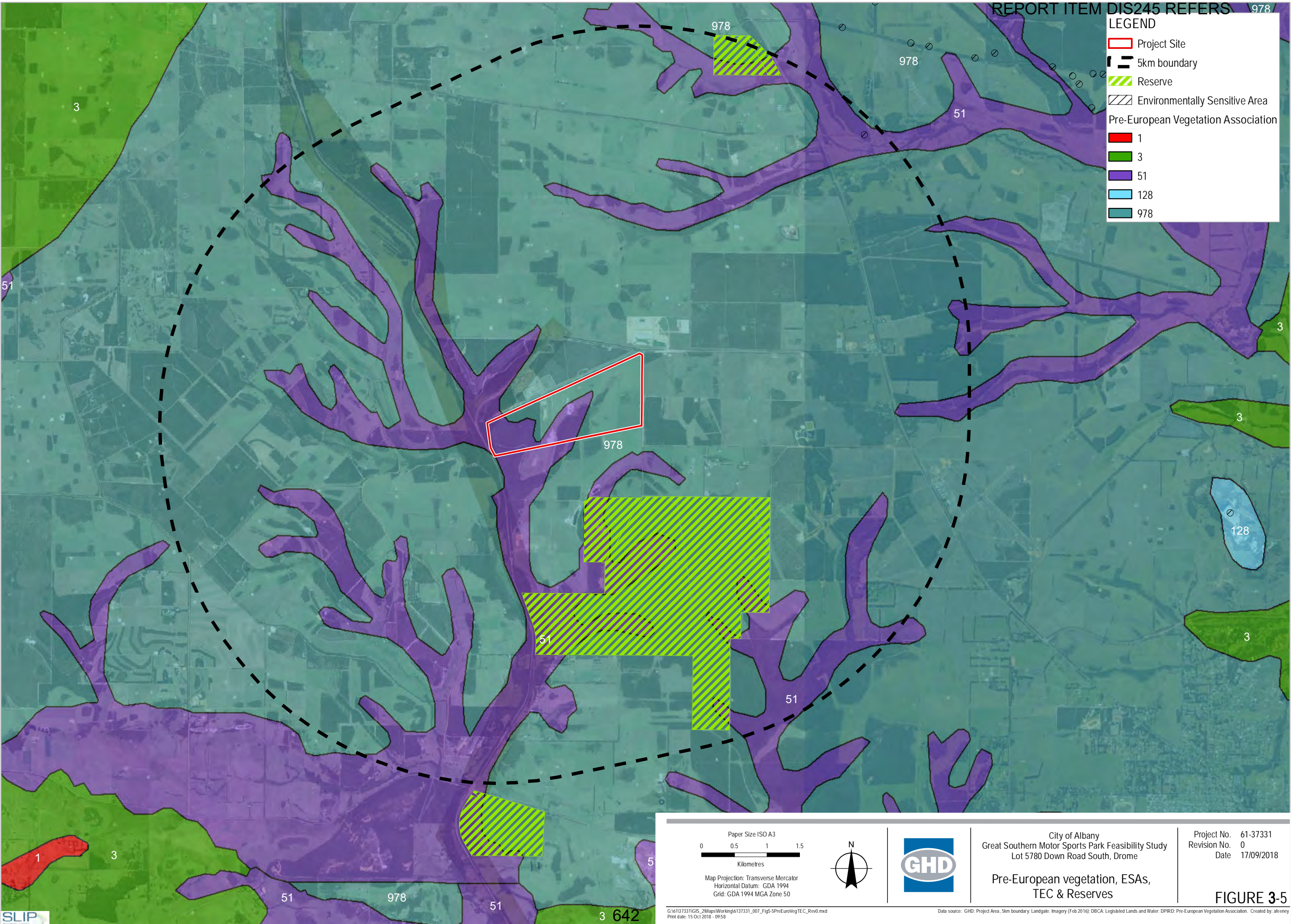
FIGURE 3-4

**LEGEND**

- Project Site
- 5km boundary
- Reserve
- Environmentally Sensitive Area

Pre-European Vegetation Association

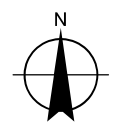
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Kilometres

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 50



City of Albany  
Great Southern Motor Sports Park Feasibility Study  
Lot 5780 Down Road South, Drome

Pre-European vegetation, ESAs,  
TEC & Reserves

Project No. 61-37331  
Revision No. 0  
Date 17/09/2018

**FIGURE 3-5**

### 3.4.4 Groundwater and hydrology

On a regional scale, the 250K Map Series – Hydrogeology identifies a “*sedimentary aquifer within intergranular porosity – extensive aquifers, major groundwater resources*” underlying the Site (DoW, 2002). Groundwater salinity in the local area is in the range of 500 – 1000 mg/L, which is considered to be marginal for productive uses (GoWA, 2018).

Bio Diverse Solutions (BDS) has undertaken surface and groundwater monitoring for the Project Site, key results of which are summarised in Section 3.4.5. A search of DWER’s WIN reporting online system for available bore data (within a 3 km radius) revealed no other relevant time series data. The Site is currently in an area under a groundwater licence owned by Plantation Energy Australia Pty Ltd. The licence (number 168308) is valid to 2028 and is allocated 4,000 kL from the Bremer West superficial aquifer.

### 3.4.5 Monitoring results

Bio Diverse Solutions has completed quarterly monitoring of surface water and groundwater at the Project Site for the period February 2018 to November 2019. The sampling locations, 2018 summary report and field records are provided in Appendix A, with key results summarised in the following sections. Soil profile descriptions for the shallow monitoring bores are provided in Appendix B, with deeper bore log in Appendix C.

It is noted that the monitoring bore installation information from Bio Diverse Solutions includes a basic site lithological description of the soils on site to around 2 m depth, and therefore the groundwater monitoring results are limited by the shallow nature of the investigation (approximately 2 m depth).

Surface and groundwater quality data is compared to the ANZECC and ARMCANZ (2000) default trigger values for South West Australia wetlands for nutrients and pH, and the 95% toxicant trigger for other parameters where relevant.

#### **Surface water flow**

Review of BDS field records (Appendix A) identify that both surface water sites were flowing for all monitoring dates during 2018, with flow reported at CS01 (downstream site) on all dates in 2019, and no flow reported for CS02 during the May and August 2019 sampling dates.

Observed depth of flow ranged between approximately 5 cm (Feb 2019) and 20 cm (May 2018) for CS02, and approximately 10 cm (Feb, May, Nov 2019) and 30 cm for CS01.

#### **Surface water quality**

Surface water quality results show that pH in the two creek locations (CS01 and CS02) within the Project Site were low and below the default trigger values of 7-8.5. The results are very similar to the pH at most of the groundwater bores within the Project Site.

The reported total nitrogen (TN) levels for both the creek locations were lower than that for many of the groundwater bores. TN concentrations at CS01 ranged from 0.5 mg/L to 2 mg/L, exceeding the default trigger value of 1.5 mg/L on one occasion, and equalling it on another. At CS02 the TN concentrations ranged from 2 mg/L to 6.5 mg/L, exceeding the default trigger value on all monitored occasions.

Total phosphorus (TP) concentrations were below detection levels at CS01. At CS02 the TP concentrations were below detection on one monitoring occasions with remaining samples ranging from 0.22 mg/L to 0.55 mg/L, exceeding the default trigger value of 0.06 mg/L and reflecting the TP concentration of bores in proximity to CS02.

For metals parameters CS01 reported exceedance of the 95% toxicant trigger value for dissolved aluminium and iron on most occasions, and zinc on three occasions, with CS02

## REPORT ITEM DIS245 REFERS

reporting a single exceedance of iron (potentially an error due to the very high value reported) and zinc.

### Groundwater level

Groundwater levels at most boreholes across the site vary from 0 mBGL (in winter months) in the low lying areas of the site (i.e. SB06), to greater than 2 mBGL in the higher areas across most of the Project Site (Table 3-4). Groundwater levels in the lower lying areas seem to be fluctuating consistent with seasonal rainfall. In 2018 and 2019, measured groundwater levels across the Project Site were observed to range between 0.00 mBGL (SB06, Sep 2018) and 1.93 mBGL (SB03, Nov 2018). Where groundwater was not measured in the bores it was reported as > 2.0 mBGL. Bores SB01, SB02, SB05, SB10 and SB11 were found to be dry during each sampling event. Bore locations are shown on Figure 3-7.

Table 3-4: Site bores and groundwater levels

Bore ID	Easting (m)	Northin g (m)	Ground level – est. RL (mAHD )	Depth to Groundwater (mBGL)							
				Feb 2018	May 2018	Sep 2018	Nov 2018	Feb 2019	May 2019	Aug 2019	Nov 2019
SB01	567179	6133615	58.4	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0
SB02	567404	6133889	49.6	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0
SB03	567519	6134401	56.8	> 2.0	> 2.0	1.21	1.93	> 2.0	> 2.0	1.45	> 2.0
SB04	567700	6134179	48.2	> 2.0	0.91	0.30	1.07	1.66	1.11	0.37	1.48
SB05	568056	6134636	60.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0
SB06	568131	6134478	53.6	0.87	0.70	0.00	0.59	1.03	0.73	0.06	0.73
SB07	567939	6134264	51.6	0.64	0.54	0.44	0.64	0.95	0.58	0.52	0.64
SB08	568308	6134637	56.5	> 2.0	1.55	0.18	1.27	1.58	1.42	0.38	1.29
SB09	568032	6134141	50.3	0.66	0.57	0.44	0.78	0.98	0.87	0.61	0.99
SB10	567886	6133756	62.7	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0
SB11	568314	6134267	68.6	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0
SB12	568474	6134781	60.2	> 2.0	> 2.0	1.04	> 2.0	> 2.0	> 2.0	1.1	> 2.0
DB01	-	-	-	-	-	-	-	-	7.10	6.95	6.97

#### Notes:

BGL – below ground level - Where results shown as "> 2.0", this means the groundwater table was not intersected by the shallow groundwater monitoring bore (being only 2 m deep)

Where results shown in red font, this means the groundwater table was intersected by the groundwater monitoring bore.

Deep bore (DB01) monitoring only commenced from May 2019.

### *Groundwater quality*

Groundwater quality results identified that pH in groundwater bores at the Project Site is generally low and below the default trigger value of 7.0 - 8.5. It was also found that pH at SB06 and SB07 (2.5 and 2.8) were significantly lower in February 2018 sampling event. These bores are in proximity to the lower lying area of the Project Site. Some wetland areas in Western Australia are naturally acidic, however the low pH may be indicative of the presence of acid sulfate soils. As noted in Section 3.2.3, tributaries of Marbelup Brook located approximately 750 m to the south of the Project Site are mapped as "Moderate to Low Risk" of ASS occurring, and GHD has inferred that where these tributaries of Marbelup Brook extend into the Project Site that they would also be considered to represent the same level of ASS risk.

Elevated total nitrogen (TN) was found in the majority of bores, which may be attributed to the historic and current farming practices across the Project Site (2 – 28 mg/L). TN levels were also significantly higher at SB06, SB07 and SB08 in the November 2018 sampling event compared to the other reported concentrations, which may be attributed to sampling following peak groundwater levels in the bores and interception of nutrient rich wetland topsoils.

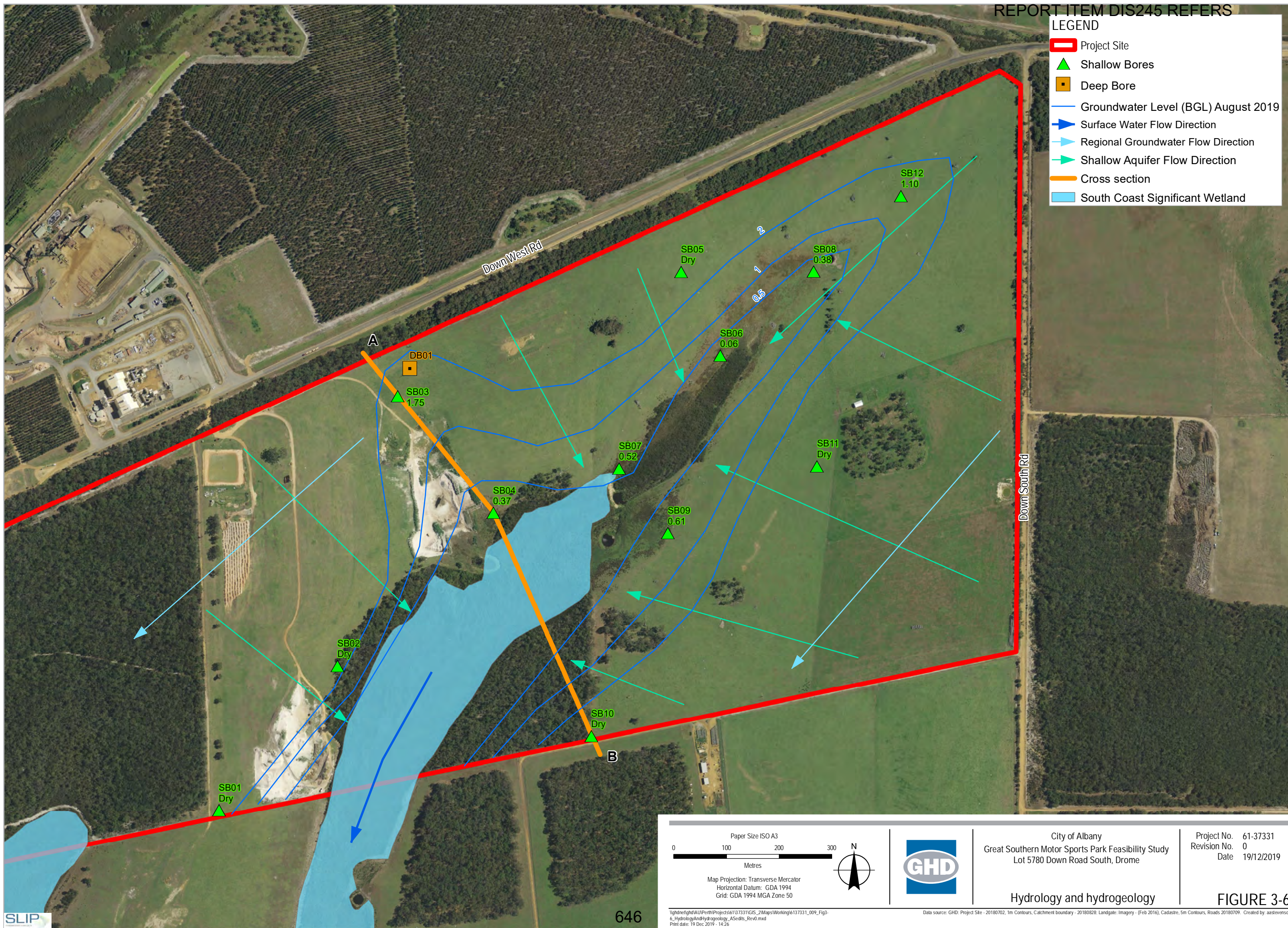
TN concentrations were exceptionally high in February and May 2019 (110 and 79 mg/L) at SB08, with a high proportion of ammonia-N and organic-N, and further sampling should be undertaken at similar times to establish if they are considered outliers.

Elevated total phosphorus (TP) was reported for bores SB06, SB07 and SB08, with all samples obtained from these bores exceeding the default trigger value of 0.065 mg/L. Exceptionally high TP (16 mg/L) was reported in February 2019 in SB08, coinciding with elevated TN. The orthophosphate concentration in February 2019 was also elevated however the majority of the TP concentration was organic phosphorus or inorganic phosphorus attached to sediment, and further sampling should be undertaken to establish this.

For metals parameters dissolved aluminium, iron and zinc exceed the default 95% toxicant trigger values in the majority of samples for all bores, suggesting background concentrations of these metals are elevated due to the local soil and geological profile. Dissolved chromium was also elevated above the default trigger value in some bores.

**LEGEND**

- Project Site
- ▲ Shallow Bores
- Deep Bore
- Groundwater Level (BGL) August 2019
- ➔ Surface Water Flow Direction
- ➔ Regional Groundwater Flow Direction
- ➔ Shallow Aquifer Flow Direction
- Cross section
- South Coast Significant Wetland



Paper Size ISO A3  
 0 100 200 300  
 Metres

Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 50



City of Albany  
 Great Southern Motor Sports Park Feasibility Study  
 Lot 5780 Down Road South, Drome

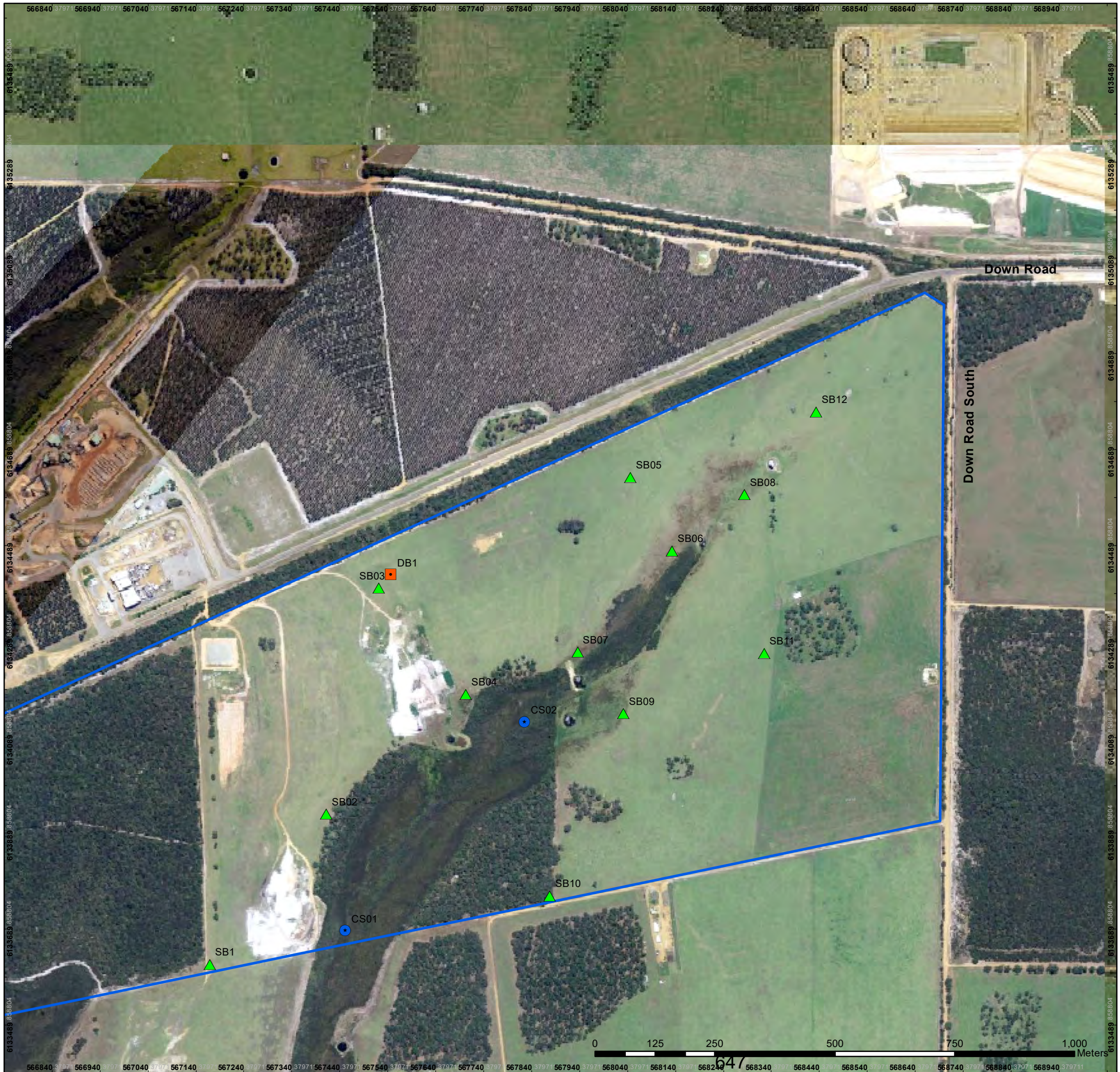
Project No. 61-37331  
 Revision No. 0  
 Date 19/12/2019

Hydrology and hydrogeology

FIGURE 3-6

Data source: GHD: Project Site - 20180702; 1m Contours, Catchment boundary - 20180628; Landgate: Imagery - (Feb 2016); Cadastre, 5m Contours, Roads 20180709. Created by: aaslevenson  
 Print date: 19 Dec 2019 - 14:26





**REPORT ITEM DIS245 REFERS**

Unit 5A, 209 Chester Pass Rd  
 Albany, WA 6330  
 Australia  
 Tel: 08 9842 1575  
 Fax: 08 9842 1575



Overview Map Scale 1:100,000

**Legend**

- Subject Site
- Cadastre
- 5m Contours
- Deep Bore
- ▲ Shallow Bore
- Creek Sample
- 50m Buffer



Scale  
 1:7,882 @ A3  
 GDA MGA 94 Zone 50

**Data Sources**  
 Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2016  
 Cadastre and Contours: Landgate 2016  
 Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
 City of Albany  
 Lot 5780 Down Road  
 Drome, WA 6330

**Figure 3-7 Monitoring Plan**

STATUS	FILE	DATE
FINAL	MSC0137	28/02/2019

### 3.4.6 Hydrogeological conceptual model

#### Sources of information

- Local shallow soil setting from *Motorplex Development, Down Road Surface and Groundwater Monitoring 2018 Summary Report* (Bio Diverse Solutions 2018)
- Regional hydrogeological setting from *Albany hinterland prospective groundwater resources map* (Ryan *et al.* 2017)
- Shallow soil profile descriptions (0)
- Deep groundwater bore (log in Appendix C)

#### Local shallow hydrogeology

The typical local surficial geology is presented in Figure 3-1 (see Figure 3-8 for cross-section trace), and the shallow groundwater flow plan is presented in Figure 3-6. The Figures show the following features:

- A thin shallow sandy/silty layer up to 1 meter thick overlies the Pallinup formation in areas leading to the creek (e.g. SB04), while on the upper-slopes lateritic gravels/cobbles predominate (e.g. SB03).
- Underlying the sandy/silty layer, the Pallinup formation comprises silty clays (e.g. SB04) which appears to extend to 25 meters below the ground level (DB01).
- Although not tested, the permeability of the upper sandy/silt is likely higher than the underlying Pallinup Formation (silty clays) which may result in temporary perching of shallow groundwater in the sandy/silt (particularly during winter rainfall).
- Shallow groundwater levels derived from the monitoring of the shallow bores indicates that the levels appear to vary seasonally up to 1 meter.
- Shallow groundwater flow within the sandy/silty layer (and upper parts of the Pallinup Formation) are inferred as towards the creek line where groundwater is inferred to discharge based on Figure 3-6 which shows the depth-to-water contours and groundwater flow direction.

#### “Deeper” hydrogeology

The deeper hydrogeology setting is presented on the cross section Figure 3-8 and shows the following features:

- The site (shallow hydrogeology) is underlain by approximately 25 metres of the Pallinup formation, deemed to comprise silt, sand and clay (Ryan *et al.* 2017). The Pallinup aquifer is inferred to contain minor water resources and exhibits a low permeability.
- The Pallinup Formation is underlain by the Werillup Aquitard described as comprising clay, silt and sand and which is deemed to hydraulically separate the overlying Pallinup Formation with underlying units (Ryan *et al.* 2017). The drilling logs (Appendix C), indicates that the thickness of the Werillup aquitard is 31 meters and comprises predominantly clay. Based on map notes (Ryan *et al.* 2017) the Werillup aquitard is inferred as extensive throughout the King River area and likely lies below all areas of the site and beyond.
- Werillup aquitard is probably underlain by granite, based on evidence of minor cuttings returned to the surface exhibiting angular quartz and some mica (See Figure 3-8).
- The groundwater levels of the Pallinup formation appears to be similar to the shallow groundwater levels (See Figure 3-8). That is to say that, excluding times when winter

rainfall may perch shallow groundwater, the shallow sandy silts are probably hydraulically connected with the Pallinup Formation.

- The groundwater flow direction of the Pallinup Formation is not well known, however, beneath the Site groundwater it is likely to follow the regional topography, and flow towards the south west where groundwater is likely to discharge into the rivers and creeks, such as dominant surface water feature in areas close to the Site - Marbelup Brook (see Figure 3-6).

### *Discussion/interpretations on pathway*

The hydrogeological setting indicates the following Site Conceptual Model.

- The depth to groundwater plan (Figure 3-6) indicates that in areas adjacent to the surface water creek/ feature, the depth to groundwater is less than 2 metres. In these areas, it is considered that there is an increased risk of impacts to groundwater from surface contaminants and spills given the thin geological profile (e.g. low adsorptive capacity).
- The shallow groundwater migration direction (shallow sands/silt and Pallinup Formation) indicates that any Site based groundwater impacts should migrate towards the creek line (on Site) where groundwater (and any impacted groundwater) is inferred to discharge (Figure 3-6 and Figure 3-8). Any impacted surface water will migrate towards areas off-site and discharge into the major drainage of the area, the Marbelup Brook.
- Any Site based groundwater impacts should preferentially migrate within shallow sands/silts (towards the creek lines) and not migrate downwards into the deeper levels of the Pallinup Formation given the similar groundwater levels between the Pallinup Formation and the overlying shallow sandy silts, and that the shallow sandy silts have a higher permeability than the Pallinup Formation
- Given the low permeability of the Pallinup Formation, any Site based groundwater impacts, which may migrate downwards into the Pallinup formation should be subject to attenuation processes, which should limit the extent and migration rate of the any impacts.
- It appears from the limited drilling information (one monitoring well) that the Pallinup Formation is underlain by the Werillup Aquitard and granite, which should constrain any potential groundwater impacts to the Pallinup Formation.

### *Potential Receptors*

The site hydrogeological conceptual model indicates that given that Site based groundwater impacts will migrate towards the on-site creek, the receptors comprise the following:

- the environment of the onsite creek (flora and fauna)
- creek systems down-gradient of the site (flora and fauna)
- groundwater bore users - where bores are located close to, and are in hydraulic connection, with the creek system
- surface water users/abstraction of surface water; and
- livestock accessing creek.

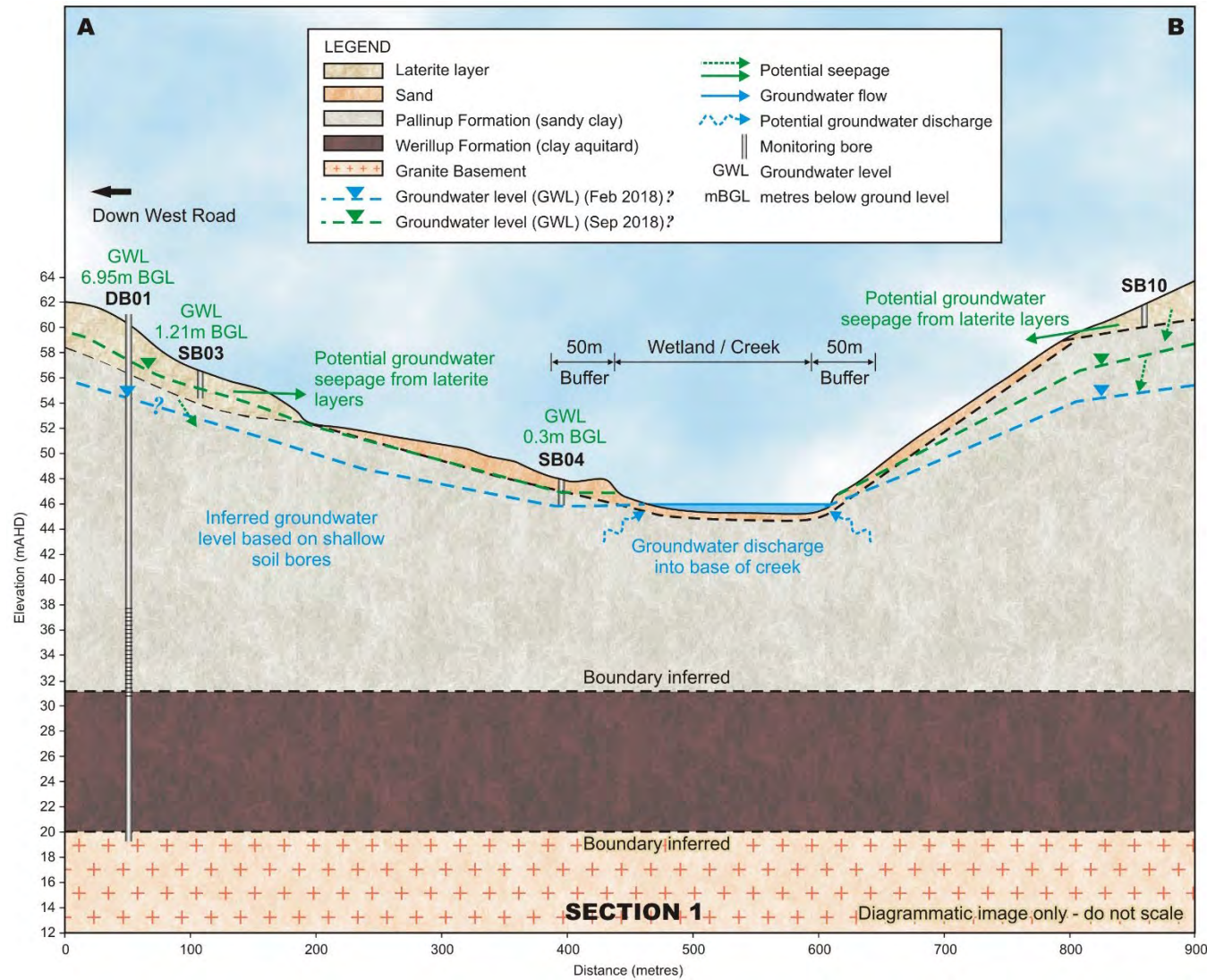


Figure 3-8: Preliminary hydrogeological section 1 (A-B)

## 3.4.7 Water users

### Surface water

Aerial photography was reviewed to identify any surface water abstraction from the Marbelup Brook downstream of the Project Site. The review identified numerous small dams located within the Marbelup Brook and riparian zone (demarcated by the DWER South Coast Significant Wetlands coverage). One potential surface water pumping site was also identified downstream of the Project Site. The locations are identified in Appendix E.

### Groundwater

Groundwater allocation in Western Australia is regulated by DWER. The DWER Water Register identifies that the Project Site is located within the Albany groundwater area, Marbelup sub-area.

The Water Register indicates there is one groundwater license for the Project Site, and five groundwater licenses downgradient / downstream of the Project Site along the Marbelup Brook (Table 3-5).

Table 3-5: Licensed groundwater abstractions

Licence No.	Licence allocation (kL/yr)	Expiry date	Location	Aquifer
168308	4000	31/8/2028	Project Site Lot 5780 Down Road, Drome	Bremer West – Superficial
156374	1400	30/09/2024	Lot 7235 Marbelup ~3.5 km downgradient	Bremer West – Superficial
76457	33200	8/04/2020	Lot 500 Marbelup ~6.5 km downgradient	Bremer West – Superficial
160280	1000	13/05/2026	Lot 86 Elleker Crown Reserve ~8 km downgradient	Bremer West – Superficial
155130	26000	20/10/2022	Lot 200 Lower Denmark Rd Elleker ~9.5 km downgradient	Bremer West – Sedimentary
173352	2100	16/05/2021	Wilgie Rd, Torbay	Bremer West – Superficial

## 4. Fit for purpose water supply

### 4.1 Water servicing

#### 4.1.1 Potable water

The Water Corporation's Lower Great Southern Towns Water Supply Scheme (LGSTWSS) runs along Albany Highway, with the nearest connection point approximately 4 km to the east at 66 Down Road (fertiliser distribution warehouse) (Water Corporation, 2018). Hence, it is proposed to service drinking water needs on the site through a combination of collected rainwater and water carts.

Uncontaminated rainwater from the AMP buildings will be collected in standard 110,000 litre rainwater tanks. At source treatment by household-scale filtration and ultraviolet disinfection will be undertaken. This will allow a safe drinking water supply to the AMP facilities (i.e. clubrooms, canteen, etc.) and ablutions.

A preliminary water balance for the site suggests that rainfall alone will be insufficient to meet expected demand for regular attendance of 500 people. Where there is a shortfall, the GSMG will need to purchase and cart water to the site. Similarly for large-scale events, additional potable water will need to be carted to site.

#### 4.1.2 Non-potable

Water demands for other external, non-potable uses (i.e. irrigation, dust suppression, etc.) will be met from site dams. The GSMG is also negotiating with Plantation Energy for access to their 4,000 kL Bremer West superficial groundwater allocation (licence number 168308).

### 4.2 Wastewater servicing

The Water Corporation's Albany sewerage scheme is not in close proximity to the site, with the nearest connection point being at Lancaster Road, McKail (being some 10 km distant). On-site wastewater management will be required, and will need to cater for human sewage, greywater and wastewater from vehicular maintenance activities (e.g. washdown).

On-site wastewater treatment and management will be carried out in accordance with the *Government Sewerage Policy* (DPLH, 2019):

- The size of the Project Site is adequate and capable of accommodating on-site wastewater disposal without putting the environment and public health at risk.
- The on-site wastewater disposal system will be maintained and serviced long-term by trained personnel.
- The on-site wastewater treatment system will meet the following minimum requirements:
  - Have a 100 metres separation from the unnamed water source/wetland (measured from the outer edge of riparian/wetland vegetation)
  - A minimum clearance distance of two metres between the maximum groundwater level and the discharge point of the disposal system will also be required. Therefore, wastewater facilities will be located at higher ground on the site, where a greater clearance to groundwater is to be expected considering seasonal conditions and long-term variability post-development.
- The on-site wastewater disposal land application area will achieve the following minimum requirements in terms of site features:

## REPORT ITEM DIS245 REFERS

- Slope should be within 1:5 ratio. Where proposed disposal sites exceed this slope earthworks will be completed to comply, in order to avoid stormwater discharge, and
- Will be clear of any temporary or permanent structures, vehicle traffic, pathways etc.
- Wastewater and/or hydrocarbon-impacted stormwater from high risk areas such as the pits and vehicle maintenance areas shall be contained within covered, hardstand areas and directed to oily water separators (OWS) for primary treatment. Treated water from the OWS will be directed into the stormwater drainage system. Collected waste and oily residue from the OWS will be collected and disposed to an approved off-site location, as per DWER's advice.

The proposed use of the motorsports park will be mostly periodic (i.e. events based) with several different groups using the site. On-site wastewater treatment systems will typically consist of both a treatment system and a disposal system. These were preliminarily sized using the Department of Health's (DoH) *Onsite wastewater system assessment tool* for estimation purposes.

The following inputs were used in the assessment:

- System capacity: 500 people (at each of the two main parts of the AMP – i.e. motocross track and multi-use track).
- Site category: Clubs (licensed), with a hydraulic loading of 35 L/person/day.
- Treatment system type: 'Secondary' wastewater treatment plant, with engineering certification to meet effluent quality of BOD < 20 mg/L; TSS < 30 mg/L; TN < 10 mg/L; TP < 1 mg/L; *E. coli* < 10 cfu/100mL; and free chlorine > 0.5 mg/L. This is to meet the requirements of *WQPN 100* (DoW, 2007).
- Site conditions: Clayey loam soil on a flat slope (< 10%), with a design irrigation rate = 3.5 mm/d.

The calculator tool produced a required demand (hydraulic loading) of 17,500 L/day and aided in the sizing of the treatment and disposal systems.

There are many vendors in the WA market for 'off the shelf' package wastewater treatment plants. For the purposes of the concept design and costing, a budget estimate was sought from MAK Water <sup>(1)</sup>.

For the purpose of this concept design and costing, sub-surface drip irrigation was chosen as the most suitable on-site disposal option. This will require two disposal/irrigation areas of approx. 5,000 m<sup>2</sup>, which are shown on . Based on groundwater level monitoring results from nearby bores (SB11 and SB05 – refer Table 3-4), a minimum clearance of 2.0 m to groundwater will be readily maintained all year round at both proposed disposal sites.

The most suitable arrangement will be to have two wastewater treatment systems, one serving the motocross facilities, the other serving the multi-use track, and drag strip. Numbers in excess of system capacity during larger events (potentially up to 20,000 for national race events) would need to be catered for with temporary waste facilities (i.e. port-a-loos) with waste taken off site for treatment post-event.

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<sup>1</sup> <https://www.makwater.com.au/products/activated-sludge-bioreactor-plus/>

## 5. Stormwater management strategy

### 5.1 Stormwater quantity management

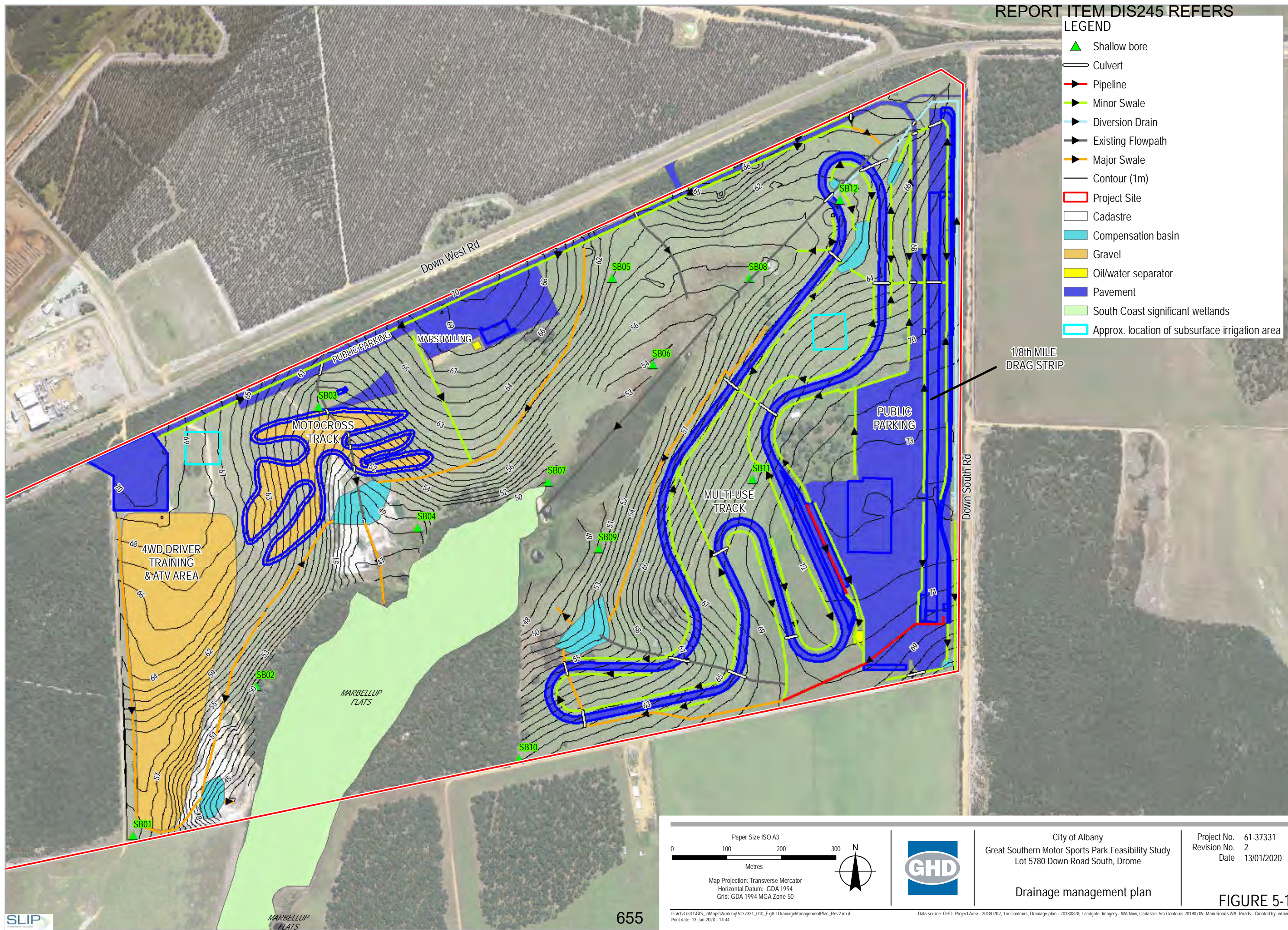
The proposed stormwater management plan for the site is depicted in and consists of the following principles and elements:

- Drainage swales are used to divert the (upstream) eastern boundary catchment around the drag strip and multi-use track, so as to minimise the potential for this water to impact on the site infrastructure.
- Where possible, uncontaminated runoff from impervious areas will be collected for drinking water, or targeted for infiltration near to the source.
- Hydrocarbon-impacted stormwater from high risk areas such as the pits and vehicle maintenance areas shall be contained within covered hardstand areas and directed to oily water separators (OWS) for primary treatment. Treated water from the OWS will be directed into the stormwater drainage system. Collected waste and oily residue from the OWS will be collected and disposed to an approved off-site location, as per DWER's advice.
- Interceptor/sediment traps will be located at points throughout the drainage swales to treat stormwater runoff from tracks.
- Suitable compensating (detention) basins are used to limit post-development peak discharge rates to pre-development rates from areas subject to development.
- The compensating basins are positioned to ensure 2 m vertical clearance from the maximum groundwater level (based on recent groundwater monitoring results).
- Suitable swales, culverts and pipework are used to convey the runoff generated from the site to engineered locations for treatment / compensation before discharge to the waterway.
- Suitable buffer separations to the wetland/creek are used to minimise the potential for impacts of site-generated water impacting on the wetland.

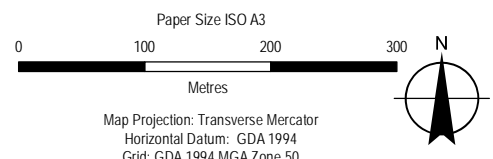


LEGEND

- ▲ Shallow bore
- Culvert
- Pipeline
- Minor Swale
- Diversion Drain
- Existing Flowpath
- Major Swale
- Contour (1m)
- Project Site
- Cadastre
- Compensation basin
- Gravel
- Oil/water separator
- Pavement
- South Coast significant wetlands
- Approx. location of subsurface irrigation area



1/8th MILE DRAG STRIP



Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 50



City of Albany  
 Great Southern Motor Sports Park Feasibility Study  
 Lot 5780 Down Road South, Drome

Drainage management plan

Project No. 61-37331  
 Revision No. 2  
 Date 13/01/2020

FIGURE 5-1

### 5.1.1 Plan outline

The following preliminary plan is proposed in accordance with the principles and objectives of the technical feasibility study (GHD, 2018), the *Stormwater Management Manual for Western Australia* (DoW, 2007); and the *Subdivision and Development Guidelines 2018* (CoA, 2018).

#### **1-year ARI event and smaller (1EY)**

To retain and treat the 1-year ARI (1EY) event:

- Roofs and other impervious areas will be managed via a range of measures including:
  - Targeted infiltration in areas where there is sufficient separation to groundwater (i.e. soakage pits or infiltration galleries),
  - Targeted rainwater (roof water only) capture for potable (i.e. drinking) and non-potable uses (such as garden irrigation, toilet flushing or vehicle wash down).
- Drainage swales will be sited downstream of the tracks, conveying stormwater to compensation basins and allowing stormwater infiltration as close to source as practical, in accordance with Water Sensitive Urban Design (WSUD) principles. Weirs, and vegetated swales will contribute to achieving WSUD objectives. Culverts will be installed to allow crossings of access tracks and raceway pavements, with some piped sections where site topography doesn't allow overland flow.
- Direction of runoff to compensating basins targeting peak flow management to pre-development levels.
- Compensating basins are positioned to ensure 2 m vertical clearance from the maximum groundwater level.

#### **10-year ARI event (10% AEP)**

To maintain site serviceability in the 10-year ARI (10% AEP) event:

- The compensating basins are designed to detain the peak flow to pre-development levels, and maximise opportunities for infiltration prior to discharge from the site.
- Drainage swales will convey stormwater to compensating basins and will allow stormwater to be infiltrated as close to source as practical in accordance with WSUD principles. Weirs, and vegetated swales will contribute to achieving WSUD objectives. Culverts will be installed to allow crossings of access tracks and raceway pavements.

#### **100-year ARI event (1% AEP)**

To protect from flooding in the 100-year ARI (1% AEP) event:

- Ensure suitable separation is provided between flooding levels and key site infrastructure such that a minimum freeboard of 300 mm is provided to prevent ingress of water into habitable buildings.
- The compensating basins will detain the peak flow to levels that will not adversely impact the downstream system, and maximise opportunities for infiltration prior to discharge from the site.
- Stormwater flows will exceed the capacity of the internal drainage swales, but will be contained within the swales freeboard.
- Ensure suitable overland flow paths are provided to minimise the potential for exposure of publicly accessible areas to flood waters.

5.1.2 Drainage swales

Stormwater runoff discharged from the site access roads and proposed facilities areas will be collected by swales located alongside the access track, and on the downstream of the facilities areas. The design levels of the facilities area are expected to generally follow the natural topography of the site, i.e. falling typically towards the wetland/creek. Any trapped low point, such as that associated with pockets of the motocross track will be captured by pit and piped to discharge into swales or basins as dictated by site topography. Refer to the proposed stormwater management plan in .

Swales are typically expected to be either V type or trapezoidal in design. Overall drains will, where space and topography permit, have batter slopes of 1V:6H. It is expected that side slopes will be limited to no great slopes than 1V:3H in areas restricted by space or topography. Flatter batter slopes are also necessitated by the need for safe vehicle run-off areas from the racetrack.

The widths and depths of swales will be determined by detailed hydraulic modelling. A typical freeboard of 0.3 m (over the 10 year design event water level), which allows additional storage and conveyance beyond the 10 year ARI (10% AEP) serviceability is also expected to be required to ensure drains convey the major event flows to the compensation basins. Dimensions of swales likely to be required are summarised in Table 5-1. Typically Type A, B and C drains would be considered major drain/swales and Type C and D as minor drains/swales.

Table 5-1: Example swale dimensions

Swale	Base width (m)	Top width (m)	Side slope (V/H)	Typical gradient (%)	Max depth (m)
Type A	3	12	1:6	0.5 to 3%	0.7
Type B	3	15	1:6	0.5 to 3%	1.0
Type C	0	12	1:6	0.5 to 3%	1.0
Type D	0	6	1:3	0.5 to 3%	1.0
Type E	3	9	1:3	0.5 to 3%	1.0

Drainage swales are proposed in accordance with the Stormwater Management Manual for Western Australia (DoW, 2007), Subdivision and Development Guidelines (CoA, 2018) and *WQPN 52 – Stormwater Management at Industrial Sites* (DoW, 2006) whereby they provide both conveyance and treatment of stormwater, which is suitable for the site being located in an area with sensitive downstream receptors.

Swales will be broad and shallow, with vegetation covering the side slopes and base, performing an important function in disconnecting the impervious environment from the downstream environment, in this case the wetland/creek, protecting it from pollutants carried by frequent storm events. They do this by improving stormwater quality and reducing the peak flow, velocity and volume reaching the receiving environment.

In small rainfall events, swales detain and retain water, promoting infiltration close to source, and reducing volume and flow. The gentle slope and high hydraulic roughness of the swales also reduces stormwater velocity, attenuate peak flows and also prevent scouring. In larger, less frequent rainfall events, the swales protect infrastructure by conveying stormwater away to central compensating basins and outlets.

The reduced water velocity allows the physical processes for particulate removal to occur; infiltration, deposition and filtration of stormwater through vegetation. As coarse and medium sediments fall out of suspension, associated suspended solids and trace metals are also removed from the stormwater, reducing the pollutant loads from frequent events. Biochemical processes also act to improve water quality reaching the downstream environment, as nitrogen is removed through denitrification, bio storage through plant and bio-film uptake, and changes in soil storage. In addition to their conveyance and water quality functions, swales have the additional benefit over traditional pit and pipe drainage systems, of providing both habitat and aesthetic value to the site.

A summary of the benefits and constraints of swales are listed in Table 5-2.

Table 5-2: Benefits and constraints of swales

Potential benefits	Potential constraints
Provide water conveyance	Uses more land area than conventional piped system Maintenance – vegetation mowing/replacement/weeding, gross pollutant trap emptying, sediment removal (other systems will also require this) Site topography may limit location and size
Retain and detain water	
Allow infiltration	
Reduces stormwater runoff peak flow, velocity and volume	
Removes coarse and medium sediments including suspended solids and trace metals	
Easy access for maintenance	
Protect downstream surface water bodies and receiving environments from frequent storm events	
Disconnect impervious environment from downstream environments	
Habitat value	
Aesthetic value	
Biochemical pollutant (nitrogen) removal	

5.1.3 Diversion drains

Diversion drains are proposed to divert surface water runoff from catchments external to the Project Site, around the site or through the site such that it does not impact on the site infrastructure. The diversion drains also aim to minimise the interaction of this surface water runoff with site runoff which will require treatment. Due to the nature of the site’s use, it will have an increased potential of pollutant generation; in particular sediments and vehicular generated pollutants. Diversion drains may also be utilised to divert external catchments through the site and safely to the wetland/creek.

The external surface water catchments to the site consist of the adjacent APEC and CBH sites to the east and north of site, and areas of uncleared land.

The diversion drains would most likely be similar in size and shape to the major drainage swales proposed in section 5.1.2. The drains are proposed to be earthen utilising in-situ materials.

#### 5.1.4 Compensating basins

Compensating basins are proposed to reduce peak discharge by providing temporary storage for stormwater and encouraging infiltration through permeable walls and floor close to source. The basins are sized such that the post-development peak discharge is maintained at or below pre-development level for the 10% AEP (10-year ARI) and that flows are similar to pre-development flows for the 1% AEP (100-year ARI) event.

Batter slopes of 1V:6H should be adopted where space permits as this will allow for the batter sides and floor to be vegetated and maintained more easily, also reducing potential erosion risks. The purpose of this vegetation is to stabilise banks, and provide water quality treatment by enhancing sedimentation and nutrient removal.

The proposed locations for compensating basins within the site are shown in . Where possible these should utilise the natural topography of the site and generally have low (piped) and high (suitable overflow structure) outlets.

Where possible, depths of basins should be limited to no greater than 1.5 m (at top water level before the spillway activates) and where possible water depths within the basins should be minimised in minor storm events (10 year ARI/ 10% AEP and less) so as to reduce potential risks to the public but also target infiltration via a large base surface areas. Should this not be possible, consideration should be given to increasing basin side slopes (to 1V:3H) to facilitate an increased base infiltration surface in the basin. Basins with these slopes should be assessed for the possible need for appropriate fencing and signage for safety. Standing water in basins is to be minimised so as to assist with mosquito and midge control during risk periods. With this in mind, onsite infiltration testing at proposed drainage basin sites will be needed to support future design. Currently, basins are designed with an assumed 2 m/day infiltration rate.

The location of compensation basins should be such that they are installed out of the flood impacted area of the adjacent creek/wetland. An assessment of this risk should be undertaken during detailed design.

Basins should also be installed such that the base of the basin has a minimum 2.0 m vertical separation to the maximum expected groundwater level in the location, so as to ensure suitable infiltration can be achieved and water quality of the wetland is retained.

#### 5.1.5 Pit and pipe drainage

It is conceptualised that the use of pit and pipe drainage systems will be minimised wherever possible. However it is expected that use of pipework on buildings and within larger hardstand areas is possible (i.e. pit and marshalling areas along with pedestrian concourse areas). It is also expected that a number of culverts will be needed throughout the site to convey stormwater across access roadways and across parts of the proposed multi-use and motocross tracks as shown in . Culverts are expected to be designed to convey events up to and including the minor event (10 year ARI/ 10% AEP) without overtopping. Suitable erosion protection should be provided at culvert outlets to ensure structural stability of any receiving waterway.

A significant culvert is likely to be required on the main internal access road to the multi-use track, where it crosses the main drainage line of the creek in the north-east corner of the Project Site.

For areas subject to higher risks of oil spills and hydrocarbons, installation of covered, fully double-bunded, hardstand areas, connected to suitable oily water separation devices is proposed. Currently, this is expected for the vehicle maintenance and pits areas at both the multi-use track and motocross areas.

## 5.1.6 Hydrologic and hydraulic assessment

**Pre-development**

A preliminary hydrologic and hydraulic assessment was undertaken to estimate the pre-development stormwater runoff from the Project Site for the future sizing of stormwater management structures.

The hydrological assessment includes mapping of catchments external to and within the site (). A one-dimensional DRAINS model with ILSAX hydrology was used for calculation of runoff. Model parameters included:

- Paved (impervious) area depression storage = 1 mm,
- Supplementary area depression storage = 1 mm,
- Grassed (pervious) area depression storage = 5 mm, and
- Soil Type 3 (slow infiltration rates).

This assessment was determined in accordance with Australian Rainfall and Runoff (ARR) 2016 (Geoscience Australia, 2016), with design rainfall data from the ARR 2016 data hub and the Bureau of Meteorology (BoM, 2018). The estimated peak flows for pre-development from various catchments are shown below in Table 5-3.

Table 5-3: Estimates of peak flows pre-development

Catchment	Area (ha)	Impervious fraction (%)	Peak flows (m <sup>3</sup> /s)			
			1EY (1 yr ARI)	0.5 EY (2 yr ARI)	10% AEP (10 yr ARI)	1% AEP (100 yr ARI)
E1	19.8	3	0.06	0.08	0.43	2.44
E2	17.4	3	0.08	0.10	0.39	2.24
E3	15.3	3	0.01	0.02	0.36	1.97
E4	13.9	0	0.00	0.00	0.45	2.27
E5	36.4	60	0.00	0.00	0.00	0.67
E6	17.4	0	0.00	0.00	0.33	1.81
S1	14.1	0	0.00	0.00	0.31	1.64
S2	23.4	0	0.00	0.00	0.57	3.30
S3	41.6	0	0.00	0.00	1.02	6.07
S4	33.6	0	0.00	0.00	0.65	3.64
S5	25.1	0	0.00	0.00	0.90	4.18
TOTAL	262.7	-	0.03	0.03	1.82	17.0

*Note: E denotes an external catchment, S denotes a catchment within the site or with a significant portion of the catchment within the site. TOTAL denotes the flows leaving the site via the creek/wetland which may be different to the individual catchments due to routing and storage within the site/model.*

**Post-development**

A conceptual post-development DRAINS model was also developed to estimate preliminary basin sizes for the development. The basins were sized such that the total post-development flow off the site was equal to or less than the pre-development flow for the minor (10% AEP) design event and targeted appropriate compensation and management of major storms (i.e. the 1% AEP or 100 year ARI). Basin parameters included:

- Nominal depth of 1.5 metres to spillway levels and 2 m to top of wall.

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- Basins equipped with a spillway that has sufficient capacity to handle 1% AEP flow.
- 1V:6H side slopes (this could be increased to a max of 1V:3H as required with suitable geotechnical assessment).
- 2 m/day infiltration rate in the absence of testing,
- Each basin would be equipped with a low flow piped discharge, designed to be:
  - Set above the peak 1EY basin water level such that no discharge occurred for water quality management, and
  - Set and sized so as to ensure that the basin spillway didn't activate in events up to and including the 10% AEP.
- The intent is that the basin spillway does not activate in events up to and including the 10% AEP. Upstream external catchments would be directed into each of the basins as detailed in .
- Post development flows are those of the combined catchment areas that contribute to the basin location.

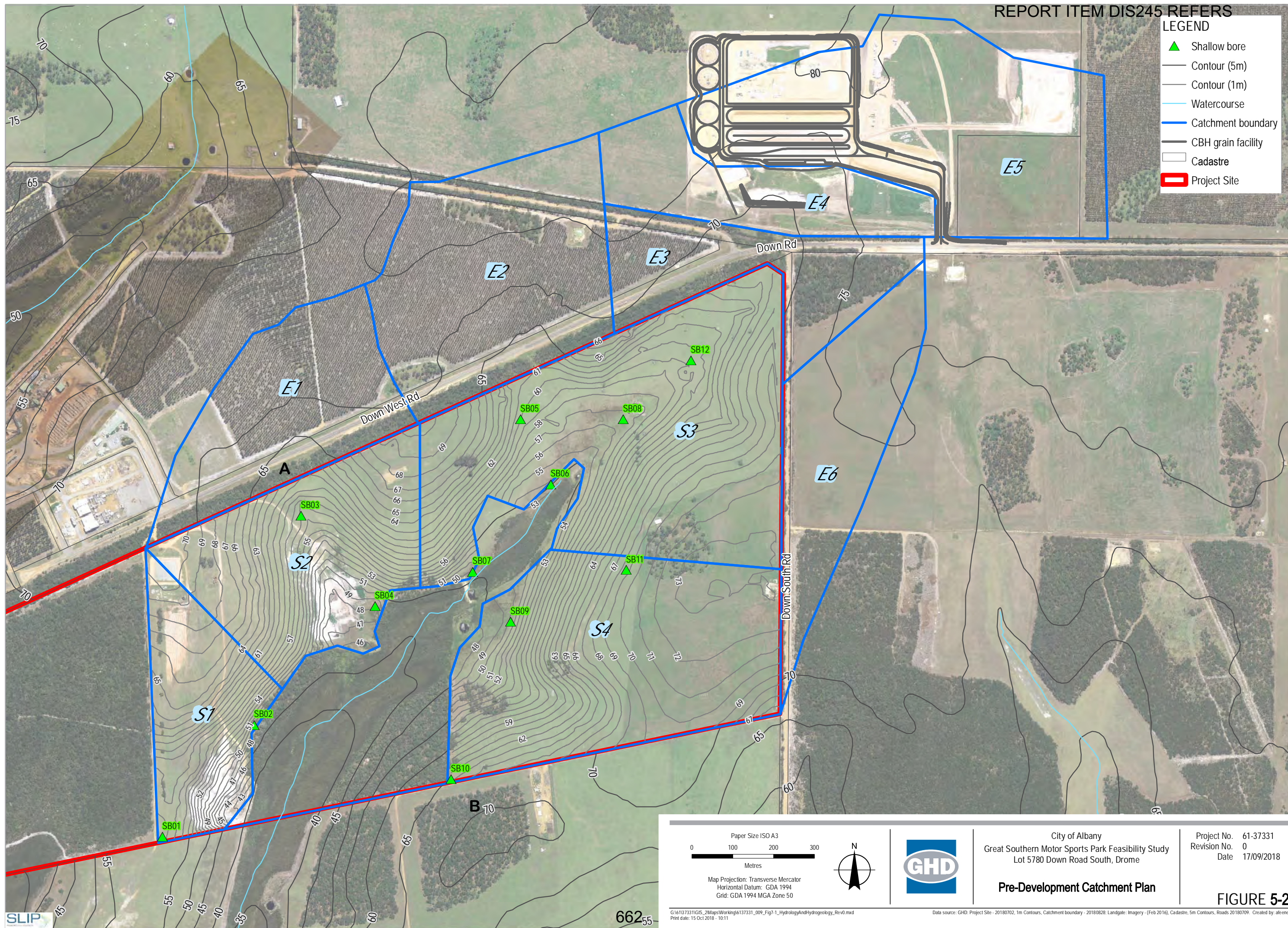
The results of the basin sizing are shown below in Table 5-4.

Table 5-4: Preliminary basin sizing

	Cont. Catch	Catch Area (ha)	Predevelopment Flow (m <sup>3</sup> /s)			Post Development Flow (m <sup>3</sup> /s)			Approx. footprint (m <sup>2</sup> )	Approx. storage volume (m <sup>3</sup> )
			1EY	10% AEP	1% AEP	1EY	10% AEP	1% AEP		
S1	S1	14.1	0	0.22	1.64	0	0.13	2.08	2,800	3,000
S2	S2/S3*/ E1	51.5	0	1.06	6.59	0	0.33	6.55	6,200	7,300
S3	S3*	15.3	0	0.29	1.99	0	0.18	2.91	2,600	3,600
S4	S4	35.0	0	0.60	3.55	0	0.18	5.64	6,200	7,200
S5	S4*	1.4	0	0.06	0.29	0.1	0.22	0.42	1,100	700
S6	S3*	0.5	0	0.02	0.12	0	0.07	0.15	500	200
S7	S3*	2.8	0	0.08	0.47	0	0.17	0.57	1,200	800

\*Portion of catchment only contributing to basin

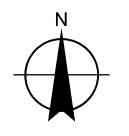
- LEGEND**
- ▲ Shallow bore
  - Contour (5m)
  - Contour (1m)
  - Watercourse
  - Catchment boundary
  - CBH grain facility
  - ▭ Cadastre
  - Project Site



Paper Size ISO A3

0 100 200 300  
Metres

Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 50



City of Albany  
Great Southern Motor Sports Park Feasibility Study  
Lot 5780 Down Road South, Drome

**Pre-Development Catchment Plan**

Project No. 61-37331  
Revision No. 0  
Date 17/09/2018

**FIGURE 5-2**



## 5.2 Stormwater quality management

### 5.2.1 Overview

The Hydrogeological conceptual model (Section 3.4.6) indicates high surface/groundwater connectivity within the Project Site. Any Project Site based groundwater impacts should migrate towards the creek line, where groundwater (and any impacted groundwater) is inferred to discharge, with impacted surface water migrating off-site towards the major drainage in the area, the Marbelup Brook.

Based on the proposed site activities the key stormwater quality issues requiring management within the Project Site include:

- **Sediment load:** Erosion caused by high flow velocity can result in a loss of soil, damage to drainage swales, and increased sediment load to the receiving water body.
- **Nutrient load:** Increased nutrient loading to the receiving water body may result from over-application of fertilisers to landscaped areas.
- **Gross pollutants:** Suspended and dissolved pollutants, and rubbish.
- **Toxicants:** Key pollutants associated with motor sport facilities include leaks and spills of chemical or petroleum hydrocarbons from storage areas, mechanical servicing areas and race tracks. Other toxicant of concern include dissolved metals and pesticides.

If not responsibly managed, the development has the potential to negatively affect stormwater quality discharging from the catchment and impact on the potential receptors and water users (Section 3.4.6 and 3.4.7). The following sections describe the key controls proposed to reduce or minimise risk to stormwater and groundwater quality based on an understanding of the key site risks (Appendix F).

### 5.2.2 Best management practices

Best management practices (BMPs) are design strategies targeted to manage total suspended solids, gross pollutants, nutrients (TP and TN) within stormwater discharged from urban catchments (DoW, 2007). Frequently occurring rainfall events are targeted, using source, in-transit and end-of-pipe controls to improve water quality. BMPs considered appropriate for the AMP development include:

- Maximising infiltration by adopting a stormwater retention system to contain, and as a minimum, treat the first 15 mm of rainfall on site.
- Construction of compensating basins to reduce peak flow rates and encourage infiltration.
- Construction of suitable bio-retention areas to allow for suitable water quality treatment.
- Swale drains shall be planted with grass for filtering of particulates and uptake of dissolved nutrients. Grass will be mowed with clippings removed from site.
- Use of suitable soils within swales and compensation basins that target the uptake of nutrients.
- Minimising discharge rates, allowing the compensating basin to act as a sediment trap, to capture suspended solids and bound pollutants prior to discharge.

### 5.2.3 Spill control and pollution management

To achieve spill control and pollution management in the high risk areas of the AMP, the following practices from WQPN 28: *Mechanical workshops and servicing* (DoW, 2013), WQPN

52: *Stormwater management at industrial sites* (DoW, 2006) and *WQPN 100: Motor sport facilities near sensitive waters* (DoW, 2007) will be implemented:

- Separation of uncontaminated stormwater from potentially contaminated stormwater (particularly roof water from other trafficked hardstands).
- Fuel / chemical storage and handling areas to be located within secondary containment areas that allow maximum recovery of any spilt materials.
- Fuel / chemical storage areas shall be secure, bunded, weatherproof compound with impervious flooring to contain any leaks or spills.
- Any fuel storage area should have a minimum volume capacity of 110 per cent of the largest tanks storage capacity in order to prevent any potential overflow into the environment.
- Paved areas exposed to rainfall where dust, litter or spilt substances accumulate should be regularly cleaned with methods that prevent fluid drainage or leaching into the surrounding environment. Litter, oil and sand traps (as appropriate to the site) are recommended at drain entry points. First-flush water diversion for dusty outdoor areas should be considered to capture initial stormwater run-off after any extended dry period.
- Turbidity should be controlled and where practical, stormwater should be treated (if necessary) then (in order of preference) used as a process water source, irrigated onto well-vegetated areas or infiltrated via on-site soak pits.
- Wash down of vehicles should occur on a bunded, impervious pad that is weatherproof to minimise stormwater access.
- Chemical solvents and non-degradable detergents used to clean equipment or pavements should not be released into stormwater systems. High pressure, steam cleaning, scrubbing or quick break detergents are the preferred methods of cleaning vehicles.
- Rainwater should not be released from chemical or fuel storage compounds, unless first tested and found to be uncontaminated.
- Where the groundwater table is within five metres of the surface or soil permeability is poor (less than one metre per day), alternatives to water infiltration may be needed to avoid harmful effects due to water table mounding.
- Any spilt liquids should drain to sealed collection sumps and be either transported off-site or treated prior to disposal.
- Absorbent materials such as sand or inert absorbent litter should always be available on the Project Site for immediate clean up in the event of fluid spills before wash-down. Contaminated materials should then be disposed off-site to an approved location.

### **Water contamination barriers**

The following water contamination barriers are proposed, to prevent any loss of hydrocarbons and chemicals from the site:

- A 50 metre grassed buffer (Development Exclusion Buffer) from the unnamed watercourse and Conservation Class wetland Figure 2-4.
- A 200 metre buffer from the unnamed water course and Conservation Class wetland to vehicle pits/maintenance and refuelling areas (as per DoW *WQPN 100*).
- All fuel, oil and chemical solvents within the Project Site shall be retained within the bunded areas.

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- Covered, double bunded impervious pit/vehicle maintenance areas with spill controls in place for hydrocarbon management. Runoff from these areas will drain to a detention area with treatment devices such as oil-water separators and/or interceptor/sediment traps prior to outlet to the site-wide drainage system. Wastes and oily residue will be disposed to an approved off-site location.
- Interceptor traps shall be installed and maintained throughout the swale network for treatment of track stormwater runoff.

It is noted that a swale exists within 200 m of the vehicle pits in the south-east of the site. Whilst water conveyance through the swale will improve water quality when compared to piped conveyance, it can also be considered a direct connection to the watercourse. It is proposed that all runoff from the pits and maintenance areas in this location should pass through an oil/water separator to remove contaminants before they enter the watercourse. Furthermore, the runoff from this area will pass through a compensating basin before entering the watercourse. This retarding effect on the runoff will allow a chance for the contaminants to settle and/or break down.

### 5.2.4 Emergency response plan

In the event of a vehicle crash and/or fire, first response extinguishment will be via standard, portable dry chemical fire extinguishers (ABE type). The multipurpose ABE powder is a versatile extinguishant, which is used to extinguish Class A (carbonaceous), Class B (flammable liquid) and Class E (electrical) fires. When dry, the powder may be cleaned up with a vacuum cleaner, or similar. No larger firefighting apparatus are proposed for the AMP, and no firefighting foams are proposed.

As part of CAMS Regulations, each flag point (attended by a trained marshal) on a racetrack is required to have 2 × 9 kg fire extinguishers available. The AMP racetrack will likely have 5-6 flag points.

In the case of an emergency in the high risk areas of the AMP, the following actions from *WQPN 100: Motor sport facilities near sensitive waters* (DoW, 2007) will be implemented:

- A contingency plan shall be developed before the operational phase and be available on the Project Site in order to address emergency situations such as accidents, fires and chemical spills that could put local water resources including surface water and groundwater at risk. Relevant staff and contractors shall be familiar with the Project Site emergency response procedures.
- During larger events (potentially up to 20,000 for national race events), adequate emergency response services (e.g. firefighting, security, communications, medical personnel and emergency vehicle access) shall be provided.
- Portable bund kits and clean-up spill kits shall be kept at various locations, including flag points within the Project Site with absorbent material to soak up spilt oil, chemicals and/or fuel. Additionally, sand bags or coir logs will be used in the case of a vehicle accident to block flow to drains.

The plan should be submitted to Water Corporation and DWER for review and approval before implementing.

### 5.2.5 Non-structural measures

There are a number of temporary and non-structural measures that may also be applied to the development project, as described below.

## **Construction**

Construction sites can be a major source of silt and other pollutants. Proponents and builders shall be encouraged to undertake good practice on building sites. Good practice for construction sites are to be documented in a CEMP and shall include:

- Temporary bunds and silt fences to prevent silt runoff from sites under construction into the drainage system.
- Litter and waste storage bins to prevent litter to be blown by wind or washed by rainfall.
- Establishing a washing-down area behind the bund or silt fence.
- Provide a stabilised entry and exit point to prevent vehicle tracking of soil from the building site onto roads.
- Position stockpiles of sand and soil stockpiles to prevent material being tracked, washed, or blown into roads, and then into the stormwater systems.

## **Maintenance**

Regular maintenance of the drainage system shall be undertaken prior to the start of the wet season. Cleaning of the drainage system and compensating basins will provide an opportunity to remove gross pollutants and silt build up that may enter the receiving water bodies after heavy rainfall. In addition to transporting pollutants, drains with accumulated pollutants may also overflow, leading to localised flooding and erosion, as well as risks to human safety and constructed assets. Unlined open drains may be reshaped at this time if required.

## **Revegetation and landscape management**

Revegetation of the Protected Exclusion Zone (Figure 2-4), which encompasses the CCW and creek line, shall be undertaken as part of the development. Revegetation will occur with suitable native species that were reported by Bio Diverse Solutions (2019) to occur within the CCW.

These include Unit 13, Unit 47 and Unit 49 from the *Albany Regional Vegetation Survey Extent* (Sandiford and Barrett 2010, Appendix D).

In addition, a 50 m wide, low fuel 'Development Exclusion Buffer' comprising managed grass areas will provide a further buffer for stormwater runoff from the development, and any overflow from compensation basins.

The managed grass buffer will assist to filter and trap sediments as well as reduce the amount of nutrients that get discharged into the unnamed creek line / wetland. The proposed native wetland revegetation species will assist to uptake nutrients and trap sediment in shallow groundwater discharging to the wetland area. These native species include *Baumea juncea* and *Baumea rubiginosa* which are frequently used in bioretention areas for their nutrient uptake abilities.

Use of pesticides and fertilisers shall be limited, and completely excluded within the Protected Exclusion Zone and Development Exclusion Buffer.

### 5.2.6 Erosion and sediment control

All reasonable and practicable measures will be taken to protect adjacent properties and downstream environments from the adverse effects of sediment and sediment-laden water displaced from the Project Site (IECA, 2008). Sediment control measures need to be appropriate for the given soil properties, expected weather conditions, required treatment standard, and the type, cost and scope of works.

With these considerations the following sediment control measures shall be incorporated in the AMP site design to prevent sediment displacement from site (IECA, 2008):

- Dust control,
- Sediment fences,
- Coir logs, and
- Stockpile management.

The detailed design for the Project Site will be developed consistent with the requirements for erosion control in consideration of the site topography. When construction is undertaken the Contractor will be required to have a suitable erosion and sediment control plan (within the CEMP) in place prior to works commencing and maintain these during and following construction during the site establishment period.

### 5.3 Recommended management actions

Since a portion of the AMP Project Site will contain impervious areas, stormwater runoff from these areas shall be managed effectively in order to prevent potential impacts from fuel, oil or chemical solvent spills. To manage stormwater in the high risk areas of the AMP, the following practices from *WQPN 100: Motor sport facilities near sensitive waters* (DoW, 2007) shall be implemented:

- The drainage system within the Project Site shall be appropriately designed to separate good quality stormwater from potentially contaminated stormwater.
- Interceptor / sediment traps shall be used for stormwater runoff which may contain contaminated/spilt fluids.
- Compensating Basins and a low fuel, 50 m wide, vegetated buffer shall be used to minimise runoff from high rainfall events.
- Use of pesticides and fertilisers shall be limited, and completely excluded within the Protected Exclusion Zone and Development Exclusion Buffer.

## 6. Groundwater management strategy

### 6.1 Groundwater level management

The existing groundwater levels across the Project Site indicate that adequate clearance to maximum groundwater levels is achieved for most of the Site during the dry summer season.

The Project Site is characterised by clay, silt, sand and gravel layers in the low-lying areas, which result in near-surface groundwater levels for parts of the year during winter periods when there is high rainfall. Depth to groundwater contours, based on maximum recorded water levels in shallow monitoring bores, identify near-surface groundwater levels for parts of the year in the low lying areas (Figure 3-6).

In accordance with *Interim: Developing a local water management strategy* (DoW, 2008) and *Water Quality Protection Note 100: Motor sport facilities near sensitive waters* (DoW, 2007) the design of the development, all development, facilities and infrastructure at the AMP are proposed outside of the low-lying Protected Exclusion Zone and Development Exclusion Buffer.

Further, in accordance with *Interim: Developing a local water management strategy* (DoW, 2008) and *WQPN 100: Motor sport facilities near sensitive waters* (DoW 2007), the design of the development results in all AMP infrastructure located on higher ground, achieving a 2 m vertical separation distance to maximum groundwater levels. The compensating basins are also located appropriately, so that there is a minimum 2 m vertical separation to maximum groundwater levels for infiltration.

The northern loop extension of the Multi-use track (comprising Turn 3, Turn 4 and Turn 5) will require sufficient fill to achieve 2 m vertical separation to maximum groundwater.

Given the Project Site is predominantly cleared there is not anticipated to be a change in the groundwater levels during the post-development period.

#### 6.1.1 Construction management

Given that there is a possibility for groundwater inundation issues within low-lying parts of the Project Site during parts of the year, temporary lowering of groundwater table may be required by using appropriate drainage for excavations during the construction phase of the AMP project. Should dewatering be required, a dewatering management plan must be prepared (generally included within the ASS management plan, if ASS is identified). It is recommended that excavations should take place during summer if possible and not during winter months after heavy rainfall periods which can result in materials being washed downstream into the wetland (creek). No groundwater dewatering will be required during the operational phase of the AMP.

### 6.2 Groundwater quality management

Groundwater quality issues that may require management within the Project Site include:

- Presence / disturbance of ASS, and
- Shallow groundwater / areas of high nutrients or Site derived contamination.

Based on the recent groundwater monitoring program (refer section 3.4.5), groundwater on the Project Site currently contains elevated nutrient levels, particularly TN and TP, and background concentrations of some dissolved metals (Section 3.4.5).

Groundwater quality will be protected through managing local stormwater as close to source as possible. The quality of stormwater before it gets infiltrated will be maximised via the proposed treatment approaches and water sensitive urban design as detailed in Section 5.2. BMPs and

non-structural controls (Sections 5.2.2 and 5.2.5) will be implemented in order to avoid mobilisation of Site derived contaminations through potential pathways to receiving waterbodies.

In particular BMPs for water management in motor sport facilities will be implemented to ensure water receives appropriate treatment prior to disposal off-site, or release to the proposed stormwater management system (Section 5.2).

It is expected that the post-development groundwater quality be improved compared to pre-development/existing levels (winter concentrations) and, will assist to restore the condition of the ecological system.

### 6.3 Groundwater monitoring strategy

The site hydrogeological conceptual model indicates that Site derived surface impacts (eg: potential sources derived from spills and impacted runoff) will infiltrate into the subsurface and together with groundwater flow, be directed towards the on-site creek where groundwater should discharge.

A groundwater monitoring network should be established, based on the following spatial considerations:

- Location of potential sources to groundwater impacts (e.g. fuel storage facilities, infiltration/storm water basins)
- Migration direction of groundwater impacts (e.g. groundwater migration direction noted as towards the creek)
- Groundwater monitoring intervals isolated to intervals within the shallow (sands) and intervals within deeper levels (upper Pallinup Formation) of the hydrogeological profile.

The groundwater samples derived from the monitoring wells should be analysed for those potential contaminants that may be derived from the site activities (e.g: nutrients, hydrocarbons, and metals). The proposed groundwater monitoring strategy is summarised in Section 7.2.

### 6.4 Actions to address ASS or contamination

#### **Potential impacts**

As shown in the Precinct Plan (Figure 2-4), the AMP infrastructure, including tracks and compensation basins, is all proposed outside of the Development Exclusion Zone and Development Exclusion Buffer. This is outside the area considered likely to present a “*moderate to low risk*” of AASS and PASS occurring within 3 m from the natural soil surface but high to moderate risk of ASS occurrence beyond 3 m of the natural soils surface, as shown in Figure 3-2.

Further to this, all infrastructure (including the stormwater compensating basins) will be designed to minimise any disturbance to groundwater during construction through maintaining a minimum 2 m vertical separation distance from the maximum groundwater height and through not requiring any dewatering activities during construction.

As a result of the expected low risk of ASS occurrence on the areas where infrastructure is proposed, in addition to the minimal proposed disturbance of soil and groundwater during construction of the onsite infrastructure; it is considered very unlikely that project development will result in disturbance of any ASS bearing soil layers.

#### **Management**

No management of ASS risk is proposed during the project development due to the unlikely risk of disturbance. However, given that the GSMG propose to undertake geotechnical

investigations across the AMP site prior to construction, GHD proposes that a review of these findings should be undertaken to confirm the absence of any likely ASS bearing soil layers.

In light of the geotechnical investigation findings, the ASS risk assessment for the project should be reassessed /confirmed and if required an appropriate management plan shall be prepared in accordance with DWER guidelines *Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes* (DER, 2015).

### 6.5 Spill control and pollution management

Measures for spill control and pollution management to groundwater are the same as those outlined in Section 5.2.3 for stormwater quality.

#### **Recommendations**

As per Figure 2-4, a Development Exclusion Zone will encompass the existing Conservation Class Wetland (CCW) and unnamed creek line. This will be revegetated with appropriate endemic, native species. In addition, a low fuel, 50 m wide Development Exclusion Buffer will surround the Development Exclusion Zone. To further manage groundwater quality and quantity in the high risk areas of the AMP, the following actions from *WQPN 52: Stormwater management at industrial sites* (DoW, 2006) and *WQPN 100: Motor sport facilities near sensitive waters* (DoW, 2007) will be implemented:

- The AMP facilities will be located at a minimum vertical separation distance of two metres to the maximum (wet season) groundwater table for free-draining soils, to avoid waterlogging and allow for soil contaminant filtration and aerobic microbial action.
- If the motor sport tracks are located on highly permeable soils, they shall (where practical) be amended with clay or other low permeability material to lessen the risk of fuel, hydraulic fluid and coolant seepage into groundwater and aid clean up after accidents.
- As part of the geotechnical investigations during design development, an ASS investigation shall be undertaken to determine the potential impacts the project may have (if any) and an ASS management plan developed (if required).
- An on-going groundwater monitoring program shall be conducted, with annual reporting to DWER and Water Corporation.
- There will be minimal use of pesticides on grass and re-vegetated plant species across the AMP area, and none within the Development Exclusion Zone or Development Exclusion Buffer.



## 7. Monitoring

Baseline groundwater and surface water quality sampling of the Project Site was undertaken by Bio Diverse Solutions in 2018 and 2019 (Section 3.4.5). DWER has been consulted during the development of this monitoring plan, and has been kept informed of the quarterly results.

### 7.1 Surface water monitoring

#### 7.1.1 Pre-development and construction monitoring

Ongoing quarterly monitoring of existing Project Site surface water conditions shall be continued prior to development, and during construction of the AMP. In combination with the existing 2018 and 2019 data, the ongoing monitoring will be used as a baseline for ongoing assessment of the potential impact of the development on shallow groundwater and surface water quality.

For surface water monitoring during the construction phase of the development, a CEMP should be prepared by GSMG and the Contractor which will include erosion and sedimentation control measures, as well as drainage and dewatering systems (if required) in order to minimise potential pollution impacts and prevent contamination to surface water and groundwater.

#### 7.1.2 Post-development monitoring

Ongoing quarterly monitoring of surface water conditions shall be continued post-development, with continued monitoring at sites CS01 and CS02, and establishment of a new upstream monitoring location.

The post-development monitoring program will also involve the collection of grab samples from the compensating basins. Sampling of basins should comprise 3-4 events per year, during or immediately following significant rainfall events (1EY, 1 year ARI event). It is assumed the first flush events will have the highest level of nutrients and chemicals, therefore sampling should occur at the time/after the first significant rainfall event of each wet season, and after extended dry periods. Field notes should include details of the rainfall events, site conditions, time of sampling and time of sample testing.

Monitoring of the compensation basin inlet and outlet water quality will be used to assess performance of the basins in improving stormwater quality.

#### 7.1.3 Monitoring program summary

The recommended monitoring parameters for the ongoing pre-development, construction and post-development monitoring program are outlined in Table 7-1.

Table 7-1: Summary of surface water monitoring

Site	Frequency	Duration	Parameters
<b>Surface water</b> - Upstream of the site (TBC) - Mid-stream (CS02) - Downstream of the site (CS01)	Quarterly	On-going, with annual reporting	In-situ: pH, EC, temperature  Unfiltered sample: pH, EC, TN, FRP, TKN, ammonia, TP, TRH, PAH, BTEXN, Surfactants
<b>Compensating basin</b> - Inlet (4 No.) - Outlet (4 No.)	3-4 events per year following 1EY rainfall events		Filtered sample: Filtered total nitrogen and filtered total phosphorus (to quantify organic component), NO <sub>2</sub> /NO <sub>3</sub> , PO <sub>4</sub> , dissolved heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg)

## 7.2 Groundwater monitoring

### 7.2.1 Pre-development and construction monitoring

Ongoing monitoring of existing Project Site shallow groundwater conditions shall be continued prior to development, and during construction of the AMP. In combination with the existing 2018 and 2019 data, the ongoing monitoring will be used as a baseline for ongoing assessment of the potential impact of the development on shallow groundwater and surface water quality.

### 7.2.2 Post-development monitoring

A groundwater monitoring network should be established post development, the locations of which will be based on groundwater monitoring strategy (Section 6.3).

Ongoing monitoring of the groundwater monitoring bores shall be conducted in accordance with the groundwater monitoring program in Table 7-2.

In addition if the development proposal seeks approval to install a production bore for abstraction of groundwater as a water supply source for the development, then six-monthly groundwater monitoring for water levels and salinity will be a required.

### 7.2.3 Monitoring program summary

The program and parameters outlined in Table 7-2 below will provide a suitable representation of groundwater quality at the site. The groundwater bores established for pre-development monitoring will be used for construction phase and incorporated into the post-development monitoring network.

Should any bores be disturbed during construction they should be reinstated in a nearby representative location. Where new bores are constructed it is recommended that they be installed to a depth that intercepts the shallow and deeper hydrogeological profile at the Project Site.

Table 7-2: Summary of groundwater monitoring program

Site	Frequency	Duration	Parameters
Monitoring bores	Quarterly	Pre-development, during construction, on-going throughout the life of development,	Water level
Production bore			In-situ: pH, EC, temperature
			Unfiltered sample: pH, EC, TN, FRP, TKN, ammonia, TP, TRH, PAH, BTEXN, Surfactants
			Filtered sample Filtered total nitrogen and filtered total phosphorus (to quantify organic component),, NO <sub>2</sub> /NO <sub>3</sub> , PO <sub>4</sub> , dissolved heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg),

## 7.3 Ecological condition monitoring

Bio Diverse Solutions completed baseline Reconnaissance Flora and Level 1 Fauna Survey Report for the Project Site during Spring 2018 (BDS 2019).

Ongoing monitoring of flora condition for the Site should be completed through annual review of vegetation condition change through review of aerial photography. Where vegetation condition is observed to change from baseline aerial photography, follow up releve sampling along transects should be completed to quantify changes to vegetation.

A baseline macroinvertebrate sampling program should be completed prior to commencement of any construction activities. Follow up macroinvertebrate sampling should be completed in the event of any major water quality incident at the Project Site.

### 7.4 Contingency measures

In the event of a major water quality incident at the Project Site, it is recommended that increased monitoring be undertaken to quantify if there is any impact to surface and groundwater quality. Contingency monitoring measures should be developed in consultation with DWER and documented in the post-development monitoring program.

### 7.5 QA/QC

All samples should be undertaken in accordance with Australian Standards. Samples should be analysed in a NATA accredited laboratory.

Post-development, permanent groundwater monitoring bore locations and sites should be identified and constructed in accordance with industry standards (ASTM D5092/ D5092-16, *Standard practice for design and installation of groundwater monitoring bores*).

### 7.6 On-going measures

In order to ensure long-term management and protection of the PDWSAs and other sensitive receptors, the following practices should be implemented:

- Water quality monitoring (surface and groundwater)
- Best management practices including minimal use of pesticides and fertilisers
- 50 m Development Exclusion Buffer zone from the unnamed water source (creek line)
- Pesticides and fertilisers should only be used on grass as well as landscaped and re-vegetated plant species with a 50 m buffer zone from the creek line
- Adherence to all relevant WQPN guidelines and standards

### 7.7 Reporting

A post-development monitoring plan should be prepared in consultation with DWER, including locations of permanent monitoring bores and sites, proposed parameters, timing and frequency of monitoring.

It is recommended that GSMG prepare an annual water quality monitoring report for each year of post-development monitoring, summarising the sampling results from the previous year and submitted to DWER, Water Corporation and City of Albany.

## 8. Implementation

### 8.1 Roles and responsibilities

Table 8-1 identifies the roles and responsibilities to be implemented to support detailed design and construction of the Project Site.

Table 8-1: LWMS roles and responsibilities

Strategy element	Role	Responsibility	Requirement and period
Detailed design	Urban Water Management Plan	Proponent	Prior to commencement of construction works
	Landscape Plan		
Stormwater quantity	Design and construction of drainage infrastructure demonstrating compliance with this LWMS	Proponent	Design to be completed prior to commencement of construction works
Monitoring	Pre-development, construction and ongoing monitoring in accordance with this LWMS	Proponent	Refer Section 7
Construction management	Preparation of an Acid Sulfate Soil Management Plan, should excavation be required to support construction.	Proponent	Management of ASS disturbance, if ASS identified
	Preparation of a Dewatering Management Plan should temporary dewatering be required during construction		Management of temporary dewatering activities during construction
	Preparation of CEMP to guide contractors, including dust control plan, construction waste management plan and emergency response plan		Sediment and erosion management during construction Spill management during construction
Wastewater management	Provision and management of on-site wastewater disposal system in accordance with the <i>Government Sewerage Policy</i>	Proponent	Ongoing
	Provision of temporary waste facilities (i.e. port-a-loos) to cater for events in excess of site on-site wastewater capacity	Proponent	Ongoing

## 8.2 Review

Should there be any change to the AMP layout the stormwater management, groundwater management, monitoring and implementation measures identified in this LWMS should be reviewed and revised, and an addendum prepared if required for review by DWER and City of Albany.

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  - Clearing Regulations – Environmentally Sensitive Areas (DWER-046)
  - Contaminated Sites Database (DWER-059)
  - DBCA Legislated Lands and Waters (DBCA-011)
  - Groundwater Salinity Statewide (DWER-026)
  - Hydrographic Catchments – Catchments (DWER-028)
  - Hydrographic Catchments – Subcatchments (DWER-030)
  - Legislated Lands and Waters (DBCA-011)
  - Pre-European Vegetation (DPIRD-006)
  - Public Drinking Water Source Areas (DWER-033)
  - Ramsar Sites (DBCA-010)
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## Appendices

Appendix A – Bio Diverse Solutions monitoring locations, 2018 summary report and field records



# REPORT ITEM DIS245 REFERS

Unit 5A, 209 Chester Pass Rd  
 Albany, WA 6330  
 Australia  
 Tel: 08 9842 1575  
 Fax: 08 9842 1575



Overview Map Scale 1:100,000

## Legend

- Subject Site
- Cadastre
- 5m Contours
- Deep Bore
- ▲ Shallow Bore
- Creek Sample
- 50m Buffer



Scale  
 1:7,882 @ A3  
 GDA MGA 94 Zone 50

**Data Sources**  
 Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2016  
 Cadastre and Contours: Landgate 2016  
 Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
 City of Albany  
 Lot 5780 Down Road  
 Drome, WA 6330

## Monitoring Plan

STATUS	FILE	DATE
FINAL	MSC0137	28/02/2019

CS01

Parameters	Guideline	27/02/2018	30/05/2018	4/09/2018	28/11/2018	26/02/2019	28/05/2019	28/08/2019
<b>Physico-chemical</b>								
pH	7 to 8.5 <sup>3)</sup>	4.46	6.09	6.09	-	6.46	6.17	5.81
pH lab	7 to 8.5 <sup>3)</sup>	-	-	-	6.30	6.50	6.10	6.00
Electrical Conductivity (uS/cm)	<1500 <sup>3)</sup>	897	930	885	890	894	883	434
Electrical Conductivity lab (uS/cm)	<1500 <sup>3)</sup>	-	923	700	810	940	840	680
Dissolved Oxygen (mg/L)		8.78	9.54	3.93	7.51	7.66	8.16	11.36
Total Dissolved Solids (g/L)	<1000mg/L <sup>3)</sup>	0.574	0.59	0.566	0.569	0.572	0.565	0.278
BOD (mg/L)		-	<5	<5	27	<5	<5	<5
<b>Nutrients (mg/L)</b>								
TN	<1.5 <sup>3)</sup>	1	0.5	2	1	1.5	0.7	1.1
NO2_N	<0.1 <sup>3)</sup>	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
NO3_N	<0.1 <sup>3)</sup>	0.26	0.9	0.2	0.23	0.3	0.23	0.22
NH3_N	<0.04 <sup>3)</sup>	<0.005	<0.005	0.036	0.007	<0.005	0.005	0.013
TP	<0.06 <sup>3)</sup>	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PO4_P	<0.03 <sup>3)</sup>	<0.005	<0.005	0.019	<0.05	0.012	<0.005	0.019
<b>Heavy Metals (mg/L)</b>								
Aluminium, Al	<0.055 <sup>2)</sup>	0.06	0.06	0.14	0.06	<0.001	0.06	0.15
Arsenic, As	<0.013 <sup>2)</sup>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium, Cd	<0.0002 <sup>2)</sup>	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium(VI), Cr <sup>6</sup>	<0.001 <sup>2)</sup>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper, Cu	<0.0014 <sup>2)</sup>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron, Fe	<0.3 <sup>3)</sup>	0.86	0.32	0.99	0.46	<0.01	0.34	0.76
Mercury, Hg		<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Manganese, Mn	<1.9 <sup>2)</sup>	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel, Ni		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead, Pb	<0.008 <sup>2)</sup>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc, Zn	<0.008 <sup>2)</sup>	0.008	0.01	0.008	0.01	<0.001	0.002	0.015
<b>Alkalinity (mg/L)</b>								
Bicarbonate HCO3 as CaCO3		N/A	7	10	7	12	10	10
Carbonate CO3 2- as CaCO3		N/A	<5	<5	<5	<5	<5	<5
Hydroxide OH- as CaCO3		N/A	<5	<5	<5	<5	<5	<5
Total Alkalinity as CaCO3	200 <sup>1)</sup>	N/A	7	10	7	12	10	10
<b>MBTEXN (µg/L)</b>								
MTBE		<1	<1	<1	<1	<1	<1	<1
Benzene	950	<1	<1	<1	<1	<1	<1	<1
Toluene		<1	<1	<1	<1	<1	<1	<1
Ethylbenzene		<1	<1	<1	<1	<1	<1	<1
m+p-xylene		<2	<2	<2	<2	<2	<2	<2
o-xylene	350	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<1	<1	<1	<1	<1	<1	<1
<b>Total Recoverable Hydrocarbons (µg/L)</b>								
TRH C6 - C9		<10	<10	<10	<10	<10	<10	<10
TRH C6 - C10		<10	<10	<10	<10	<10	<10	<10
TRH C6 -C10 less BTEX (F1)		<10	<10	<10	<10	<10	<10	<10
TRH C10 - C14		<50	97	<50	<50	<50	<50	<50
TRH C15 - C28		<100	<100	<100	<100	<100	<100	<100
TRH C29 - C36		110	<100	<100	<100	<100	<100	<100
TRH >C10 - C16		<50	71	<50	<50	<50	<50	<50
TRH >C10 -C16 less N (F2)		<50	71	<50	<50	<50	<50	<50
TRH >C16 - C34		140	<100	<100	<100	<100	<100	<100
TRH >C34 - C40		<100	<100	<100	<100	<100	<100	<100
<b>PAHs in water (µg/L)</b>								
Naphthalene	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAHs		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Microbial Testing (cfu/100mL)</b>								
Faecal Enterococci	<1cfu/100ml <sup>1)</sup>	N/A	40	10	40	40	10	<10
Thermotolerant Coliforms	<1cfu/100ml <sup>1)</sup>	N/A	10	10	30	70	<10	20
E.coli	<1cfu/100ml <sup>1)</sup>	N/A	10	10	30	70	<10	20

<sup>1)</sup> Practical Quantitation Limit (PQL) defined as the lowest concentration at which an analyte can be detected in a sample within a reasonable degree of accuracy and precision.

<sup>2)</sup> ANZECC and ARMCANZ (2000) Trigger values for toxicants in freshwater ecosystems at 95% level of protection, stated otherwise; target exceedance printed in red.

<sup>3)</sup> ANZECC and ARMCANZ (2000) Trigger values for South-west Australia for slightly-disturbed wetlands ecosystems; target exceedance printed in red.

<sup>4)</sup> ADWG (2011) Drinking water aesthetic value

# REPORT ITEM DIS245 REFERS

CS02

Parameters	Guideline	27/02/2018	30/05/2018	4/09/2018	28/11/2018	26/02/2019	28/05/2019	28/08/2019
<b>Physico-chemical</b>								
pH	7 to 8.5 <sup>3)</sup>	6.34	5.78	5.68	-	6.85	4.94	5.24
pH Lab	7 to 8.5 <sup>3)</sup>	-	-	-	5.60	5.20	5.00	5.10
Electrical Conductivity (uS/cm)	<1500 <sup>3)</sup>	623	1050	659	890	781	1170	608
Electrical Conductivity lab (uS/cm)	<1500 <sup>3)</sup>	-	1100	930	920	1100	1200	990
Dissolved Oxygen (mg/L)		5.14	4.66	7.83	6.71	2.4	4.49	7.94
Total Dissolved Solids (g/L)	<1000mg/L <sup>3)</sup>	0.400	0.675	0.422	0.570	0.500	0.748	0.389
BOD (mg/L)		-	7	<5	71	47	14	6
<b>Nutrients (mg/L)</b>								
TN	<1.5 <sup>3)</sup>	3.0	3.1	3.0	2.0	6.5	2.0	2.7
NO <sub>2</sub> _N	<0.1 <sup>3)</sup>	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
NO <sub>3</sub> _N	<0.1 <sup>3)</sup>	0.007	<0.5	0.041	0.006	0.012	<0.005	<0.005
NH <sub>3</sub> _N	<0.04 <sup>3)</sup>	<0.005	<0.005	0.019	<0.005	0.009	<0.005	<0.005
TP	<0.06 <sup>3)</sup>	0.26	0.55	0.28	<0.05	0.55	0.22	0.24
PO <sub>4</sub> _P	<0.03 <sup>3)</sup>	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
<b>Dissolved Metals (mg/L)</b>								
Aluminium, Al	<0.055 <sup>2)</sup>	0.46	0.02	0.03	0.01	<0.01	0.04	0.05
Arsenic, As	<0.013 <sup>2)</sup>	0.013	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001
Cadmium, Cd	<0.0002 <sup>2)</sup>	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium(VI), Cr <sup>6</sup>	<0.001 <sup>2)</sup>	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001
Copper, Cu	<0.0014 <sup>2)</sup>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001
Iron, Fe	<0.3 <sup>3)</sup>	40	0.05	0.26	0.06	0.09	0.1	0.67
Mercury		<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Manganese, Mn	<1.9 <sup>2)</sup>	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickle		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead Pb	<0.008 <sup>2)</sup>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc, Zn	<0.008 <sup>2)</sup>	0.002	0.015	0.002	0.004	0.041	0.006	0.004
<b>Alkalinity (mg/L)</b>								
Bicarbonate HCO <sub>3</sub> as CaCO <sub>3</sub>		N/A	N/A	170	7	7	<5	6
Carbonate CO <sub>3</sub> 2- as CaCO <sub>3</sub>		N/A	N/A	<5	<5	<5	<5	<5
Hydroxide OH- as CaCO <sub>3</sub>		N/A	N/A	<5	<5	<5	<5	<5
Total Alkalinity as CaCO <sub>3</sub>	200 <sup>4)</sup>	N/A	N/A	170	7	7	<5	6
<b>MBTEXN (µg/L)</b>								
MTBE		<1	<1	<1	<1	<1	<1	<1
Benzene	950	<1	<1	<1	<1	<1	<1	<1
Toluene		<1	<1	<1	<1	<1	<1	<1
Ethylbenzene		<1	<1	<1	<1	<1	<1	<1
m+p-xylene		<2	<2	<2	<2	<2	<2	<2
o-xylene	350	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<1	<1	<1	<1	<1	<1	<1
<b>Total Recoverable Hydrocarbons (µg/L)</b>								
TRH C6 - C9		<10	<10	<10	<10	<10	<10	<10
TRH C6 - C10		<10	<10	<10	<10	<10	<10	<10
TRH C6 -C10 less BTEX (F1)		<10	<10	<10	<10	<10	<10	<10
TRH C10 - C14		<50	220	<50	<50	<50	<50	<50
TRH C15 - C28		<100	<100	<100	<100	<100	<100	<100
TRH C29 - C36		330	<100	<100	<100	<100	<100	<100
TRH >C10 - C16		<50	92	<50	<50	<50	<50	<50
TRH >C10 -C16 less N (F2)		<50	92	<50	<50	<50	<50	<50
TRH >C16 - C34		280	100	<100	<100	<100	120	110
TRH >C34 - C40		220	<100	<100	<100	<100	<100	<100
<b>PAHs in water (µg/L)</b>								
Naphthalene	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAHs		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Microbial Testing (cfu/100mL)</b>								
Faecal Enterococci	<1cfu/100ml <sup>1)</sup>	N/A	50	80	90	180	160	<10
Thermotolerant Coliforms	<1cfu/100ml <sup>1)</sup>	N/A	260	20	460	400	<10	<10
E.coli	<1cfu/100ml <sup>1)</sup>	N/A	260	20	460	400	<10	<10

<sup>1)</sup> Practical Quantitation Limit (PQL) defined as the lowest concentration at which an analyte can be detected in a sample within a reasonable degree of accuracy and precision.

<sup>2)</sup> ANZECC and ARMCANZ (2000) Trigger values for toxicants in freshwater ecosystems at 95% level of protection, stated otherwise; target exceedance printed in red.

<sup>3)</sup> ANZECC and ARMCANZ (2000) Trigger values for South-west Australia for slightly-disturbed wetlands ecosystems; target exceedance printed in red.

<sup>4)</sup> ADWG (2011) Drinking water aesthetic value

SB03

Parameters	Guideline	27/02/2018	30/05/2018	4/09/2018	28/11/2018	26/02/2019	28/05/2018	28/08/2019
<b>Physico-chemical</b>								
pH	7 to 8.5 <sup>3)</sup>	N/A	N/A	6.09	N/A	N/A	N/A	N/A
pH lab	7 to 8.5 <sup>3)</sup>	N/A	N/A	-	N/A	N/A	N/A	N/A
Electrical Conductivity (uS/cm)	<1500 <sup>3)</sup>	N/A	N/A	963	N/A	N/A	N/A	N/A
Electrical Conductivity lab (uS/cm)	<1500 <sup>3)</sup>	N/A	N/A	1100	N/A	N/A	N/A	N/A
Dissolved Oxygen (mg/L)		N/A	N/A	2.07	N/A	N/A	N/A	N/A
Total Dissolved Solids (g/L)	<1000mg/L <sup>3)</sup>	N/A	N/A	0.62	N/A	N/A	N/A	N/A
BOD (mg/L)		N/A	N/A	45	N/A	N/A	N/A	N/A
<b>Nutrients (mg/L)</b>								
TN	<1.5 <sup>3)</sup>	N/A	N/A	8.0	N/A	N/A	N/A	N/A
NO <sub>2</sub> _N	<0.1 <sup>3)</sup>	N/A	N/A	<0.005	N/A	N/A	N/A	N/A
NO <sub>3</sub> _N	<0.1 <sup>3)</sup>	N/A	N/A	0.18	N/A	N/A	N/A	N/A
NH <sub>3</sub> _N	<0.04 <sup>3)</sup>	N/A	N/A	1.5	N/A	N/A	N/A	N/A
TP	<0.06 <sup>3)</sup>	N/A	N/A	0.2	N/A	N/A	N/A	N/A
PO <sub>4</sub> _P	<0.03 <sup>3)</sup>	N/A	N/A	0.2	N/A	N/A	N/A	N/A
<b>Dissolved Metals (mg/L)</b>								
Aluminium, Al	<0.055 <sup>2)</sup>	N/A	N/A	0.59	N/A	N/A	N/A	N/A
Arsenic, As	<0.013 <sup>2)</sup>	N/A	N/A	0.002	N/A	N/A	N/A	N/A
Cadmium, Cd	<0.0002 <sup>2)</sup>	N/A	N/A	<0.0001	N/A	N/A	N/A	N/A
Chromium(VI), Cr <sup>6</sup>	<0.001 <sup>2)</sup>	N/A	N/A	0.006	N/A	N/A	N/A	N/A
Copper, Cu	<0.0014 <sup>2)</sup>	N/A	N/A	0.004	N/A	N/A	N/A	N/A
Iron, Fe	<0.3 <sup>3)</sup>	N/A	N/A	2.0	N/A	N/A	N/A	N/A
Mercury		N/A	N/A	<0.00005	N/A	N/A	N/A	N/A
Manganese, Mn	<1.9 <sup>2)</sup>	N/A	N/A	0.24	N/A	N/A	N/A	N/A
Nickle		N/A	N/A	0.003	N/A	N/A	N/A	N/A
Lead Pb	<0.008 <sup>2)</sup>	N/A	N/A	<0.001	N/A	N/A	N/A	N/A
Zinc, Zn	<0.008 <sup>2)</sup>	N/A	N/A	0.013	N/A	N/A	N/A	N/A
<b>Alkalinity (mg/L)</b>								
Bicarbonate HCO <sub>3</sub> as CaCO <sub>3</sub>		N/A	N/A	170	N/A	N/A	N/A	N/A
Carbonate CO <sub>3</sub> 2- as CaCO <sub>3</sub>		N/A	N/A	<5	N/A	N/A	N/A	N/A
Hydroxide OH- as CaCO <sub>3</sub>		N/A	N/A	<5	N/A	N/A	N/A	N/A
Total Alkalinity as CaCO <sub>3</sub>	200 <sup>4)</sup>	N/A	N/A	170	N/A	N/A	N/A	N/A
<b>MBTEXN (µg/L)</b>								
MTBE		N/A	N/A	<5	N/A	N/A	N/A	N/A
Benzene	950	N/A	N/A	<5	N/A	N/A	N/A	N/A
Toluene		N/A	N/A	<5	N/A	N/A	N/A	N/A
Ethylbenzene		N/A	N/A	<5	N/A	N/A	N/A	N/A
m+p-xylene		N/A	N/A	<10	N/A	N/A	N/A	N/A
o-xylene	350	N/A	N/A	<5	N/A	N/A	N/A	N/A
Naphthalene		N/A	N/A	<5	N/A	N/A	N/A	N/A
<b>Total Recoverable Hydrocarbons (µg/L)</b>								
TRH C6 - C9		N/A	N/A	<100	N/A	N/A	N/A	N/A
TRH C6 - C10		N/A	N/A	<100	N/A	N/A	N/A	N/A
TRH C6 -C10 less BTEX (F1)		N/A	N/A	<100	N/A	N/A	N/A	N/A
TRH C10 - C14		N/A	N/A	<50	N/A	N/A	N/A	N/A
TRH C15 - C28		N/A	N/A	380	N/A	N/A	N/A	N/A
TRH C29 - C36		N/A	N/A	170	N/A	N/A	N/A	N/A
TRH >C10 - C16		N/A	N/A	<50	N/A	N/A	N/A	N/A
TRH >C10 -C16 less N (F2)		N/A	N/A	<50	N/A	N/A	N/A	N/A
TRH >C16 - C34		N/A	N/A	500	N/A	N/A	N/A	N/A
TRH >C34 - C40		N/A	N/A	<100	N/A	N/A	N/A	N/A
<b>PAHs in water (µg/L)</b>								
Naphthalene	16	N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Acenaphthylene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Acenaphthene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Fluorene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Phenanthrene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Anthracene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Fluoranthene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Pyrene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Benzo(a)anthracene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Chrysene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Benzo(b,j+k)fluoranthene		N/A	N/A	<0.2	N/A	N/A	N/A	N/A
Benzo(a)pyrene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Indeno(1,2,3-c,d)pyrene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Dibenzo(a,h)anthracene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Benzo(g,h,i)perylene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Benzo(a)pyrene TEQ		N/A	N/A	<0.5	N/A	N/A	N/A	N/A
Total +ve PAH's		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
<b>Microbial Testing (cfu/100mL)</b>								
Faecal Enterococci	<1cfu/100ml <sup>1)</sup>	N/A	N/A	<10	N/A	N/A	N/A	N/A
Thermotolerant Coliforms	<1cfu/100ml <sup>1)</sup>	N/A	N/A	10	N/A	N/A	N/A	N/A
E.coli	<1cfu/100ml <sup>1)</sup>	N/A	N/A	10	N/A	N/A	N/A	N/A

<sup>1)</sup> Practical Quantitation Limit (PQL) defined as the lowest concentration at which an analyte can be detected in a sample within a reasonable degree of accuracy and precision.

<sup>2)</sup> ANZECC and ARMCANZ (2000) Trigger values for toxicants in freshwater ecosystems at 95% level of protection, stated otherwise; target exceedance printed in red.

<sup>3)</sup> ANZECC and ARMCANZ (2000) Trigger values for South-west Australia for slightly-disturbed wetlands ecosystems; target exceedance printed in red.

<sup>4)</sup> ADWG (2011) Drinking water aesthetic value

SB04

Parameters	Guideline	27/02/2018	30/05/2018	4/09/2018	28/11/2018	26/02/2019	28/05/2019	28/08/2019
<b>Physico-chemical</b>								
pH	7 to 8.5 <sup>3)</sup>	N/A	5.78	5.38	-	5.51	5.24	4.40
pH Lab	7 to 8.5 <sup>3)</sup>	N/A	-	-	6.30	5.40	5.50	4.60
Electrical Conductivity (uS/cm)	<1500 <sup>3)</sup>	N/A	242	328	226	207	229	262
Electrical Conductivity lab (uS/cm)	<1500 <sup>3)</sup>	N/A	210	340	210	200	190	400
Dissolved Oxygen (mg/L)		N/A	4.66	1.93	5.6	2.04	2.43	5.32
Total Dissolved Solids (g/L)	<1000mg/L <sup>3)</sup>	N/A	0.675	0.21	0.147	0.135	0.148	0.168
BOD (mg/L)		-	11	<5	140	240	8	7
<b>Nutrients (mg/L)</b>								
TN	<1.5 <sup>3)</sup>		0.8	1.2	0.5	0.6	0.9	2.0
NO <sub>2</sub> _N	<0.1 <sup>3)</sup>	N/A	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
NO <sub>3</sub> _N	<0.1 <sup>3)</sup>	N/A	<0.5	<0.005	0.013	0.024	<0.005	<0.025
NH <sub>3</sub> _N	<0.04 <sup>3)</sup>	N/A	0.34	0.11	0.2	0.12	0.25	0.027
TP	<0.06 <sup>3)</sup>		<0.05	<0.05	<0.005	<0.05	<0.05	<0.05
PO <sub>4</sub> _P	<0.03 <sup>3)</sup>	N/A	<0.005	<0.005	<0.005	<0.005	0.06	<0.05
<b>Dissolved Metals (mg/L)</b>								
Aluminium, Al	<0.055 <sup>2)</sup>	N/A	0.02	0.56	0.12	0.07	0.02	2.5
Arsenic, As	<0.013 <sup>2)</sup>	N/A	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium, Cd	<0.0002 <sup>2)</sup>	N/A	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium(VI), Cr <sup>6</sup>	<0.001 <sup>2)</sup>	N/A	<0.001	0.002	<0.001	<0.001	<0.001	0.003
Copper, Cu	<0.0014 <sup>2)</sup>	N/A	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron, Fe	<0.3 <sup>3)</sup>	N/A	0.01	3.0	4.1	0.05	0.12	1.7
Mercury		N/A	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00012
Manganese, Mn	<1.9 <sup>2)</sup>	N/A	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickle		N/A	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead Pb	<0.008 <sup>2)</sup>	N/A	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc, Zn	<0.008 <sup>2)</sup>	N/A	0.008	0.013	0.004	<0.001	0.008	0.066
<b>Alkalinity (mg/L)</b>								
Bicarbonate HCO <sub>3</sub> as CaCO <sub>3</sub>		N/A	8	6	13	13	12	<5
Carbonate CO <sub>3</sub> 2- as CaCO <sub>3</sub>		N/A	<5	<5	<5	<5	<5	<5
Hydroxide OH- as CaCO <sub>3</sub>		N/A	<5	<5	<5	<5	<5	<5
Total Alkalinity as CaCO <sub>3</sub>	200 <sup>4)</sup>	N/A	8	6	13	13	12	<5
<b>MBTEXN (µg/L)</b>								
MTBE		N/A	<1	<1	<1	<1	<1	<1
Benzene	950	N/A	<1	<1	<1	<1	<1	<1
Toluene		N/A	8	2	2	2	1	1
Ethylbenzene		N/A	<1	<1	<1	<1	<1	<1
m+p-xylene		N/A	<2	<2	<2	<2	<2	<2
o-xylene	350	N/A	<1	<1	<1	<1	<1	<1
Naphthalene		N/A	<1	<1	<1	<1	<1	<1
<b>Total Recoverable Hydrocarbons (µg/L)</b>								
TRH C6 - C9		N/A	<10	<10	<10	<10	<10	<10
TRH C6 - C10		N/A	<10	<10	<10	<10	<10	<10
TRH C6 -C10 less BTEX (F1)		N/A	<10	<10	<10	<10	<10	<10
TRH C10 - C14		N/A	<50	<50	<50	70	<50	<50
TRH C15 - C28		N/A	<100	<100	140	180	<100	<100
TRH C29 - C36		N/A	<100	<100	<100	<100	<100	<100
TRH >C10 - C16		N/A	<50	<50	<50	65	<50	<50
TRH >C10 -C16 less N (F2)		N/A	<50	<50	<50	65	<50	<50
TRH >C16 - C34		N/A	<100	<100	140	250	100	110
TRH >C34 - C40		N/A	<100	<100	<100	<100	<100	<100
<b>PAHs in water (µg/L)</b>								
Naphthalene	16	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene		N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ		N/A	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's		N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Microbial Testing (cfu/100mL)</b>								
Faecal Enterococci	<1cfu/100ml <sup>1)</sup>	N/A	<10	<10	<10	30	<10	<10
Thermotolerant Coliforms	<1cfu/100ml <sup>1)</sup>	N/A	<10	<10	<10	<10	<10	20
E.coli	<1cfu/100ml <sup>1)</sup>	N/A	<10	<10	<10	<10	<10	20

<sup>1)</sup> Practical Quantitation Limit (PQL) defined as the lowest concentration at which an analyte can be detected in a sample within a reasonable degree of accuracy and precision.

<sup>2)</sup> ANZECC and ARMCANZ (2000) Trigger values for toxicants in freshwater ecosystems at 95% level of protection, stated otherwise; target exceedance printed in red.

<sup>3)</sup> ANZECC and ARMCANZ (2000) Trigger values for South-west Australia for slightly-disturbed wetlands ecosystems; target exceedance printed in red.

<sup>4)</sup> ADWG (2011) Drinking water aesthetic value

SB06

Parameters	Guideline	27/02/2018	30/05/2018	4/09/2018	28/11/2018	26/02/2019	28/05/2018	28/09/2019
<b>Physico-chemical</b>								
pH	7 to 8.5 <sup>3)</sup>	2.5	4.78	4.16	-	N/A	3.82	4.04
pH lab	7 to 8.5 <sup>3)</sup>	-	-	-	3.30	N/A	4.60	4.10
Electrical Conductivity (uS/cm)	<1500 <sup>3)</sup>	311	321	1070	328	N/A	467	242
Electrical Conductivity lab (uS/cm)	<1500 <sup>3)</sup>	-	320	320	590	N/A	420	350
Dissolved Oxygen (mg/L)		4.53	2.24	8.95	6.7	N/A	4.04	5.0
Total Dissolved Solids (g/L)	<1000mg/L <sup>3)</sup>	0.203	0.208	0.69	0.213	N/A	0.304	0.155
BOD (mg/L)		-	29	23	18	N/A	8	65
<b>Nutrients (mg/L)</b>								
TN	<1.5 <sup>3)</sup>	0.2	4.9	5.2	17.0	N/A	7.1	5.5
NO2_N	<0.1 <sup>3)</sup>	<0.005	<0.005	<0.005	<0.005	N/A	<0.005	<0.005
NO3_N	<0.1 <sup>3)</sup>	0.024	<0.5	<0.05	0.013	N/A	<0.005	<0.005
NH3_N	<0.04 <sup>3)</sup>	0.7	1	0.67	2.4	N/A	0.5	0.78
TP	<0.06 <sup>3)</sup>	1.3	1.2	1.1	2.2	N/A	3.1	0.88
PO4_P	<0.03 <sup>3)</sup>	1.1	0.79	0.88	1.9	N/A	2.4	0.67
<b>Dissolved Metals (mg/L)</b>								
Aluminium, Al	<0.055 <sup>2)</sup>	1.8	0.32	0.26	0.25	N/A	0.40	0.23
Arsenic, As	<0.013 <sup>2)</sup>	<0.001	<0.001	<0.001	<0.001	N/A	0.001	<0.001
Cadmium, Cd	<0.0002 <sup>2)</sup>	<0.0001	<0.0001	<0.0001	<0.0001	N/A	<0.0001	<0.0001
Chromium(VI), Cr <sup>6</sup>	<0.001 <sup>2)</sup>	0.002	<0.002	0.001	0.002	N/A	0.002	0.002
Copper, Cu	<0.0014 <sup>2)</sup>	<0.001	<0.001	<0.001	<0.001	N/A	0.003	<0.001
Iron, Fe	<0.3 <sup>3)</sup>	0.9	0.8	0.38	1	N/A	0.41	0.61
Mercury		<0.00005	<0.00005	<0.00005	<0.00005	N/A	<0.00005	<0.00005
Manganese, Mn	<1.9 <sup>2)</sup>	0.01	<0.005	<0.005	0.006	N/A	<0.005	<0.005
Nickle		0.003	<0.001	<0.001	<0.001	N/A	<0.001	<0.001
Lead Pb	<0.008 <sup>2)</sup>	0.006	<0.001	<0.001	<0.001	N/A	<0.001	<0.001
Zinc, Zn	<0.008 <sup>2)</sup>	0.097	0.014	0.01	0.028	N/A	0.046	0.009
<b>Alkalinity (mg/L)</b>								
Bicarbonate HCO3 as CaCO3		N/A	<5	<5	<5	N/A	5	<5
Carbonate CO3 2- as CaCO3		N/A	<5	<5	<5	N/A	<5	<5
Hydroxide OH- as CaCO3		N/A	<5	<5	<5	N/A	<5	<5
Total Alkalinity as CaCO3	200 <sup>4)</sup>	N/A	<5	<5	<5	N/A	5	<5
<b>MBTEXN (µg/L)</b>								
MTBE		<1	<10	<3	<3	N/A	<3	<1
Benzene	950	<1	<10	<3	<3	N/A	<3	<1
Toluene		<1	<10	7	30	N/A	<3	<1
Ethylbenzene		<1	<10	<3	<3	N/A	<3	<1
m+p-xylene		<2	<20	<6	<6	N/A	<6	<2
o-xylene	350	<1	<10	<3	<3	N/A	<3	<1
Naphthalene		<1	<10	<3	<3	N/A	<3	<1
<b>Total Recoverable Hydrocarbons (µg/L)</b>								
TRH C6 - C9		<10	<100	<50	<50	N/A	<50	<10
TRH C6 - C10		<10	<100	<50	<50	N/A	<50	<10
TRH C6 -C10 less BTEX (F1)		<10	<100	<50	<50	N/A	<50	<10
TRH C10 - C14		<50	97	<50	160	N/A	<50	<50
TRH C15 - C28		<100	<100	100	120	N/A	130	150
TRH C29 - C36		110	<100	<100	<100	N/A	<100	260
TRH >C10 - C16		<50	71	<50	150	N/A	<50	<50
TRH >C10 -C16 less N (F2)		<50	71	<50	150	N/A	<50	<50
TRH >C16 - C34		140	<100	140	160	N/A	180	340
TRH >C34 - C40		<100	<100	<100	<100	N/A	<100	120
<b>PAHs in water (µg/L)</b>								
Naphthalene	16	<0.1	<0.1	<0.1	<0.1	N/A	<0.1	0.2
Acenaphthylene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Acenaphthene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Fluorene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Phenanthrene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Anthracene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Fluoranthene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Pyrene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Benzo(a)anthracene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Chrysene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Benzo(b,j+k)fluoranthene		<0.2	<0.2	<0.2	<0.2	N/A	<0.2	<0.2
Benzo(a)pyrene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Dibenzo(a,h)anthracene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Benzo(g,h,i)perylene		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	<0.1
Benzo(a)pyrene TEQ		<0.5	<0.5	<0.5	<0.5	N/A	<0.5	<0.5
Total +ve PAHs		<0.1	<0.1	<0.1	<0.1	N/A	<0.1	0.9
<b>Microbial Testing</b>								
Faecal Enterococci (cfu/100mL)	<1cfu/100ml <sup>1)</sup>	N/A	10	10	<10	N/A	<10	<10
Thermotolerant Coliforms	<1cfu/100ml <sup>1)</sup>	N/A	<10	20	<10	N/A	<10	<10
E.coli	<1cfu/100ml <sup>1)</sup>	N/A	<10	20	<10	N/A	<10	<10

<sup>1)</sup> Practical Quantitation Limit (PQL) defined as the lowest concentration at which an analyte can be detected in a sample within a reasonable degree of accuracy and precision.

<sup>2)</sup> ANZECC and ARMCANZ (2000) Trigger values for toxicants in freshwater ecosystems at 95% level of protection, stated otherwise; target exceedance printed in red.

<sup>3)</sup> ANZECC and ARMCANZ (2000) Trigger values for South-west Australia for slightly-disturbed wetlands ecosystems; target exceedance printed in red.

<sup>4)</sup> ADWG (2011) Drinking water aesthetic value



SB07

Parameters	Guideline	27/02/2018	30/05/2018	4/09/2018	28/11/2018	26/02/2019	28/05/2019	28/08/2019
<b>Physico-chemical</b>								
pH	7 to 8.5 <sup>3)</sup>	2.82	4.77	4.50	-	5.68	4.15	4.23
pH lab	7 to 8.5 <sup>3)</sup>	-	-	-	4.70	5.60	4.20	4.40
Electrical Conductivity (uS/cm)	<1500 <sup>3)</sup>	337	280	211	449	485	665	1261
Electrical Conductivity lab (uS/cm)	<1500 <sup>3)</sup>	-	380	210	450	490	410	200
Dissolved Oxygen (mg/L)		3.9	5.34	2.6	4.95	1.22	9.54	4.74
Total Dissolved Solids (g/L)	<1000mg/L <sup>3)</sup>	0.224	0.181	0.14	0.291	0.316	0.427	0.807
BOD (mg/L)		-	61	13	110	160	23	29
<b>Nutrients (mg/L)</b>								
TN	<1.5 <sup>3)</sup>	0.3	6.1	6.5	28	28	8.9	4.9
NO <sub>2</sub> _N	<0.1 <sup>3)</sup>	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
NO <sub>3</sub> _N	<0.1 <sup>3)</sup>	0.27	<0.5	<0.005	<0.5	<0.005	<0.005	<0.005
NH <sub>3</sub> _N	<0.04 <sup>3)</sup>	0.22	0.77	0.19	6.4	12	0.82	0.16
TP	<0.06 <sup>3)</sup>	0.65	0.81	0.45	1.9	1.7	0.63	0.25
PO <sub>4</sub> _P	<0.03 <sup>3)</sup>	0.52	0.73	0.23	1.3	1	0.31	0.1
<b>Dissolved Metals (mg/L)</b>								
Aluminium, Al	<0.055 <sup>2)</sup>	0.86	0.14	0.18	0.1	0.07	0.21	0.18
Arsenic, As	<0.013 <sup>2)</sup>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium, Cd	<0.0002 <sup>2)</sup>	0.0002	<0.0001	<0.0001	0.0002	0.0003	<0.0001	<0.0001
Chromium(VI), Cr <sup>6+</sup>	<0.001 <sup>2)</sup>	0.002	0.002	<0.001	0.001	0.001	0.001	<0.001
Copper, Cu	<0.0014 <sup>2)</sup>	0.002	<0.001	0.002	<0.001	0.001	<0.001	0.002
Iron, Fe	<0.3 <sup>3)</sup>	1.1	0.51	0.21	0.54	0.17	0.5	0.17
Mercury		<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Manganese, Mn	<1.9 <sup>2)</sup>	0.009	<0.005	<0.005	0.027	0.011	0.008	<0.005
Nickle		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead Pb	<0.008 <sup>2)</sup>	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc, Zn	<0.008 <sup>2)</sup>	0.065	0.013	0.01	0.023	0.008	0.079	0.041
<b>Alkalinity (mg/L)</b>								
Bicarbonate HCO <sub>3</sub> as CaCO <sub>3</sub>		N/A	<5	<5	11	38	5	<5
Carbonate CO <sub>3</sub> 2- as CaCO <sub>3</sub>		N/A	<5	<5	<5	<5	<5	<5
Hydroxide OH- as CaCO <sub>3</sub>		N/A	<5	<5	<5	<5	<5	<5
Total Alkalinity as CaCO <sub>3</sub>	200 <sup>4)</sup>	N/A	<5	<5	11	38	5	<5
<b>MBTEXN (µg/L)</b>								
MTBE		<1	<10	<5	<3	<3	<1	<1
Benzene	950	<1	<10	<5	<3	<3	<1	<1
Toluene		<1	11	5	770	150	39	<1
Ethylbenzene		<1	<10	<5	<3	<3	<1	<1
m+p-xylene		<2	<20	<10	<6	<6	<2	<2
o-xylene	350	<1	<10	<5	<3	<3	<1	<1
Naphthalene		<1	<10	<5	<3	<3	<1	<1
<b>Total Recoverable Hydrocarbons (µg/L)</b>								
TRH C6 - C9		<10	<100	<100	1000	200	51	<10
TRH C6 - C10		<10	<100	<100	1000	220	55	<10
TRH C6 -C10 less BTEX (F1)		<10	<100	<100	260	70	16	<10
TRH C10 - C14		<50	220	<50	360	170	57	<50
TRH C15 - C28		<100	<100	<100	240	1700	270	110
TRH C29 - C36		330	<100	<100	210	2100	470	140
TRH >C10 - C16		<50	92	<50	300	200	<50	<50
TRH >C10 -C16 less N (F2)		<50	92	<50	300	200	<50	<50
TRH >C16 - C34		280	100	140	380	3400	670	210
TRH >C34 - C40		220	<100	<100	100	800	160	<100
<b>PAHs in water (µg/L)</b>								
Naphthalene	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Microbial Testing</b>								
Faecal Enterococci (cfu/100mL)	<1cfu/100ml <sup>1)</sup>	N/A	30	10	<10	<10	<10	10
Thermotolerant Coliforms	<1cfu/100ml <sup>1)</sup>	N/A	<10	<10	<10	<10	<10	<10
E.coli	<1cfu/100ml <sup>1)</sup>	N/A	<10	<10	<10	<10	<10	<10

<sup>1)</sup> Practical Quantitation Limit (POL) defined as the lowest concentration at which an analyte can be detected in a sample within a reasonable degree of accuracy and precision.

<sup>2)</sup> ANZECC and ARMCANZ (2000) Trigger values for toxicants in freshwater ecosystems at 95% level of protection, stated otherwise; target exceedance printed in red.

<sup>3)</sup> ANZECC and ARMCANZ (2000) Trigger values for South-west Australia for slightly-disturbed wetlands ecosystems; target exceedance printed in red.

<sup>4)</sup> ADWG (2011) Drinking water aesthetic value

# REPORT ITEM DIS245 REFERS

SB08

Parameters	Guideline	27/02/2018	30/05/2018	4/09/2018	28/11/2018	26/02/2019	28/05/2019	28/08/2019
<b>Physico-chemical</b>								
pH	7 to 8.5 <sup>3)</sup>	N/A	4.56	4.41	-	6.28	5.22	4.38
pH lab	7 to 8.5 <sup>3)</sup>	N/A	-	-	4.60	6.40	5.30	4.40
Electrical Conductivity (uS/cm)	<1500 <sup>3)</sup>	N/A	217	1200	888	1010	525	1020
Electrical Conductivity lab (uS/cm)	<1500 <sup>3)</sup>	N/A	350	1400	920	930	500	1600
Dissolved Oxygen (mg/L)		N/A	4.68	2.57	5.72	2.42	1.16	5.86
Total Dissolved Solids (g/L)	<1000mg/L <sup>3)</sup>	N/A	0.14	0.77	0.565	0.645	0.336	0.653
BOD (mg/L)		N/A	50	23	82	-	480	36
<b>Nutrients (mg/L)</b>								
TN	<1.5 <sup>3)</sup>	N/A	7.1	11	13	110	79	9.5
NO <sub>2</sub> _N	<0.1 <sup>3)</sup>	N/A	<0.005	<0.05	<0.05	<0.1	<0.1	<0.025
NO <sub>3</sub> _N	<0.1 <sup>3)</sup>	N/A	<0.5	<0.05	<0.05	<0.005	<0.1	<0.005
NH <sub>3</sub> _N	<0.04 <sup>3)</sup>	N/A	0.69	0.24	4	55	14	0.2
TP	<0.06 <sup>3)</sup>	N/A	<0.05	0.33	0.52	16	1.1	0.25
PO <sub>4</sub> _P	<0.03 <sup>3)</sup>	N/A	<0.005	0.075	0.21	1.9	0.4	0.098
<b>Dissolved Metals (mg/L)</b>								
Aluminium, Al	<0.055 <sup>2)</sup>	N/A	4.8	5.5	4.5	8.2	6.9	5.5
Arsenic, As	<0.013 <sup>2)</sup>	N/A	<0.001	0.002	0.004	0.008	0.004	0.003
Cadmium, Cd	<0.0002 <sup>2)</sup>	N/A	<0.0001	0.0001	<0.0001	0.0016	0.0002	0.0001
Chromium(VI), Cr <sup>6</sup>	<0.001 <sup>2)</sup>	N/A	0.01	0.007	0.013	0.04	0.024	0.008
Copper, Cu	<0.0014 <sup>2)</sup>	N/A	<0.001	0.003	0.001	0.007	0.002	<0.001
Iron, Fe	<0.3 <sup>3)</sup>	N/A	1.4	2.4	2.7	2.5	2.1	4.2
Mercury		N/A	<0.00005	<0.00005	<0.00005	0.00013	0.00013	<0.00026
Manganese, Mn	<1.9 <sup>2)</sup>	N/A	0.012	0.041	0.048	0.038	0.03	0.043
Nickel		N/A	0.001	0.001	0.002	0.002	<0.001	<0.001
Lead Pb	<0.008 <sup>2)</sup>	N/A	<0.001	<0.001	0.036	0.004	0.001	<0.001
Zinc, Zn	<0.008 <sup>2)</sup>	N/A	0.039	0.031	<0.001	0.064	0.02	0.034
<b>Alkalinity (mg/L)</b>								
Bicarbonate HCO <sub>3</sub> as CaCO <sub>3</sub>		N/A	<5	<5	9	190	46	<5
Carbonate CO <sub>3</sub> 2- as CaCO <sub>3</sub>		N/A	<5	<5	<5	<5	<5	<5
Hydroxide OH- as CaCO <sub>3</sub>		N/A	<5	<5	<5	<5	<5	<5
Total Alkalinity as CaCO <sub>3</sub>	200 <sup>4)</sup>	N/A	<5	<5	9	190	46	<5
<b>MBTEXN (µg/L)</b>								
MTBE		<1	<10	<5	<3	<3	<3	<10
Benzene	950	<1	<10	<5	<3	<3	<3	<10
Toluene		<1	11	5	210	980	310	35
Ethylbenzene		<1	<10	<5	<3	<3	<3	<10
m+p-xylene		<2	<20	<10	<6	<6	<6	<20
o-xylene	350	<1	<10	<5	<3	<3	<3	<10
Naphthalene		<1	<10	<5	<3	<3	<3	<10
<b>Total Recoverable Hydrocarbons (µg/L)</b>								
TRH C6 - C9		<10	<100	<100	280	990	540	<2000
TRH C6 - C10		<10	<100	<100	290	1100	580	<2000
TRH C6-C10 less BTEX (F1)		<10	<100	<100	84	140	270	<2000
TRH C10 - C14		N/A	85	<50	260	760	190	60
TRH C15 - C28		N/A	190	<100	140	10000	450	<100
TRH C29 - C36		N/A	130	<100	<100	5300	450	<100
TRH >C10 - C16		N/A	74	<50	230	990	200	50
TRH >C10 -C16 less N (F2)		N/A	74	<50	230	990	200	50
TRH >C16 - C34		N/A	270	<100	160	16000	840	130
TRH >C34 - C40		N/A	<100	<100	<100	1600	<100	<100
<b>PAHs in water (µg/L)</b>								
Naphthalene	16	<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Acenaphthylene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Acenaphthene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Fluorene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Phenanthrene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Anthracene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Fluoranthene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Pyrene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Benzo(a)anthracene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Chrysene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Benzo(b,j+k)fluoranthene		<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2
Benzo(a)pyrene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Dibenzo(a,h)anthracene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Benzo(g,h,i)perylene		<0.1	<0.1	<0.1	<0.1	<0.8	<0.1	<0.1
Benzo(a)pyrene TEQ		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Microbial Testing (cfu/100mL)</b>								
Faecal Enterococci	<1cfu/100ml <sup>1)</sup>	N/A	<10	90	-	<100	<10	70
Thermotolerant Coliforms	<1cfu/100ml <sup>1)</sup>	N/A	<10	80	-	<100	<10	30
E.coli	<1cfu/100ml <sup>1)</sup>	N/A	<10	80	-	<100	<10	20

<sup>1)</sup> Practical Quantitation Limit (PQL) defined as the lowest concentration at which an analyte can be detected in a sample within a reasonable degree of accuracy and precision.

<sup>2)</sup> ANZECC and ARMCANZ (2000) Trigger values for toxicants in freshwater ecosystems at 95% level of protection, stated otherwise; target exceedance printed in red.

<sup>3)</sup> ANZECC and ARMCANZ (2000) Trigger values for South-west Australia for slightly-disturbed wetlands ecosystems; target exceedance printed in red.

<sup>4)</sup> ADWG (2011) Drinking water aesthetic value

# REPORT ITEM DIS245 REFERS

SB09

Parameters	Guideline	27/02/2018	30/05/2018	4/09/2018	28/11/2018	26/02/2019	28/05/2019	28/08/2019
<b>Physico-chemical</b>								
pH	7 to 8.5 <sup>3)</sup>	4.03	6.28	5.86	-	5.85	5.43	5.33
pH lab	7 to 8.5 <sup>3)</sup>	-	-	-	5.80	5.60	5.70	5.60
Electrical Conductivity (uS/cm)	<1500 <sup>3)</sup>	296	250	390	322	263	275	206
Electrical Conductivity lab (uS/cm)	<1500 <sup>3)</sup>	-	280	320	260	250	260	300
Dissolved Oxygen (mg/L)		2.22	4.84	4.6	5.54	2.05	0.8	4.95
Total Dissolved Solids (g/L)	<1000mg/L <sup>3)</sup>	0.192	0.161	0.25	0.208	0.171	0.179	0.132
BOD (mg/L)		-	6	7	<5	8	<5	<5
<b>Nutrients (mg/L)</b>								
TN	<1.5 <sup>3)</sup>	1.1	0.4	1	0.5	0.9	0.5	0.7
NO2_N	<0.1 <sup>3)</sup>	<0.005	<0.5	<0.05	<0.005	<0.005	<0.005	<0.005
NO3_N	<0.1 <sup>3)</sup>	<0.005	<0.005	<0.05	<0.005	0.016	0.005	<0.005
NH3_N	<0.04 <sup>3)</sup>	0.11	0.13	0.1	0.26	0.51	0.074	0.12
TP	<0.06 <sup>3)</sup>	<0.05	<0.05	<0.05	<0.05	0.14	<0.05	<0.05
PO4_P	<0.03 <sup>3)</sup>	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.005
<b>Dissolved Metals (mg/L)</b>								
Aluminium, Al	<0.055 <sup>2)</sup>	1.2	0.04	0.09	<0.01	<0.01	0.02	0.09
Arsenic, As	<0.013 <sup>2)</sup>	0.006	0.003	0.002	<0.001	0.002	0.001	0.002
Cadmium, Cd	<0.0002 <sup>2)</sup>	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium(VI), Cr <sup>6</sup>	<0.001 <sup>2)</sup>	0.003	<0.001	0.001	<0.001	<0.001	<0.001	0.001
Copper, Cu	<0.0014 <sup>2)</sup>	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron, Fe	<0.3 <sup>3)</sup>	2.8	5.6	6.3	1.3	0.96	1.6	4.9
Mercury		<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.0001	0.00034
Manganese, Mn	<1.9 <sup>2)</sup>	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead Pb	<0.008 <sup>2)</sup>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc, Zn	<0.008 <sup>2)</sup>	0.069	0.006	0.006	0.003	0.008	0.004	0.008
<b>Alkalinity (mg/L)</b>								
Bicarbonate HCO3 as CaCO3		N/A	25	19	26	16	22	18
Carbonate CO3 2- as CaCO3		N/A	<5	<5	<5	<5	<5	<5
Hydroxide OH- as CaCO3		N/A	<5	<5	<5	<5	<5	<5
Total Alkalinity as CaCO3	200 <sup>4)</sup>	N/A	25	19	26	16	22	18
<b>MBTEXN (µg/L)</b>								
MTBE		<1	<1	<1	<1	<1	<1	<1
Benzene	950	<1	<1	<1	<1	<1	<1	<1
Toluene		<1	7	<1	<1	13	2	<1
Ethylbenzene		<1	<1	<1	<1	<1	<1	<1
m+p-xylene		<2	<2	<2	<2	<2	<2	<2
o-xylene	350	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<1	<1	<1	<1	<1	<1	<1
<b>Total Recoverable Hydrocarbons (µg/L)</b>								
TRH C6 - C9		<10	<10	<10	<10	20	<10	<10
TRH C6 - C10		<10	<10	<10	<10	26	<10	<10
TRH C6-C10 less BTEX (F1)		<10	<10	<10	<10	13	<10	<10
TRH C10 - C14		<50	66	<50	<50	<50	<50	<50
TRH C15 - C28		<100	140	<100	<100	180	<100	120
TRH C29 - C36		<100	<100	<100	<100	<100	<100	<100
TRH >C10 - C16		<50	69	<50	<50	<50	<50	<50
TRH >C10 -C16 less N (F2)		<50	69	<50	<50	<50	<50	<50
TRH >C16 - C34		<100	140	<100	<100	190	100	130
TRH >C34 - C40		<100	<100	<100	<100	<100	<100	<100
<b>PAHs in water (µg/L)</b>								
Naphthalene	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Microbial Testing (cfu/100mL)</b>								
Faecal Enterococci	<1cfu/100ml <sup>1)</sup>	N/A	<10	10	<10	<10	<10	<10
Thermotolerant Coliforms	<1cfu/100ml <sup>1)</sup>	N/A	<10	<10	<10	<10	<10	10
E.coli	<1cfu/100ml <sup>1)</sup>	N/A	<10	<10	<10	<10	<10	10

<sup>1)</sup> Practical Quantitation Limit (PQL) defined as the lowest concentration at which an analyte can be detected in a sample within a reasonable degree of accuracy and precision.

<sup>2)</sup> ANZECC and ARMCANZ (2000) Trigger values for toxicants in freshwater ecosystems at 95% level of protection, stated otherwise; target exceedance printed in red.

<sup>3)</sup> ANZECC and ARMCANZ (2000) Trigger values for South-west Australia for slightly-disturbed wetlands ecosystems; target exceedance printed in red.

<sup>4)</sup> ADWG (2011) Drinking water aesthetic value

SB12

Parameters	Guideline	27/02/2018	30/05/2018	4/09/2018	28/11/2018	26/02/2019	28/05/2019	28/08/2019
<b>Physico-chemical</b>								
pH	7 to 8.5 <sup>3)</sup>	N/A	N/A	7.52	N/A	N/A	N/A	N/A
pH lab	7 to 8.5 <sup>3)</sup>	N/A	N/A	-	N/A	N/A	N/A	N/A
Electrical Conductivity (uS/cm)	<1500 <sup>3)</sup>	N/A	N/A	80	N/A	N/A	N/A	N/A
Electrical Conductivity lab (uS/cm)	<1500 <sup>3)</sup>	N/A	N/A	160	N/A	N/A	N/A	N/A
Dissolved Oxygen (mg/L)		N/A	N/A	2.7	N/A	N/A	N/A	N/A
Total Dissolved Solids (g/L)	<1000mg/L <sup>3)</sup>	N/A	N/A	0.05	N/A	N/A	N/A	N/A
BOD (mg/L)		N/A	N/A	13	N/A	N/A	N/A	N/A
<b>Nutrients (mg/L)</b>								
TN	<1.5 <sup>3)</sup>			13	N/A	N/A	N/A	N/A
NO <sub>2</sub> _N	<0.1 <sup>3)</sup>	N/A	N/A	<0.005	N/A	N/A	N/A	N/A
NO <sub>3</sub> _N	<0.1 <sup>3)</sup>	N/A	N/A	0.12	N/A	N/A	N/A	N/A
NH <sub>3</sub> _N	<0.04 <sup>3)</sup>	N/A	N/A	0.15	N/A	N/A	N/A	N/A
TP	<0.06 <sup>3)</sup>	N/A	N/A	0.16	N/A	N/A	N/A	N/A
PO <sub>4</sub> _P	<0.03 <sup>3)</sup>			0.009	N/A	N/A	N/A	N/A
<b>Alkalinity (mg/L)</b>								
Bicarbonate HCO <sub>3</sub> as CaCO <sub>3</sub>		N/A	N/A	35	N/A	N/A	N/A	N/A
Carbonate CO <sub>3</sub> 2- as CaCO <sub>3</sub>		N/A	N/A	<5	N/A	N/A	N/A	N/A
Hydroxide OH- as CaCO <sub>3</sub>		N/A	N/A	<5	N/A	N/A	N/A	N/A
Total Alkalinity as CaCO <sub>3</sub>	200 <sup>4)</sup>	N/A	N/A	35	N/A	N/A	N/A	N/A
<b>Dissolved Metals (mg/L)</b>								
Aluminium, Al	<0.055 <sup>2)</sup>	N/A	N/A	0.2	N/A	N/A	N/A	N/A
Arsenic, As	<0.013 <sup>2)</sup>	N/A	N/A	<0.001	N/A	N/A	N/A	N/A
Cadmium, Cd	<0.0002 <sup>2)</sup>	N/A	N/A	<0.0001	N/A	N/A	N/A	N/A
Chromium(VI), Cr <sup>6</sup>	<0.001 <sup>2)</sup>	N/A	N/A	<0.001	N/A	N/A	N/A	N/A
Copper, Cu	<0.0014 <sup>2)</sup>	N/A	N/A	<0.001	N/A	N/A	N/A	N/A
Iron, Fe	<0.3 <sup>3)</sup>	N/A	N/A	0.13	N/A	N/A	N/A	N/A
Mercury		N/A	N/A	<0.00005	N/A	N/A	N/A	N/A
Manganese, Mn	<1.9 <sup>2)</sup>	N/A	N/A	<0.005	N/A	N/A	N/A	N/A
Nickle		N/A	N/A	<0.001	N/A	N/A	N/A	N/A
Lead Pb	<0.008 <sup>2)</sup>	N/A	N/A	<0.001	N/A	N/A	N/A	N/A
Zinc, Zn	<0.008 <sup>2)</sup>	N/A	N/A	0.003	N/A	N/A	N/A	N/A
<b>MBTEXN (µg/L)</b>								
MTBE		N/A	N/A	<1	N/A	N/A	N/A	N/A
Benzene	950	N/A	N/A	<1	N/A	N/A	N/A	N/A
Toluene		N/A	N/A	<1	N/A	N/A	N/A	N/A
Ethylbenzene		N/A	N/A	<1	N/A	N/A	N/A	N/A
m+p-xylene		N/A	N/A	<2	N/A	N/A	N/A	N/A
o-xylene	350	N/A	N/A	<1	N/A	N/A	N/A	N/A
Naphthalene		N/A	N/A	<1	N/A	N/A	N/A	N/A
<b>Total Recoverable Hydrocarbons (µg/L)</b>								
TRH C6 - C9		N/A	N/A	<10	N/A	N/A	N/A	N/A
TRH C6 - C10		N/A	N/A	<10	N/A	N/A	N/A	N/A
TRH C6-C10 less BTEX (F1)		N/A	N/A	<10	N/A	N/A	N/A	N/A
TRH C10 - C14		N/A	N/A	<50	N/A	N/A	N/A	N/A
TRH C15 - C28		N/A	N/A	<100	N/A	N/A	N/A	N/A
TRH C29 - C36		N/A	N/A	<100	N/A	N/A	N/A	N/A
TRH >C10 - C16		N/A	N/A	<50	N/A	N/A	N/A	N/A
TRH >C10 - C16 less N (F2)		N/A	N/A	<50	N/A	N/A	N/A	N/A
TRH >C16 - C34		N/A	N/A	<100	N/A	N/A	N/A	N/A
TRH >C34 - C40		N/A	N/A	<100	N/A	N/A	N/A	N/A
<b>PAHs in water (µg/L)</b>								
Naphthalene	16	N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Acenaphthylene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Acenaphthene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Fluorene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Phenanthrene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Anthracene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Fluoranthene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Pyrene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Benzo(a)anthracene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Chrysene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Benzo(b,j+k)fluoranthene		N/A	N/A	<0.2	N/A	N/A	N/A	N/A
Benzo(a)pyrene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Indeno(1,2,3-c,d)pyrene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Dibenzo(a,h)anthracene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Benzo(g,h,i)perylene		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
Benzo(a)pyrene TEQ		N/A	N/A	<0.5	N/A	N/A	N/A	N/A
Total +ve PAHs		N/A	N/A	<0.1	N/A	N/A	N/A	N/A
<b>Microbial Testing (cfu/100mL)</b>								
Faecal Enterococci	<1cfu/100ml <sup>1)</sup>	N/A	N/A	330	N/A	N/A	N/A	N/A
Thermotolerant Coliforms	<1cfu/100ml <sup>1)</sup>	N/A	N/A	12000	N/A	N/A	N/A	N/A
E.coli	<1cfu/100ml <sup>1)</sup>	N/A	N/A	8000	N/A	N/A	N/A	N/A

<sup>1)</sup> Practical Quantitation Limit (PQL) defined as the lowest concentration at which an analyte can be detected in a sample within a reasonable degree of accuracy and precision.

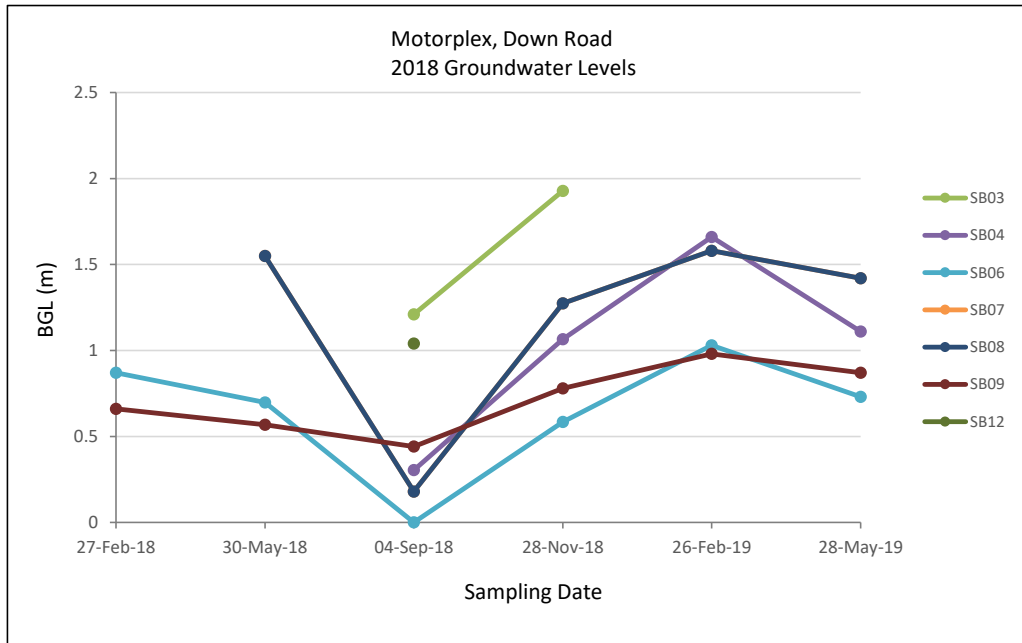
<sup>2)</sup> ANZECC and ARMCANZ (2000) Trigger values for toxicants in freshwater ecosystems at 95% level of protection, stated otherwise; target exceedance printed in red.

<sup>3)</sup> ANZECC and ARMCANZ (2000) Trigger values for South-west Australia for slightly-disturbed wetlands ecosystems; target exceedance printed in red.

<sup>4)</sup> ADWG (2011) Drinking water aesthetic value

# REPORT ITEM DIS245 REFERS

	27/02/2018	30/05/2018	4/09/2018	28/11/2018	26/02/2019	28/05/2019	28/08/2019
SB03			1.21	1.928			1.45
SB04			0.304	1.066	1.660	1.11	0.37
SB06	0.87	0.698	0	0.585	1.030	0.73	0.06
SB07	0.64	0.535	0.44	0.64	0.950	0.58	0.52
SB08		1.55	0.18	1.274	1.580	1.42	0.38
SB09	0.66	0.568	0.441	0.78	0.980	0.87	0.61
SB12			1.04				1.1
DB1						7.1	6.95



## Appendix B – Shallow soil profile description

**Soil Profile Sampling**



**Location:** Lot 5780 Down Road  
**Date tested:** 27/02/2018  
**Sampled by:** Kathryn Kinnear  
**Weather:** Windy, cool 21 degrees Overcast

<u>Location</u>	<u>Site description</u>	<u>Depth of profile (mm)</u>	<u>Soil Description</u>
SB1	South west corner Open Paddock	0-150 150-300 300-500  500-1200 1200-1500  1500-2000	Dark grey sandy top soil, veg matter. Grey silty sand. Orange, light brown sandy gravel pebbles 10-30mm. Laterite rock . Light brown pebbles 10-30mm, orange sandy silty gravel. Light brown sandy clay, slightly moist. No WT.
SB02	Paddock near creek west side Jarrah/Cas/Marri Forrest adjacent	0-50 50-200 200-800 800-1200 1200-1500 1500-2000  2000-2500	Dark grey sandy top soil, veg matter. Grey sandy silt. Light grey sandy silt, slightly moist. Cream sandy silt, slightly moist Laterite rock. Moist light brown orange sandy silt gravel, pebbles 10-30mm, minor clay. Light grey silty sand. No WT.
SB03	Open paddock North in minor Drainage swale	0-50 50-500 500-1000 1000-1200 1200-1600 1600-1800 1800-2000	Light brown slightly moist silty sand top soil, veg matter. Light brown silty gravel, pebbles 5-10mm. Brown silty gravel pebbles 20-30mm. Dark brown gravelly silt pebbles 20-30mm. Grey silty sand. Light grey moist silty sand. Light brown/orange silty sand, gravel pebbles 10-30mm. No WT.
SB04	Paddock near Creek in Depression area.	0-50 50-200 700-900 900-1300  1300-1500 1500-1800 1800-2000	Dark brown peaty organic matter. Dark grey silty sand slightly moist. Light grey silty sand moist. Laterite rock, moist dark brown gravelly silt (coffee rock) mottled orange. Light brown silty clay wet. Light grey moist clay. White clay not wet. No WT.
SB05	North paddock Area	0-50 50-200 200-700 700-900 900-1500  1500-1800 1800-1900 1900-2000	Slightly moist dark brown peaty sandy silt top soil, veg matter. Dry dark grey silty sand. Dry light grey silty sand. Dry gravelly silty sand orange pebbles. Dry cream quartz gravelly silty sand pebbles 30-50mm. Pink/orange silty sand gravel, cemented compacted gavel pebbles 10-30mm. Moist dark clayey sand. Dry compacted silty gravel orange/pink. No WT.

## REPORT ITEM DIS245 REFERS

<u>Location</u>	<u>Site description</u>	<u>Depth of profile (mm)</u>	<u>Soil Description</u>
SB06	Near creek North side In reed beds	0-100 100-400 400-700 700-1800 1800-2000	Dark brown peaty organic matter moist. Dark grey silty sand moist. Grey silty sand moist. Light grey silty sand wet (smell). Wet brown silty sand (smell) WT 870mm BGL
SB07	Near creek Crossing North side	0-200 200-400 400-600 600-1800 1800-2000	Dark brown/black peaty moist. Black/dark grey peaty sand moist. Dark grey silty sand moist. Light brown silty sand smell. Cream wet silty sand smell. WT 640mm BGL
SB08	Mid creek near dam	0-50 50-200 200-500 500-900 900-1200 1200-1400 1400-1800 1800-2000	Slightly moist dark brown peaty silt, veg matter. Dark brown sandy peaty silt moist. Dark grey silty sand moist. Grey slightly moist silty sand. Dark brown cemented silt, coffee rock. Dark grey moist to wet silty sand. Grey silty sand wet. Dark brown silt minor pebbles 10mm. No WT.
SB09	South side of creek	0-50 50-200 200-600 600-700 700-1100 1100-1300 1300-2000	Dark brown peaty organic matter moist. Dark grey silty sand. Grey silty sand. Light brown gravelly silt. Laterite rock. Wet silt pebbles 30-40mm. White moist clayey silt. WT 660mm BGL
SB010	South boundary east of bush line in paddock	0-50 50-300  300-500  500-1200  1200-2000	Brown silty sand organic matter dry. Brown silty sand gravels 40-50mm, boulders 200mm Laterite, dry. Brown/orange silty sandy gravel cemented Laterite. Light brown/orange cemented silt. White mottles sandstone dry. Light brown/orange cemented silt. White mottles sandstone dry. No WT.
SB011	Mid paddock, top of hill eastern side of site	0-50 50-300 300-400 400-1200 1200-1800 1800-2000	Dark brown silty sand dry. Grey silty sand dry. Light brown silty gravel pebble 30-50mm. Light brown cemented silt Laterite. Light brown, mottles pink * white clay dry. Orange mottled red dry clay. No WT.
SB012		0-400 400-1000 1000-1500 1500-1800  1800-2000	Grey sandy silt organic matter dry. Light grey silty sand. Cream silty sand slightly moist. Dark brown sandy silt, slightly moist gravel minor pebbles. Light brown silty clayey slightly moist boulder Laterite gravels 40mm. No WT.



## Appendix C – Deep bore log

# REPORT ITEM DIS245 REFERS

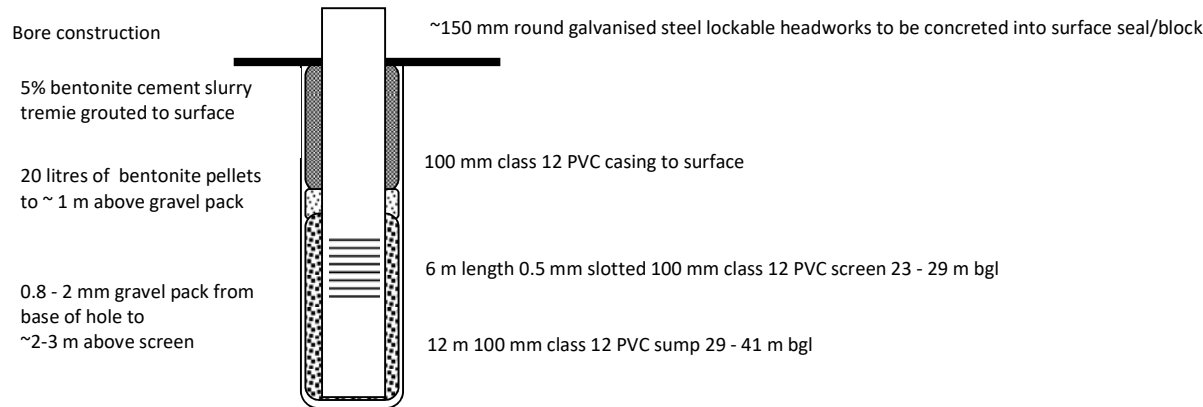
Bore ID: Down Road Motorsports complex site  
 Driller: Phil Putland, WA Drilling  
 Method: Mud rotary, ~200 mm bit  
 Logged by: Andrew Maughan

From (m)	To (m)	Lithology	Lithological Description	Geology	Aquifers
0	2	SAND, GRAVEL, SANDY CLAY	Topsoil and laterite, sandy clay, orange-brown	Pallinup Formation, Siltstone facies	Possible surficial aquifer, seasonally saturated
3	5	SANDY CLAY	Clay with medium sand, light orange-brown		
6	9	CLAYEY SAND	Clay with medium - fine sand, light orange-brown		
10	12	SILTY SANDY CLAY	Clay with medium - fine sand and silt, light yellow-brown and grey		
13	28	SILTSTONE/SANDSTONE	Consolidated silt and fine sand, with minor very fine sand from 13 m grading to minor medium sand to 28 m (fining-upwards sequence), grey 13-14 m, light red-brown 15-28 m with some ~orange/red-white banding. Sand grains sub-rounded. Drilled as sand with v. minor consolidated chips. Silt was minor to not evident in cuttings but possibly suspended in drilling fluid.	Werillup Formation, Werillup Clay	Semi-confined Pallinup aquifer
29	32	CLAY	Clay, dark grey		
32	40	CLAY AND SHALE/SILTSTONE	Clay interbedded with bands of very fine sand/siltstone or shale, dark grey. Shale/siltstone bands drilling as chips ~1-2 mm to max 5 mm.	Proterozoic Granite	Werillup aquitard
EoH	41	GRANITE	Apparent basement granite. Rig refusal. No weathered granite profile returned from cuttings which is very uncommon and difficult to explain. Initially unsure whether very hard sandstone however the minor cuttings returned were angular quartz and some mica with no chips of consolidated silt/sand - suggesting igneous/crystalline granitic rock.		

Airlifted for only ~ 1/2 hour and apparently cleaned up fairly quickly. Then pumped with submersible at 2 l/s for several hours. Some silt still evident in discharge suggesting bore not developed for long enough, although pump is placed in sump which may have accumulated silt.

SWL = TBA. Maybe 1.5 m bgl  
 Drawdown = TBA. Possibly to ~21 m, so 19.5 m  
 EC = 1090 µs/cm ~ 600 mg/L TDS  
 pH = 5.5

Bore construction



## Appendix D – Revegetation species list

Source: *Albany Regional Vegetation Survey Extent, Type and Status Report* (E.M. Sandiford & S.Barrett 2010)

### Unit 13

#### Floristic Summary

Lifeform	%cover	Species
Trees <10m	S	<i>Allocasuarina fraseriana</i> , <i>Eucalyptus marginata</i> , <i>Eucalyptus staeri</i> , <i>Banksia attenuata</i> , <i>Banksia ilicifolia</i>
Shrubs >2m	V	<i>Banksia grandis</i> , <i>Taxandria parviceps</i> , <i>Hakea ruscifolia</i> , <i>Persoonia longifolia</i> , <i>Beaufortia decussata</i>
Shrubs 1-2m	V-M	<i>Isopogon longifolia</i> , <i>Melaleuca thymoides</i> , <i>Agonis theiformis</i> , <i>Gompholobium scabrum</i> , <i>Isopogon formosus</i> , <i>Acacia myrtifolia</i>
Shrubs 0.5-1m	V-M	<i>Adenanthos cuneatus</i> , <i>Xanthosia rotundifolia</i> , <i>Leucopogon glabellus</i> , <i>Allocasuarina humilis</i> , <i>Daviesia flexuosa</i> , <i>Daviesia incrassata</i> , <i>Tetratheca setigera</i> , <i>Hypocalymma strictum</i> , <i>Beaufortia anisandra</i> , <i>Leptomeria squarrolosa</i> , <i>Gompholobium knightianum</i> , <i>Gompholobium venustum</i> , <i>Acacia browniana</i> , <i>Acacia luteola</i> , <i>Acacia robiniae</i> , <i>Xanthorrhoea preissii</i> , <i>Adenanthos obovatus</i>
Shrubs <0.5m	V	<i>Astroloma baxteri</i> , <i>Petrophile rigida</i> , <i>Boronia spathulata</i> , <i>Boronia crenulata</i> , <i>Dampiera pedunculata</i> , <i>Synaphea polymorpha</i> , <i>Hibbertia depressa</i> , <i>Dampiera leptoclada</i> , <i>Rinzia schollerifolia</i> , +/- <i>Banksia goodii</i>
Sedges/rushes	M	<i>Anarthria scabra</i> , <i>Cyathochaeta equitans</i> , <i>Tricostularia neesii</i> var <i>elatior</i> , <i>Lepidosperma densiflora</i> , <i>Hypolaena exsulca</i> , <i>Desmocladus fasciculatus</i> , <i>Anarthria prolifera</i> , <i>Mesomelaena gracilipes</i> , <i>Schoenus sublateralis</i> , <i>Schoenus caespititius</i> , <i>Mesomelaena tetragona</i>
Herbs	V	<i>Dasyopogon bromeliifolius</i> , <i>Conostylis setigera</i> , <i>Conostylis serrulata</i> , <i>Conospermum caeruleum</i> , <i>Stylidium scandens</i> , <i>Logania serpyllifolia</i> , <i>Scaevola striata</i> , <i>Lindsaea linearis</i> , <i>Patersonia umbrosa</i>

### Unit 47

#### Floristic Summary

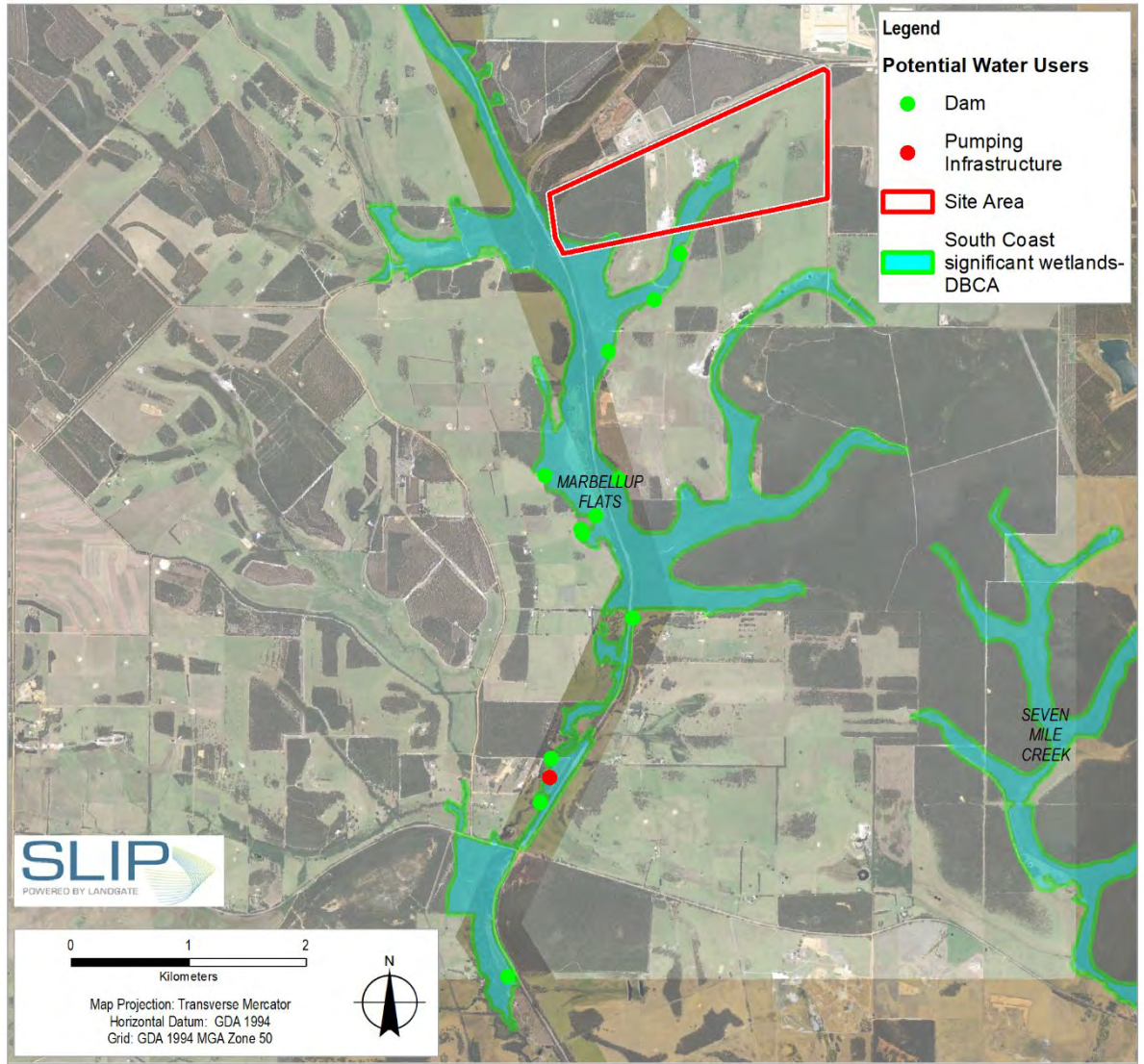
Lifeform	%cover	Species
Trees	Nil-E	<i>Melaleuca preissiana</i> , <i>Eucalyptus megacarpa</i>
Shrubs >2m	S-D	<i>Homalospermum firmum</i> , <i>Callistemon glaucus</i> , <i>Hakea linearis</i> , <i>Taxandria linearifolia</i> , <i>Taxandria parviceps</i> +/- <i>Callistachys lanceolata</i> , <i>Rhadinothamnus anceps</i>
Shrubs 1-2m	S-M	<i>Acacia hastulata</i> , <i>Hypocalymma cordatum</i> , <i>Boronia crassipes</i> , <i>Sphaerolobium rosulatum</i> , <i>Boronia stricta</i> , <i>Sphaerolobium fornicatum</i>
Shrubs <0.5m		<i>Dampiera leptoclada</i> , <i>Sphenotoma gracilis</i> , <i>Astartea corniculata</i>
Sedges/rushes	D	<i>Empodisma gracillimum</i> , <i>Gymnoschoenus anceps</i> , <i>Schoenus multiglumis</i> , <i>Leptocarpus tenax</i> , <i>Gahnia decomposita</i> , <i>Lepidosperma striatum</i> , <i>Baumea rubiginosa</i> , <i>Schoenus sublaxus</i> , <i>Baumea acuta</i>
Herbs	V	<i>Xyris lanata</i> , <i>Xyris lacera</i> , <i>Cephalotus follicularis</i> , <i>Lycopodium serpentinum</i> , <i>Diaspasis filifolia</i> , <i>Stylidium assimile</i>

### Unit 49

#### Floristic Summary

Lifeform	%cover	Species
Trees	E-S	<i>Melaleuca preissiana</i> +/- <i>Banksia littoralis</i>
Shrubs >2m	M	<i>Aotus intermedia</i> , <i>Homalospermum firmum</i> , <i>Callistemon glaucus</i> , <i>Hakea ceratophylla</i> , <i>Taxandria linearifolia</i> , <i>Taxandria parviceps</i>
Shrubs 0.5-1m	V	<i>Sphenotoma gracilis</i> , <i>Sphaerolobium hygrophilum</i> , <i>Astartea corniculata</i>
Sedges/rushes	M	<i>Leptocarpus tenax</i> , <i>Schoenus efoliatus</i> , <i>Evandra aristata</i> , <i>Anarthria prolifera</i> , <i>Cyathochaeta avenacea</i> , <i>Lepidosperma striatum</i> , <i>Baumea juncea</i> , <i>Lepidosperma</i> sp Down Rd Fan
Herbs		<i>Xyris lanata</i>

# Appendix E – Potential water users



C:\Users\HECHILD\Desktop\Albany\job.mxd

Data source: Created by hechild

## Appendix F – AMP risk assessment

**Albany Motorsport Park Drinking Water Quality Risk Register**  
**Risk Assessment Matrix**

Item No.	Source / Cause	Scenario / Event Description	Hazard	Existing controls	Likelihood	Consequence	Significance of Risk	Proposed controls	Likelihood	Consequence	Significance of Risk	Action	Responsibility	Critical Control Points	Comments
1.01	Compliance	Changes in water quality due to development; both groundwater and surface water not measured over time	Various	1. Preliminary groundwater investigation and shallow bore installation	2	3	6 Med	1. Finish preliminary investigation by installing deep bores 2. Regular groundwater monitoring program and reporting to Department of Water and/or City of Albany	1	3	3 Low				
1.02	Groundwater contamination	Lack of understanding of existing hydrology/hydrogeology (baseline data)	Chemical / Unexpected Water Quality	N/A - site undeveloped				1. Further geotechnical investigations, with deeper bores drilled to improve hydrogeological site understanding 2. Continual monitoring and inspection as per approved plan	1	3	3 Low				
1.03	Groundwater contamination	Contamination during construction activities with chemicals or drilling mud	Chemical	N/A - site undeveloped				1. Only use approved contractors.	2	2	4 Med				
1.04	Water Quality	Sediment loading and erosion occurs during construction	Dirty water / Biological/Chemical	N/A - site undeveloped				1. Erosion and sediment control plan in place by contractor. 2. Use controls such as sediment fences, stockpile management, dust control etc. 3. Majority of construction to take place in summer if possible	1	3	3 Low				
1.05	Land use - agriculture	Groundwater source is contaminated with pesticides and agricultural chemicals from land use in the area, particularly catchments upstream of site	Chemical	1. Sites regulated by development approvals 2. Zoning/planning restrictions for Mirambeena Strategic Industrial Area	1	3	3 Low	1. Increased fencing to keep cattle off property at Lot 5780 2. Revegetation of degraded areas of the site, particularly the creek/wetland and fringe	1	3	3 Low				
1.06	Land use - gardening and landscaping	Landscaping and gardening uses pesticides or fertilisers in close proximity to the wetland/creek	Chemical	N/A - site undeveloped				1. Buffer zones in place 2. Retain existing vegetation where possible 3. Targeted revegetation of degraded land areas 4. Use native vegetation for landscaping 5. Avoid the use of pesticides 6. Training of gardeners/maintenance personnel	1	3	3 Low				
1.07	Land use - waste facilities	Wastewater leaches into groundwater	Biological / Chemical	N/A - site undeveloped				1. Approved wastewater systems installed 2. Water Management Plan developed for the site 3. Temporary waste facilities used for larger events with waste taken off site for treatment, post-event 4. Install wastewater treatment systems on higher ground where there is atleast clearance to groundwater	1	3	3 Low				
1.08	Maintenance	Drainage system fails due to poor maintenance (e.g. Basin fills up with sediment over time)	Biological/Chemical	N/A - site undeveloped				1. Stormwater system designed to attenuate flows to pre-development levels 2. Stormwater management plan in place which specifies regular activities such as de-silting of sedimentation basins 2. Site walkover after large storm events in winter to check system function (optional)	1	3	3 Low				
1.09	Materials of construction	Materials of construction not suitable for contact with wetland/creek resulting in the introduction of contamination	Chemical	N/A - site undeveloped				1. Design and construction by competent contractors 2. Water quality monitoring throughout system 3. Avoid construction during winter months where rainfall is likely to wash materials downstream into wetland/creek	1	3	3 Low				

**Albany Motorsport Park Drinking Water Quality Risk Register  
Risk Assessment Matrix**

Item No.	Source / Cause	Scenario / Event Description	Hazard	Existing controls	Likelihood	Consequence	Significance of Risk	Proposed controls	Likelihood	Consequence	Significance of Risk	Action	Responsibility	Critical Control Points	Comments
1.1	Facility operations	Vehicle accidents, fuel and chemical spills, fires etc.	Biological/Chemical/Dirty Water	N/A - site undeveloped				1. Buffer zones in place 2. Incident management plan (e.g. portable bund kits available on site) 3. Emergency response plan also required	2	2	4 Med				
1.11	Facility operations	Vehicle washdown or refuelling does not take place in designated area	Biological/Chemical/Dirty Water	N/A - site undeveloped				1. Buffer zones in place 2. These activities to take place in designated areas that are double bunded and have water quality treatment controls in place (i.e. oil/water separators) 3. Incident management plan (e.g. portable bund kits available on site)	2	3	6 Med				
1.12	Facility operations	Trash enters wetland/creek	Gross-pollutants	N/A - site undeveloped				1. Temporary waste facilities for larger events 2. Facility waste management plan to be implemented 3. Adequate numbers of permanent bins placed around site	2	1	2 Low				
1.13	Stormwater	Flood event leading to ingress of dirty stormwater (i.e. high sediment loads and/or hydrocarbons) into wetland/creek	Dirty water / Biological/Chemical	N/A - site undeveloped				1. Stormwater drainage system designed to safely manage the critical 1% AEP event 2. Water quality monitoring program in place	1	2	2 Low				
1.14	Unauthorised access	Unauthorised person/s access site with vehicles for the purposes of hooning or vandalism	Various	1. Private property with padlocked gate	2	1	2 Low	1. Signage to deter persons from entering when the facility is not in use 2. Fenced/gated entrances once site is fully developed 3. Security for larger events if needed	1	1	1 Low				

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 166 Stirling Terrace  
 T: 61 8 9840 5100 F: 61 8 9463 6012 E: albmail@ghd.com

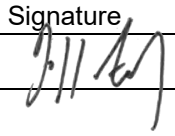
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[https://projects.ghd.com/oc/WesternAustralia1/albanymotorsportspar/Delivery/Documents/6137331-REP-A\\_Albanymotorsport LWMS.docx](https://projects.ghd.com/oc/WesternAustralia1/albanymotorsportspar/Delivery/Documents/6137331-REP-A_Albanymotorsport LWMS.docx)

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	P. Yoganthan C. Finneran	K. Hunt		J. Foley		22.01.20



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Mr Andrew Sharpe  
Chief Executive Officer  
City of Albany  
PO Box 484  
**ALBANY WA 6331**

Our Ref: CMS 17544  
Enquiries: Steve Pavey, 6364 6430  
Email: [Steve.Pavey@dwer.wa.gov.au](mailto:Steve.Pavey@dwer.wa.gov.au)

Dear Mr Sharpe

**DECISION UNDER SECTION 48A(1)(a)**  
***Environmental Protection Act 1986***

<b>SCHEME</b>	<b>City of Albany Local Planning Scheme 1 Amendment 35</b>
<b>LOCATION</b>	<b>Lot 5780 Down Road South, Drome.</b>
<b>RESPONSIBLE AUTHORITY</b>	<b>City of Albany</b>
<b>DECISION</b>	<b>Referral Examined, Preliminary Investigations and Inquiries Conducted. Scheme Amendment Not to be Assessed Under Part IV of the EP Act. No Advice Given. (Not Appealable)</b>

Thank you for referring the above scheme to the Environmental Protection Authority (EPA).

After consideration of the information provided by you, the EPA considers that the proposed scheme should not be assessed under Part IV Division 3 of the *Environmental Protection Act 1986* (EP Act) and that it is not necessary to provide any advice or recommendations. I have attached a copy of the Chairman's determination of the scheme.

Please note the following:

- For the purposes of Part IV of the EP Act, the scheme is defined as an assessed scheme. In relation to the implementation of the scheme, please note the requirements of Part IV Division 4 of the EP Act.
- There is no appeal right in respect of the EPA's decision to not assess the scheme.

A copy of the Chairman's determination will be made available to the public via the EPA website.

Yours sincerely

A handwritten signature in black ink, appearing to read 'A. Sutton', with a horizontal line extending from the end of the signature.

**Anthony Sutton**  
**Delegate of the Environmental Protection Authority**  
Executive Director  
EPA Services

8 October 2020

Encl. Chairman's Determination



Our Ref: D11412  
Your Ref: LAMD35

Adrian Nicoll  
City of Albany  
[planning@albany.wa.gov.au](mailto:planning@albany.wa.gov.au)

Dear Mr Nicoll

## **RE: PROPOSED SCHEME AMENDMENT NO. 35 – LOT 5780 DOWN ROAD SOUTH, DROME**

I refer to your email dated 16 August 2019 regarding the submission of a Bushfire Management Plan (BMP) (Version 3), prepared by Bio Diverse Solutions & Eco Logical Australia dated 23 May 2019, for the above local planning scheme amendment.

It should be noted that these comments relate only to *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7) and the *Guidelines for Planning in Bushfire Prone Areas* (Guidelines). It is the responsibility of the proponent to ensure that the proposal complies with all other relevant planning policies and building regulations where necessary. This advice does not exempt the applicant/proponent from obtaining necessary approvals that may apply to the proposal including planning, building, health or any other approvals required by a relevant authority under other written laws.

### **General Comments**

It is understood that the subject site is zoned 'Priority Agriculture Zone' and that the Scheme Amendment seeks to introduce tourism through motorsport-based recreation and incidental uses within the proposed 'Special Use Zone' of the subject site.

Consequently, the site's location adjacent to significant areas of vegetation which represents an extreme bushfire hazard requires an appropriate design response to reduce the vulnerability of visitors from the impact of bushfire. The concept plans for the future development, submitted in support of the Scheme Amendment, have not been designed to respond to SPP 3.7 or the findings of the bushfire risk assessment. It is on this basis that our comments are made.

### **Assessment**

At the Scheme Amendment level, consideration should be given to the introduction of tourism land uses and how they relate to identified bushfire hazards at this location. DFES is generally satisfied that the BMP has adequately identified issues arising from the bushfire risk assessment in support of the Scheme Amendment.

However, this does not indicate DFES support of the bushfire protection measures proposed within the BMP, as they are based on indicative conceptual designs which may be subject to change.

The following assessment is intended to guide subsequent planning stages (structure planning, subdivision and development).

**1. Policy Measure 6.3 c) Compliance with the Bushfire Protection Criteria**

Issue	Assessment	Action
<p><b>Vehicular Access</b></p>	<p><b>A3.1, A3.6 – Does not comply</b></p> <p>Access to two different destinations only becomes available approximately 4.3km from the subject site at the intersection of Down Road and Albany Highway.</p> <p>It is acknowledged that four options were explored and Option 4 was the applicant’s preferred option.</p> <p>However, the proposed Emergency Access Way (EAW) for Option 4 will far exceed the 600m maximum length specified in the Guidelines and be insufficient to safely accommodate the evacuation of up to 500 persons.</p> <p>DFES therefore does not support Option 4 and recommends Option 2 with access construction to the standard of a rural road as per the <i>IPWEA Local Government Guidelines for Subdivisional Development</i>. This would provide the necessary improvements to the public road network to accommodate the evacuation and response access requirements of DFES.</p>	<p>Recommend modification of the BMP to adopt access Option 2 with a public road constructed and maintained to IPWEA standards.</p>

**Recommendation – modifications required**

DFES has assessed the BMP and identified a number of critical issues that need to be addressed prior to providing support for the proposal (refer to the table above).

Should you require further information, please contact me on telephone number 6551 4031.

Yours sincerely



**Richard Trinh**  
**SENIOR LAND USE PLANNING OFFICER**

15 January 2019

**From:** Ross MacCulloch [<mailto:Ross.MacCulloch@westernaustralia.com>]

**Sent:** Friday, 16 October 2020 10:22 AM

**To:** Planning (External Use ONLY) <[planners@albany.wa.gov.au](mailto:planners@albany.wa.gov.au)>

**Subject:** EF20392594 - A5983 - Lot 5780, Down Road South, Drome - LPS Amendment No.35 - Local Planning Scheme No.1 Your Ref: (LAMD35/PA95526/AMDLAMD35)

Tourism Western Australia (Tourism WA) appreciates being requested for comments regarding the above scheme amendment. Tourism WA notes that:

*“There is presently insufficient information to estimate the potential boost caused by a motorsports facility to the Study Area’s \$90 million tourism industry. However, data suggests that sports-related tourists spend up to 30 percent more than typical ‘holiday’ tourists.”*

Therefore Tourism WA is generally supportive of the project and resulting scheme amendment and has no comments to make at this stage.

Thank you and kind regards. Ross

**Ross MacCulloch**

Planning Manager



**WESTERN  
AUSTRALIA**

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[Tourism WA Corporate](#)

[Visit westernaustralia.com](http://www.westernaustralia.com)

## REPORT ITEM DIS245 REFERS

Dear Zoe,

Thank you for your email dated 14 October 2020 inviting the Department of Planning, Lands and Heritage (DPLH), Aboriginal Heritage Operations to comment on the proposed rezoning of Lot 5780 Down Road South, Drome, from 'Priority Agriculture' zone to 'Special Use – SU26' zone.

I have reviewed the Aboriginal Heritage Register of Places and Objects as well as the DPLH Aboriginal Heritage database. The results indicate that the land does not intersect with the boundary of any lodged or registered Aboriginal sites. Therefore no approvals are deemed necessary under section 18, *Aboriginal Heritage Act 1972*.

DPLH recommends the proponent refer to the State's Aboriginal Heritage Due Diligence Guidelines (Guidelines). The Guidelines can be found on the DPLH website at the following link:

<https://www.dplh.wa.gov.au/information-and-services/aboriginal-heritage>

The Guidelines allow proponents to undertake their own risk assessment regarding any proposal's potential impact to Aboriginal Heritage.

**Lorna Cooper** | Heritage Support Officer | Aboriginal Heritage Operations

140 William Street, Perth WA 6000

(08) 6551 7929

[www.dplh.wa.gov.au](http://www.dplh.wa.gov.au)



The department is responsible for planning and managing land and heritage for all Western Australians – now and into the future

For the attention of Adrian Nicoll

Good morning Adrian ,

**Your Ref: LAMD35/PA95526/AMDLAMD35**

**Our Ref: LM20481**

**RE: PROPOSED AMENDMENT NO. 35 TO LOCAL PLANNING SCHEME NO. 1\_TO REZONE LOT 5780  
DOWN ROAD SOUTH\_DROME (CITY OF ALBANY)**

Thank you for providing ATCO Gas Australia (ATCO) the opportunity to comment on the proposed Amendment No. 35 to the Local Planning Scheme No.1, within the City of Albany (the City) to enable motorsport activities.

ATCO has considered the documentation provided by the City and also on the City's website. ATCO has no objection to the proposed Amendment No. 35 being formalised and change the permitted uses from 'Priority Agriculture' to 'Special Use' for Lot 5780. ATCO does not currently operate gas mains nor infrastructure within Lot 5780 nor do we operate gas mains and infrastructure within the surrounding road reserves. For the purposes of this proposal ATCO has no objection.

Should you have any queries regarding the information above Adrian, please contact Engineering Service via [eservices@atco.com](mailto:eservices@atco.com)

Thank you Adrian and enjoy your Friday.

Kind regards

Fiona Snellin  
Land Management Coordinator  
Gas, Australia

E. [Fiona.Snellin@atco.com](mailto:Fiona.Snellin@atco.com)

Mobile 0476 831 540

A. 81 Prinsep Road, Jandakot WA 6164

P. Locked Bag 2, Bibra Lake DC, WA, 6965

W. [atcogas.com.au](http://atcogas.com.au)



Integrity Caring Agility Collaboration





Your ref LAMD35/PA95526/AMDLAMD35  
Our ref A1497/201801  
Enquiries Steven Batty  
9222 3104  
Steven.BATTY@dmirs.wa.gov.au

Adrian Nicoll  
Senior Planning Officer - Strategic Planning  
City of Albany  
Sent by Email - [planning@albany.wa.gov.au](mailto:planning@albany.wa.gov.au)  
Albany WA 6331

Dear Mr Nicoll

**CITY OF ALBANY - LOCAL PLANNING SCHEME 1 AMENDMENT 35 - LOT 5780  
DOWN ROAD SOUTH DROME**

Thank you for your letter dated 13 October inviting comment on the above proposal for Local Planning Scheme 1 Amendment 35 - Lot 5780 Down Road South Drome - City of Albany.

The Department of Mines, Industry Regulation and Safety has determined this proposal raises no significant issues with respect to mineral and petroleum resources, geothermal energy, and basic raw materials.

Yours sincerely

*Samantha Carter*

---

Samantha Carter  
Acting General Manager Land Use Planning  
Minerals and Petroleum Resources Directorate  
30 October 2020

Development  
Services

629 Newcastle Street  
Leederville WA 6007

PO Box 100  
Leederville WA 6902

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F (08) 9420 3193



Your Ref: LAMD35/PA95526/AMDLAMD35  
Our Ref: 57101282 (TPS371167)  
Enquiries: Brett Coombes  
Direct Tel: 9420 3165  
Fax: 9420 3193

06 November 2020

Chief Executive Officer  
City of Albany  
P.O. Box 484  
ALBANY WA 6331

Attention: Adrian Nicoll – Senior Planning Officer

**City of Albany LPS Amendment No.35 – Motorsport site Lot 5780 Drome Road South**

Thank you for your letter of 13 October 2020 inviting comments on the above amendment.

The Water Corporation has no objections to the proposal as the amendment site is remote from any Water Corporation infrastructure.

It is noted that the site is located within a gazetted 'Priority 2' drinking water source protection area. The City is advised to refer the proposal to DWER for advice on whether the proposed motor sports complex is a compatible land use in the source protection area.

If you have any queries or require further clarification on any of the above issues, please contact me on Tel. 9420-3165.

A handwritten signature in black ink that reads "B. Coombes".

Brett Coombes  
Senior Urban Planner  
Development Services



Government of Western Australia  
Department of Jobs, Tourism, Science and Innovation

Your ref: LAMD35/PA95526/AMDLAMD35  
Our ref: J0802/201702  
Enquiries: freya.symons@jtsi.wa.gov.au  
Phone: 08 6277 2914

Jeremy Edwards  
Chief Executive Officer  
City of Albany  
PO BOX 484  
ALBANY WA 6331

Dear Mr Nicoll

Thank you for providing the Department of Jobs, Tourism, Science and Innovation with the opportunity to comment on Local Planning Scheme Amendment No. 35 over Lot 5780, Down Road South, Drome.

The Department has reviewed the proposed amendment and notes the site subject to the amendment, which proposes to rezone the lot from 'Priority Agriculture' to 'Special Use', is located directly south of the Timber Precinct of the Mirambeena Strategic Industrial Area (SIA).

The proposed scheme amendment, which is intended to enable the site's future use as a Motorsport Park, is not considered to limit the operation of existing or future businesses within the Mirambeena SIA.

The Department also notes that TourismWA has provided a separate submission, via email on the 16 October 2020, and has no additional comments to make at this stage.

Yours sincerely

Kristian Dawson  
A/EXECUTIVE DIRECTOR  
INFRASTRUCTURE, PLANNING AND ECONOMIC DEVELOPMENT

6 November 2020



Department of  
Primary Industries and  
Regional Development

**Your reference:**

LAMD35/PA95526/AMDLAMD35

**Our reference:** LUP959

**Enquiries:** Heather Percy

Adrian Nicoll  
Senior Planning Officer – Strategic Planning  
City of Albany  
PO Box 484  
Albany WA 6331  
[planning@albany.wa.gov.au](mailto:planning@albany.wa.gov.au)

Date: 16 December 2020

Dear Mr Nicoll

**Local Planning Scheme Amendment No. 35 Complex Amendment Lot 5780, Down Road South, Drome: Rezone Priority Agriculture' to 'Special Use-SU26' in order to enable motorsport activities**

Thank you for inviting the Department of Primary Industries and Regional Development (DPIRD) to comment on the above proposal to amend land zoned 'Priority Agriculture' to 'Special Use' in order to enable motorsport activity.

DPIRD does not object to the proposed scheme amendment and offers the following comments:

- Land Assessment Pty Ltd.'s agricultural capability assessment of Lot 5780 Down Road South generally supports the regional scale resource survey and land capability assessment which was originally used to designate the area as Priority Agricultural Land.
- The regional scale capability assessment for perennial horticulture (Table 8) does not discriminate between cleared and uncleared and indicates 85.4% of Lot 5780 is suitable for perennial horticulture, including 40.9% high capability (category A) and 44.5% fair or moderate capability (category B).
- Land Assessment's site-specific agricultural ratings (page 16) indicate 85.6% of the cleared land on Lot 5780 is suitable for perennial horticulture with 40 hectares (ha) (33.9%) rated as fair to high (Category A) and 61 ha (51.7% rated as fair (category B). Only 17 ha (14.4%) of the cleared land has low capability which means it is unsuitable for perennial horticulture development.

1 Verschuer Place, Bunbury 6230

PO Box 1231 Bunbury 6230

Telephone +61 (0)8 9780 6262 [landuse.planning@dpird.wa.gov.au](mailto:landuse.planning@dpird.wa.gov.au)

**[dpird.wa.gov.au](http://dpird.wa.gov.au)**

ABN: 18 951 343 745

## REPORT ITEM DIS245 REFERS

- Land Assessment includes 74 ha of remnant vegetation as low capability (C category) rated land on the basis that an environmental permit to clear the vegetation is unlikely to be given.
- Other limitations to development for intensive agriculture, such as perennial horticulture, include uncertainty about the quality of groundwater for irrigation and the risk of nutrients contaminating the P2 drinking water source protection area and nearby wetlands.
- If the land is developed for motorsports activities, the contamination risk to the drinking water source and wetlands are greater than for horticulture and include risks from on-site sewage disposal, hydrocarbons and firefighting liquids.
- DPIRD agrees with Land Assessment's conclusion that 'in terms of the nature of its soils and landforms, and hence its agricultural capability, Lot 5780 is therefore not unique'.
- DPIRD disagrees with the conclusion made throughout the amendment report that the proposed change of use has no significant effect on the agricultural land or that the proposed motorsport complex represents a more productive use of the land.
- The proposed scheme amendment will remove 101 ha of suitable land from agricultural production.

For information please contact me on 9780 6262 or [heather.percy@dpird.wa.gov.au](mailto:heather.percy@dpird.wa.gov.au)

Yours sincerely



Ms Heather Percy  
**Principal Research Scientist**  
**Sustainability and Biosecurity**

**Your Ref:** LAMD35/PA95526/AMDLAMD35  
**Our Ref:** A1901312  
**Enquiries:** Doug Stirling 08 9482 7499  
**Date:** 15 December 2020

---

Mr Adrian Nicoll  
Senior Planning Officer – Strategic Planning  
City of Albany  
102 North Road  
ALBANY WA 6330

And by email: [planning@albany.wa.gov.au](mailto:planning@albany.wa.gov.au)

Dear Adrian

**LOCAL PLANNING SCHEME AMENDMENT NO. 35 - LOT 5780, DOWN ROAD SOUTH, DROME**

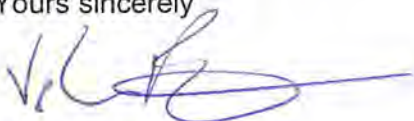
I refer to your letter dated 13 October 2020 inviting comment on the above proposal in relation to proposed motorsport activities.

DevelopmentWA owns land in the Mirambeena Timber Processing Precinct (Timber Precinct) immediately north of Lot 5780 available to the market for lease for future industrial development. DevelopmentWA manages the Timber Precinct as part of the broader Mirambeena Strategic Industrial Area in coordination with the Department of Jobs, Tourism, Science and Innovation.

DevelopmentWA notes that the proposed motorsport facility will operate within the Timber Precinct buffer area (denoted as IA4BA in the Local Planning Scheme). The buffer is intended to protect existing and future industries in the Timber Precinct industrial area (denoted as R1 in the Local Planning Scheme) from encroachment from sensitive uses. The buffer is intended to allow heavy industrial activities with off-site impacts to operate without affecting sensitive uses. The buffer effectively provides certainty that cumulative heavy industries can operate in the industrial area provided that their emissions, risk, noise and other impacts are adequately addressed at the buffer boundary.

DevelopmentWA notes that the motorsport facility is likely to be an activity which generates significant off-site noise impacts. DevelopmentWA would not normally seek to place an activity with significant off-site noise impacts within the buffer as it has the potential to compromise the effect of the buffer for existing and future industry operating in the Timber Precinct industrial area and may impact on surrounding sensitive uses.

Yours sincerely



Vaughan Brazier  
**Manager Strategic Industrial**

## REPORT ITEM DIS245 REFERS



Department of Biodiversity,  
Conservation and Attractions



*We're working for  
Western Australia.*

Your ref: LAMD35/PA95526/AMDLAMD35  
Our ref: PRS44364 2019/002226 27.2.1.1.35  
Enquiries: Deon Utber  
Phone: (08) 9842 4500  
Email: Deon.Utber@dbca.wa.gov.au

Adrian Nicoll  
Senior Planning Officer - Strategic Planning  
City of Albany  
PO Box 484  
ALBANY WA 6331

Dear Adrian

### **LOCAL PLANNING SCHEME AMENDMENT NO. 35 – LOT 5780, DOWN ROAD SOUTH, DROME**

The Department of Biodiversity, Conservation and Attractions South Coast Region has no comments on this amendment.

It is considered that the proposal and any potential environmental impacts will be appropriately addressed through the existing planning framework.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Deon Utber'.

Deon Utber  
On behalf of Peter Hartley  
A/REGIONAL MANAGER

16 December 2020

**From:** Deon Utber <[deon.utber@dbca.wa.gov.au](mailto:deon.utber@dbca.wa.gov.au)>  
**Sent:** Tuesday, 19 March 2019 11:28 AM  
**To:** Bianca Theyer <[bianca@biodiversesolutions.com.au](mailto:bianca@biodiversesolutions.com.au)>; Mike Shephard <[mike.shephard@dbca.wa.gov.au](mailto:mike.shephard@dbca.wa.gov.au)>  
**Cc:** [kath@biodiversesolutions.com.au](mailto:kath@biodiversesolutions.com.au); Jennifer Medbury <[jennifer.medbury@dbca.wa.gov.au](mailto:jennifer.medbury@dbca.wa.gov.au)>  
**Subject:** RE: Albany Motorsport Park Flora and Fauna Report

Dear Bianca,

Thank you for the opportunity to provide comment on the Albany Motorsport Park Flora and Fauna Report. The report presents a comprehensive assessment of the flora and fauna values associated with the property on which the Motorsport Park is proposed. The only comment is that the lack of ringtails is possibly due to survey effort. MRWA surveys in Down Road NR recent found 81 individuals - ie pretty high density. Therefore, it is not unreasonable to expect them to be in the Down Road site rem veg even at low density. More intensive sampling may improve detection and should be considered if any areas of possum habitat are likely to be impacted. It is noted that the proposed development is unlikely to impact native vegetation.

Regards,

*Deon Utber*

**Regional Leader Nature Conservation  
Parks and Wildlife Service  
South Coast Region**

**Ph:** (08) 9842 4514  
**Fax:** (08) 9841 7105  
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**Address:** 120 Albany Highway, Albany WA 6330





# REPORT ITEM DIS245 REFERS

From: [GRANT Chris \(NOM\)](#)  
To: [Adrian Nicoll](#)  
Subject: EF20398158 - LAMD35 - Local Planning Scheme Amendment No 35 - Lot 5780 Down Road - Albany Motor Sport Park  
Date: Monday, 30 November 2020 9:50:23 AM  
Attachments: [image001.png](#)  
[image002.png](#)  
[image003.png](#)

---

Hi Adrian

Main Roads has no in principle objection to the above scheme amendment.

The only concern that Main Roads has is that the emergency fire exit onto Albany Highway does not become a secondary access to the site, and is managed in such a way to avoid this scenario.

Regards

### Chris Grant

Network Operations Manager  
Great Southern Region  
Metropolitan and Southern Regions  
p: 08 9892 0524 | m: **0427 388 047**  
w: [www.mainroads.wa.gov.au](http://www.mainroads.wa.gov.au)



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Your ref: LAMD35  
Our ref: PA37748 / DWERDT351228 / DWERT1347  
Enquiries: Nicolie Sykora Ph 9841 0123

Mr Andrew Sharpe  
Chief Executive Officer  
City of Albany  
PO Box 484  
Albany WA 6331

Attention: Adrian Nicoll

Dear Andrew

## **LOCAL PLANNING SCHEME AMENDMENT NO. 35 – LOT 5780 DOWN ROAD SOUTH, DROME**

Thank you for providing the proposed Amendment 35 to Local Planning Scheme No. 1 for the Department of Water and Environmental Regulation (Department) to consider.

Key issues and recommendations are provided below and these matters should be addressed:

### **Noise management plan**

The Environmental Noise Branch of the Department has provided assessment on the proponent's Noise management plan in response to a request by the City of Albany dated 13 October 2020. Please find attached a Technical (Review) Report, dated 14 December 2020 which forms the basis of the Department's advice on the Albany Motorsport Park Noise Assessment (the Assessment).

The Department's Environmental Noise Branch has previously provided advice to the Environmental Protection Authority on earlier versions of the Assessment and a copy of this previous advice is also attached.

### **Scheme Amendment Report**

The following general comments are provided in relation to Section 6.2 of the Scheme Amendment Report excluding section 6.2.4 Noise addressed previously.

#### **6.2.6 Flora and fauna impacts**

A requirement for fencing of the 50 m development exclusion area is supported to prevent public access.

A survey on the presence/absence of native fish species in the Marbellup tributary on the site is supported. However, the tributary and creek area is an exclusion zone and for this reason there should be no disturbance within the creek or its 50 m buffer area apart from revegetation and/or rehabilitation.

**Local water management strategy (LWMS)**

The Department has previously provided advice to the Environmental Protection Authority (EPA) on the *Albany Motorsports Park Local Water Management Strategy* (GHD, January 2020 – see Appendix J).

Where the Department has sought clarification on management commitments within the LWMS these should be addressed as part of future revisions of the document. Previous advice to the EPA regarding management commitments should be incorporated into scheme provisions. See Attachment 4. This provides a list of the Department's recommendations in relation to scheme provisions for inclusion within Schedule 4 of the Local Planning Scheme 1.

**6.2.7 Water management**

It is noted that as part of the detailed design of the Motorsports facility a Stormwater management plan will be prepared. This should be in accordance with the LWMS for the site.

A drainage management plan is not required. This instead should be referred to as a stormwater management plan as per section 5.0 under the LWMS.

**Water quality monitoring**

The LWMS incorporates proposed ongoing groundwater and surface water monitoring and includes a summary of proposed monitoring programs. A revised surface and groundwater monitoring plan will be required to be submitted to DWER for approval prior to the operational phase of the facility. As part of the monitoring, preparation of an annual water quality report in accordance with ANZECC Guidelines (2000) will be required as a condition of development approval.

It is recommended that monthly surface water and groundwater monitoring be required. Water monitoring will be required for the duration of the operation of the facility rather than as specified for the three years following practical completion. This is to allow any groundwater level or water quality changes as a result of construction or operation to be identified with remedial action taken if necessary.

Should you require any further information on the comments please contact Nicolie Sykora on 9841 0123.

Yours sincerely



Karen McKeough  
Program Manager – Planning Advice  
South Coast Region

17 December 2020

List of Attachments

Attachment 1 – DWER, Technical (Review) Report – Advice on City of Albany Scheme 1 Amendment 35, 14 December 2020

Attachment 2 - DWER, Technical (Review) Report - Advice on City of Albany Local Planning Scheme 1 Amendment 35, 1 October 2020

Attachment 3 - DWER, Technical Expert Advice - Addendum, prepared for the Environmental Protection Authority, dated 28 May 2020.

Attachment 4 –  
Department of Water and Environmental Regulation Comments on the Local Water Management Strategy

# ATTACHMENT 1



Government of **Western Australia**  
Department of **Water and Environmental Regulation**

## Technical (Review) Report

Advice on City of Albany Local Planning Scheme 1  
Amendment 35 – to allow for proposed motorsport complex,  
prepared for the City of Albany

Department of Water and Environmental Regulation  
December 2020

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December 2020

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### **Acknowledgements**

For more information about this report, contact

Environmental Noise, Department of Water and Environmental Regulation.

## Document control


### Document version history

Version	Date	Description	Author	Reviewer
0.0	14/12/2020	Draft – internal review	PPA	EB
1.0	14/12/2020	Final - Issued	PPA	EB


### Corporate reference

File number and/or name	File owner or custodian
DWERDT351228	DWER South Coast Region

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Signature		Date 14/12/2020



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## 1. Introduction

This advice was prepared by the Environmental Noise Branch (ENB), Department of Water and Environmental Regulation (DWER) for the City of Albany in response to the request dated 13 October 2020 regarding the City of Albany Local Planning Scheme 1 Amendment 35.

## 2. Documents

In support of this request, the City made the following materials and documents available. These materials form the basis of this technical expert advice.

Material / document name	Author	Date
City of Albany Local Planning Scheme No. 1 Scheme Amendment 35, Scheme Amendment Report	City of Albany	September 2020
Appendix H: Albany Motorsport Park Noise Assessment (Rev 3) (Ref: 6137331-37108-94)	GHD	24 September 2020

## 3. Background

The City of Albany (the City) is proposing to rezone Lot 5780 Down Road South, Drome from Priority Agriculture to Special Use No. 26 for development of a motorsport complex (the Venue). In support of the proposal the City has prepared the *City of Albany Local Planning Scheme No. 1 Scheme Amendment 35, Scheme Amendment Report* (the Report). Attached as Appendix H to this report is the *City of Albany, Albany Motorsport Park Noise Assessment* (the Assessment) which forms the basis of this advice.

## 4. Advice

ENB previously provided advice to the Environmental Protection Authority based on earlier versions of the Assessment, this report provides advice on aspects of the Assessment that have changed from the previous versions. Previous reports provide additional information listed in Previous Advice below.

### 4.1. Background noise

Table 4-2 provides estimates of the  $L_{A90}$  values derived from the  $L_{Amin}$  data obtained by the loggers. Comparison with the time history data provided in Appendix B of the Assessment indicates that the values seem reasonable. While the average  $L_{A90}$  levels as reported in the table have minimal value for assessing emergence of noise, it is noted that the lowest day time  $L_{A90}$  levels were used in calculating the values for emergence (the decibel amount that the motor sport complex noise sticks up above

the existing background noise level) in Table 6-7 in section 6.5.3. This is acceptable as it references the worst-case probable emergence.

## 4.2. Modelling

The sound power levels (SWLs) and the modelling for neutral and worst-case meteorological conditions seem appropriate. As they are based on maximum levels, the SWLs are on the conservative side.

The possibility of tonality has been considered, motocross can be tonal if clearly audible and therefore would attract a +5 dB adjustment to the modelled levels when compared with the assigned levels of the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations). It must be noted that the SWL of motocross noise sources have been adjusted by +5 dB, hence the contours of the predicted motocross events *do not reflect the levels as would be received* but the levels required for comparison with the assigned levels.

## 4.3. Results

Section 6.5.3 provides a summary of the noise modelling results for the different motoring events and provides two pathways in which to view the impact of the noise on the four closest noise sensitive receivers, with the assumption that noise-sensitive receivers further away from the Venue would be less impacted.

Firstly, comparison with the assigned noise levels under the Noise Regulations compares the levels with those that would be not be considered “unreasonable noise” in a statutory sense from any other noise source covered by the Noise Regulations. And secondly, with a comparison with the existing background noise in the vicinity of the four receivers, indicating the level of emergence of the motor sport noise events above the lowest likely existing background noise.

As Division 3 of the Noise Regulations potentially allow the operations of a motor sport venue to emit noise above the assigned levels both pathways provide information to inform a decision regarding acceptability, given the local context.

### Assessment against Assigned levels

Table 6-6 provides the potential levels of exceedance above the assigned levels. As meteorological conditions have considerable effect on the noise levels received at a distance from the source the comparisons are made with motor sport operations under calm meteorological conditions (no wind) and “worst case” meteorological conditions (i.e. with light wind from the source to the receiver). Note that for the “worst case” condition the modelling shows the physically impossible case of winds blowing in all direction.

The levels appear to be correct, however it should be noted that the comparison is being made with the (worst case, under the proposed operating times of the Venue)  $L_{A10}$  assigned level under the Noise Regulations of 40 dB(A) being for daytime on Sundays and Public Holidays (0900 to 1900) or evening on all days (1900 to 2200). Events during daytime on Monday to Saturday (0700 to 1900) however need to meet a less stringent level, 5 dB higher, of  $L_{A10} = 45$  dB. Therefore, for comparison on

those days and times 5 dB should be subtracted from the values in Table 6-6. It appears drifting events are the only events that are proposed to operate during the evening period.

Driver training, school and manufacturer testing and 4WD training will comply with the assigned levels on all days during the daytime and evening. Motocross events provide the highest exceedance of up to 22 dB above the “worst case” assigned level under “worst case” meteorological conditions. As an indication of significance, a difference of 10 dB is usually subjectively associated with a doubling (or halving) of loudness, with a difference of 20 dB therefore indicating four times increase (or decrease of a quarter) in subjective loudness.

### Assessment against existing background levels

Table 6-7 provides the levels of emergence above the lowest existing background levels. This provides the best indication of “impact” being the potential change to the existing acoustic environment. Similarly, as noted above, an emergence of 10 dB is usually subjectively associated with a source being twice as loud as the background and an emergence of 20 dB with a source being four times as loud as the background. Similarly, an emergence of 30 dB is in the realms of being subjectively associated with a source being eight times as loud as the background. Additionally, it should be noted that an emergence of 0 dB does not guarantee that the source would not be inaudible above the background. Depending on the spectral (frequency) content of the source and background, inaudibility is likely if the source is more than 10 dB below the background level (ie the noise source will be masked by the existing background noise).

Driver training, school and manufacturer testing and 4WD training appears not to impact the acoustic environment at most locations and under most meteorological conditions. Motocross and multi-use track events provide the highest level of emergence under “worst case” meteorological conditions. It should be noted that the motocross emergence values are calculated using predicted levels based on the SWL of the source being adjusted by +5 dB for tonality as required for assessment against the assigned levels. While this adjustment for motocross events might provide a subjective “penalty” for the more annoying characteristic associated with the motocross noise sources the *actual level of exceedance above the background would be 5 dB less* than that presented in Table 6-7.

### The impact of meteorological conditions

Modelling of calm and “worst case” conditions provide an indication of the range of effect the meteorological conditions may have on the received noise levels. The report provides statistical values based on wind data obtained at Albany Airport to estimate the probability of occurrence of the “worst case” noise levels for the four closest receivers. While local wind effects are likely, the wind data from Albany Airport appears to be appropriate for the Venue location as the airport is only some 6 km to the east south-east from the Venue site. The Assessment notes that occurrence of “worst case” levels at the closest receivers appear to be in the range of 2% to 5% of daytime hours.

The wind rose data also indicates the probabilities of the occasions when the levels received at the individual receivers would be less than that predicted under “calm” conditions. This would occur when there is a negative vector wind speed (i.e the wind is blowing in a direction that has a vector from the receiver to the source). This occurs on approximately 29% of the time for receiver SR01, 33% of the time for SR02, 38% of the time for SR03 and 38% of the time for SR04. Under these conditions both the exceedance of the assigned levels and the emergence above the background would be less than the values indicated for calm conditions as presented in Tables 6-6 and 6-7.

Note also that at higher levels of wind, generally at 5 m/s or above, the local background noise level may increase due to local effects such as the rustling of tree leaves, hence increasing the level of masking. This effect is however variable depending on the environ of the receiving location.

#### 4.4. Management of noise impacts

There are limited practical options to attenuate noise from motorsport venues. Practical options for noise mitigation at source can be categorized as either management or engineering.

The Assessment indicates that, based on the distance between the Venue and the nearby noise-sensitive receivers, engineering options such as noise barriers are only likely to lead to slight reductions in noise levels, by up to 3-5 dB(A), depending on location and height. ENB agrees with this conclusion. Hence the focus of the Assessment regarding noise mitigation measures have been on management options.

On-site management options to reduce noise levels at source are limited to scheduling of events. This approach is also limited as the Venue has to achieve a balance that ensures the Venue’s viability. Note that the Indicative Event Profile presented in Table 7 of the Report indicates that drifting is the only event that is proposed to occur during the evening period. All other events are proposed to operate during the daytime.

External to the Venue the Assessment offers mitigation measures that currently are in place or can be possibly be implemented at existing properties or for any future residential development in the area. Options proposed include:

1. Provision of at property treatments to maintain suitable acoustic amenity at existing noise sensitive receptors in the vicinity of the Venue.
2. Preventing the construction of any habitable dwellings on properties immediately adjacent to the Venue by utilising the existing Mirambeena Strategic Industrial Area buffer.
3. Introducing additional planning controls to establish a Special Use zone, with an associated Special Control Area to prevent further residential development, in the vicinity of the Venue unless specific planning and building controls are implemented.

While ENB agrees that all options are potentially feasible option 1 poses the most difficulty and requires further investigation for practicality.

To maintain suitable acoustic amenity at existing noise sensitive receptors the use of criteria associated with *State Planning Policy 5.4: Road and Rail Noise (SPP5.4)* is a reasonable approach as the SPP5.4 criteria is used to protect residents from long term continuous noise sources and the noise from the Venue is limited to event times only.

At this stage the Assessment however offers no information regarding the actual feasibility of providing noise attenuation for existing noise sensitive receivers in the vicinity of the Venue. Note that the success of providing noise attenuation for existing noise sensitive receivers depends on the willingness of the owners of the receiving properties to accept noise attenuation as an offset for the noise intrusion as well as on the practicality of attenuation of the existing noise sensitive premises. Additionally, the owners of the affected noise sensitive premises are under no obligation to participate in a noise attenuation scheme.

## 5. Discussion

The Assessment indicates that the effect of noise reaches well beyond the area of the Albany Motorsports Precinct. The comparisons provided between the noise emissions from the Venue and the assigned levels under the Noise Regulations or the existing acoustic environment offer some indication to stakeholders as to the acceptability of the Venue noise emissions.

The acceptability and practicality of noise attenuation to existing receivers remains a difficulty and the Assessment indicates that the requirements for outdoor area screening and provision of insulation packages will be assessed by completion of property inspections, in order to provide recommended acoustic treatments. At this point there is no indication whether providing noise attenuation for existing noise sensitive receivers is possible.

The preparation of a Noise Management Plan as required under Division 6 of the Noise Regulations codifies the conditions of operations for the Venue providing certainty for both the venue and noise-sensitive receivers, however the provision of noise attenuation for existing noise sensitive receivers first needs to be assessed for acceptability and practicality.

## 6. Limitations

Technical expert advice in any field is subject to various limitations. Important limitations to the advice include:

- No attempt has been made to verify the modelling or assessment beyond what has been described above.

## 7. Previous Advice

DWER, Technical (Review) Report - Advice on City of Albany Local Planning Scheme 1 Amendment 35 – to allow for proposed motorsport complex, prepared for the Environmental Protection Authority, dated 1 October 2020

DWER, Technical Expert Advice—Addendum, prepared for the Environmental Protection Authority, dated 28 May 2020.

ATTACHMENT 2





Government of **Western Australia**  
Department of **Water and Environmental Regulation**

## Technical (Review) Report

Advice on City of Albany Local Planning Scheme 1  
Amendment 35 – to allow for proposed motorsport complex,  
prepared for the Environmental Protection Authority

Department of Water and Environmental Regulation  
September 2019

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September 2019

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### **Acknowledgements**

For more information about this report, contact

Environmental Noise, Department of Water and Environmental Regulation.

## Document control


### Document version history

Version	Date	Description	Author	Reviewer
0.0	26/09/2019	Draft – internal review	JB	EB
1.0	01/10/2019	Final - Issued	JB	EB

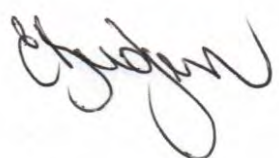
### Corporate reference

File number and/or name	File owner or custodian
DWERT3917; DWERDT188878	EPA Services

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Signature	Date: 01/10/2019
	

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## 1. Introduction

This advice was prepared by the Environmental Noise Branch (ENB), Department of Water and Environmental Regulation (DWER) for the Environmental Protection Authority (EPA) in response to the request dated 13 August 2019 regarding the City of Albany Local Planning Scheme 1 Amendment 35. The request for advice consisted of the following:

1. *“Whether ENB has provided advice on the proposed scheme amendment to the City.”*
2. *“The adequacy of the City’s noise assessment report (Appendix H), particularly operational noise modelling, proposed mitigation measures, and assumptions surrounding regulation 16AA of the Environmental Protection (Noise) Regulations 1997.”*
3. *“Any further information ENB believes relevant to the EPA in making its decision under section 48A of the EP Act.”*

## 2. Documents

In support of this request, the EPA made the following materials and documents available. These materials form the basis of this technical expert advice.

Material / document name	Author	Date
City of Albany Local Planning Scheme No. 1 Scheme Amendment 35, Scheme Amendment Report	City of Albany	May 2019

## 3. Background

The City of Albany (the City) is proposing to rezone Lot 5780 Down Road South, Drome from Priority Agriculture to Special Use No. 26 for development of a motorsport complex. In support of the proposal the City has prepared the *City of Albany Local Planning Scheme No. 1 Scheme Amendment 35, Scheme Amendment Report* (the Report). Attached as Appendix H to this report is the *City of Albany, Albany Motorsport Park Noise Assessment* (the Assessment) which forms the basis of this advice.

## 4. Advice

### 4.1. “Whether ENB has provided advice on the proposed scheme amendment to the City.”

ENB received a request for advice from DWER’s South Coast Region in February 2019 in relation to a feasibility study (as attached as Appendix E to the Report) for a new motorsports development referred to DWER by the City of Albany. A copy of ENB’s advice to the South Coast Region is attached for your information (Attachment 1). It is understood this advice was provided to the City.

A number of the issues raised in ENB’s advice to the South Coast Region have been addressed partly or entirely in the Assessment. In particular:

**a. The use of a ground absorption factor of 1 throughout**

A ground absorption factor of 0.7 has now been used throughout the model. This would seem to be appropriate for vegetated areas, but not paved surfaces. Typically the hard surface areas such as the race track and roads within the model area would have little absorptive capacity and would be modelled with a ground absorption factor close to 0. As the model algorithms are sensitive to ground effects close to the source, the ground absorption factor for the track surface is significant and may have an impact on model results.

**b. The use of 5 metre ground contours**

The Assessment now relies on 1 metre ground contours, which is appropriate for noise modelling of this scenario.

**c. The specific modelled meteorological conditions have not been stated**

The model which previously utilised the ISO 9613 algorithm now relies on the CONCAWE algorithm with default meteorological conditions which are appropriate for the Western Australia context.

#### 4.2. “The adequacy of the City’s noise assessment report (Appendix H), particularly operational noise modelling, proposed mitigation measures, and assumptions surroundings regulation 16AA of the Environmental Protection (Noise) Regulations 1997.”

##### Ambient Noise Assessment

Ambient noise monitoring was undertaken at three residential sites considered to be most affected by the Albany Motorsport Park (AMP) proposal. The selected sites seem generally appropriate. However, it would be normal practice to select sites which are not impacted by noise sources in the immediate vicinity of the microphone. Such sources may include residential or rural equipment such as pumps, refrigeration, generators and alike. No information has been provided concerning site selection in this regard. From the monitoring results presented in Appendix B of the Assessment, there appear to be some instances when the monitoring locations are impacted by peculiar noise that may be related to such sources. In particular:

- Site B Saturday 9 March 2019 23:30 to Sunday 10 March 07:15
- Site B Sunday 10 March 2019 14:00 to 15:30
- Site C Monday 11 March 2019 10:30 to 10:45
- Site C Tuesday 12 March 2019 12:00 to 16:30
- Site C Wednesday 13 March 2019 04:00 to Thursday 14 March 09:00

No explanation has been provided in relation to these instances and it appears this data has been included in the latter consideration of the ambient noise levels. It is common practice to exclude atypical noise monitoring data when undertaking ambient noise studies.

Section 4.3 of the Assessment mentions the noise monitoring data was filtered to remove periods affected by rainfall > 0.2 mm and/or wind speed > 18 km/h. The source of the meteorological data is not stated. The assessment states “sampled noise levels for the monitoring period are provided graphically in Appendix B along with the corresponding meteorological conditions during the monitoring period at each site, including precipitation and wind speed and direction for each site.” This would suggest meteorological data has been collected at each monitoring site, which would be appropriate for filtering the noise monitoring data as indicated. However examination of the charts in Appendix B suggests the meteorological data for each site may in fact be the same data set and so not gathered at each site, but rather at a single site. Meteorological data such as wind speed (close to ground level) and rain events are site specific and can vary significantly over relatively short distances. Consequently, meteorological data gathered other than from the noise monitoring site is usually an unreliable indicator of meteorological conditions affecting the

measurements. A manual review of audio samples, if they have been recorded along with the data, provides a far more reliable determination of impacted measurements in such circumstances.

Table 4-2 of the Assessment reports the noise monitoring findings as  $L_{Aeq}$  level for the ‘day’, ‘evening’ and ‘night’ periods at each site. The  $L_{Aeq}$  level represents the ‘average’ noise level over the period of measurement. The  $L_{Aeq}$  level is significantly affected by short duration high level noise events and is of only limited value for characterising ambient noise levels.

Typically, ambient noise studies prioritise identifying the background noise levels. Table 4-3 of the Assessment presents the “rating background level”. The rating background level is a reference level used in specific circumstances in some Eastern Australian jurisdictions. It is apparent from relevant jurisdictional policy documents that the rating background level is usually derived from  $L_{A90}$  measurement data. In this instance the “background rating level” has been derived from  $L_{Aeq}$  measurement data which would seem peculiar. An  $L_{Aeq}$  derivation of the “background rating level” appears to have little value in characterising background noise.

Notwithstanding, the levels reported in Table 4-3 for sites B & C are not consistent with the levels in Table 4-2. It is therefore questionable whether the  $L_{Aeq}$  derived background rating levels reported in Table 4-3 are correct in any case.

Almost universally background noise is characterised with reference to  $L_{A90}$  levels. The  $L_{A90}$  level represents the level exceeded for 90 per cent of the measurement period, that is to say that the noise is at or above this level 90 per cent of the time. No  $L_{A90}$  measurement data has been presented in the Assessment.

Appendix B presents the  $L_{Amax}$ ,  $L_{Aeq}$  and  $L_{Amin}$  measurement data over 15 minute periods for each site over several days. The  $L_{Amin}$  level represents the minimum noise level measured over the 15 minute period. The  $L_{Amin}$  level will be less than or equal to the  $L_{A90}$  level, and from the data presented, provides the best indication of the background levels at each site. A visual estimate of the typical  $L_{Amin}$  levels charted in Appendix B for each period at each site is presented in Table 4.1 below.

**Table 4.1 Estimated typical  $L_{Amin}$  levels**

Site	$L_{Amin}$ Day (dB)	$L_{Amin}$ Evening (dB)	$L_{Amin}$ Night (dB)
Site A	30	27	26
Site B	25	18	18
Site C	30	23	20

In considering the noise impact of a proposal it is common to examine the extent to which noise from the proposal will emerge above the background noise. The Assessment provides no discussion of the background noise level in relation to the predicted noise emissions. Further consideration is provided below under the Noise Assessment subheading.



The Assessment provides a summary of noise monitoring and observations at each monitoring site. At each site the observations include that “the APEC wood chip mill was in operation during the noise monitoring”. It is not explained whether noise from the APEC operations were audible or affecting the ambient measured levels. In light of this observation, the conclusion that “noise monitoring at sensitive receptors in the vicinity of the Albany Motorsport Park indicates there were no existing noise sources, operating at the time of the noise monitoring, which need to be considered as ‘significantly contributing’”, needs further explanation.

#### Noise Modelling

Table 6-3 of the Assessment presents the vehicle sound power levels utilised in the modelling of AMP operational noise. Notably, octave band data is only provided for motocross bikes. For all other vehicles the sound energy is assumed to be entirely within the 500 Hz octave band. Such an assumption will significantly affect the accuracy of the modelled noise levels as sound propagation is frequency dependent. Generally, motor vehicle noise has significant low frequency content which is less attenuated with distance than the higher frequency components. Consequently, the assumption that all the sound energy is within the 500 Hz octave band is likely to underestimate the received noise levels.

Typically, where noise levels from a source are variable, but little is known about the statistical distribution of the levels, it is common to model the maximum noise levels associated with the source. This is because the maximum noise levels are relatively easy to obtain and the assessment against criteria can be considered conservative. It is not stated whether the sound power levels presented in the Assessment represent the maximum noise levels for each of the vehicle types.

Assuming the overall A-weighted sound power levels presented in Table 6-3 are intended to represent the typical maximum vehicle noise levels, most of the levels appear to be underestimated. For the multi-use track, motocross, drag racing, and burnout events the Assessment assumes that the vehicles will be required to comply with the Confederation of Australian Motor Sport (CAMS) racing rules. The CAMS rules require vehicles do not exceed 95 dB(A) measured at 30 metres from the track edge. A conservative estimate of vehicle sound power would be made by assuming the vehicle is right at the edge of the track, 30 metres from the point of measurement and the measurements are made over fully reflective, hard ground. On this basis the sound power level would be calculated as 132.5 dB(A). Assumptions that the ground is softer or the distance to the vehicle is further, will only result in a higher calculated sound power level. It is unclear how the Assessment has concluded a sound power level of 129 dB(A) on the basis of the CAMS rules.

Notwithstanding, it is understood a number of the events listed are not subject to the CAMS noise criteria, namely drag racing and burnout events. Referring to the June 1999 Public Environmental Review for the Kwinana International Motorplex (Kwinana Motorplex PER) it is apparent that sound power levels for drag racing vehicles can reach 168 dB(A), significantly higher than the 129 dB(A) assumed in the

Assessment. No reliable and readily available sound level data could be located for burnout events. Given the nature of the events and the types of vehicle it is likely the noise emissions would exceed the CAMS criteria.

For road registered vehicles noise emission standards are made by the Commonwealth under the *Motor Vehicle Standards Act 1989* in particular *Vehicle Standard (Australian Design Rule 28/01 — External Noise of Motor Vehicles) 2006* [ADR 28/01] and *Vehicle Standard (Australian Design Rule 83/00 — External Noise) 2005* [ADR 83/00]. The particular Australian Design Rule (ADR) that applies depends when the vehicle was manufactured. Generally, for relevant vehicles, those manufactured after 1 January 1992 and before 1 January 2005 will need to comply with ADR 28/01, while those manufactured after 1 January 2005 will need to comply with ADR 83/00. ADR 83/00 is more stringent than ADR 28/01. For passenger cars in motion ADR 28/01 sets criteria of 77 dB(A) at 7.5 metres, suggesting a sound power level of 102.5 dB(A). ADR 83/00 sets criteria of 74 dB(A) at 7.5 metres for passenger cars, suggesting a sound power level of 99.5 dB(A).

ADR28/01 does not set criteria for motorcycles. ADR 83/00 does however, include criteria for motorcycles. For capacities of over 175 cm<sup>3</sup> ADR 83/00 sets a limit of 80 dB(A) at 7.5 metres, suggesting a sound power level of 105.5 dB(A).

The ADR procedure consists of a full-throttle drive-by test commencing at 50 km/h. Such a test would seem particularly relevant to the race track driver training and manufacturer testing days proposed at the AMP. The sound power levels stated above, derived from the ADR criteria, are significantly higher than the 95 dB(A) used in the Assessment. The basis for the use of the lower sound power level is not explained and would appear to underestimate the potential noise impact.

In light of the observations above the noise modelling presented is not considered reliable and is likely to under predict the noise levels associated with the AMP.

#### Noise Assessment

The modelling results are presented as LA<sub>10</sub> levels for the purpose of comparison to the LA<sub>10</sub> assigned levels. There is no description in the Assessment of a method to derive the LA<sub>10</sub> levels from the sound power levels presented in Table 6-3, so it is assumed the sound power levels presented have been input into the model without manipulation and the results presented as the LA<sub>10</sub> noise levels. While such an approach might in one sense be conservative, it fails to have regard to the operation of the assigned noise levels under the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations).

The Noise Regulations set higher limits for short duration noise and lower limits of longer duration noise. The LA<sub>max</sub> assigned level is the level never to be exceeded, the LA<sub>1</sub> is the level not to be exceeded for more than 1 per cent of the representative assessment period and the LA<sub>10</sub> is the level not to be exceeded for more than 10 per cent of the representative assessment period. The representative assessment period is between 15 minutes and 4 hours, determined by an inspector or authorised person to be appropriate for the assessment of the noise emission. For the purpose of

considering a proposal such as the AMP it would be usual to assume a 4 hour representative assessment period.

While drag racing is likely to be the activity with the highest noise levels it is usually of a short duration. The Assessment has assessed drag racing noise against the LA<sub>10</sub> assigned level, which may not be appropriate as the noise may not be present for more than 24 minutes (10%) in a four hour period. The duration of drag racing noise was considered in the Kwinana Motorplex PER which examined the noise over a typical race meeting held at the Ravenswood Raceway.

Figure 1 below presents the drag racing analysis from the Kwinana Motorplex PER. While the racing format and breakdown may not be the same for the AMP, the analysis provides an example of how consideration of the duration of activities may be related to the assigned noise levels.

The Kwinana Motorplex PER undertook a similar analysis across both drag racing and speedway activities to examine the cumulative distribution of noise in relation to the relevant assigned noise levels. Such an analysis of the activities at the AMP would be appropriate.

While the consideration of the maximum noise levels and duration of emissions provides some characterisation of the noise levels for the purpose of comparison to the assigned noise levels, it does not necessarily reflect the true nature of emissions from an activity such as circuit racing. Noise levels during an event are likely to fluctuate due to the presence of breaks between races, variability in the vehicle types, vehicle operation and vehicle locations around the tracks and slight changes in meteorological conditions. Such fluctuations in noise levels are best determined by noise measurement of similar events as part of an appropriately designed acoustic study that considers the influence that distance from the race track has on the noise levels and the relationship between statistical indicators. The consideration of noise emissions from the AMP would benefit from such a study.

Table 3.2 RACE TIMES AT RAVENSWOOD RACEWAY EVENT  
WA GRAND FINALS - 2/4/99

Vehicle Type	Number of Vehicles Competing	Number of Races	Average Time per Race (secs) incl. Burnouts	Total Race Time (secs)	% of Total Time	Cumul -ative %	Relevant Noise Level
Top Fuel Dragsters	2	3	15	45	0.25	0.25	L <sub>max</sub>
Top Competition Eliminator	14	16	15	240	1.3	1.55	L <sub>A1</sub>
Super Stock	42	43	15	645	3.58	5.13	L <sub>A1</sub>
Motorcycles	30	33	10	330	1.83	6.96	L <sub>A1</sub>
Super Street Eliminator	27	27	15	405	2.25	9.21	L <sub>A1</sub>

- Notes:
1. It has been assumed that that the burnouts for each vehicle occur separately thus the total race time can be considered a conservative estimation.
  2. Super Stock, Motorcycles and Super Street have been assumed to have the same noise emissions
  3. Mini Jets are assumed to have the same noise emissions as Top Fuel Dragsters. This can be confirmed from historical measurements at Ravenswood Raceway.
  4. Elimination Start Time 6pm Event Finish 11pm.

Figure 1: Drag racing analysis – excerpt from June 1999 Public Environmental Review for the Kwinana International Motorplex

Comparison with the assigned levels under the Noise Regulations provides an initial indication of the impact of a noise emitting proposal. However, reference to the assigned levels alone may under represent the impact of the noise source. The impact of a noise source introduced into an existing environment depends on the change to the environment that is experienced on its introduction. Ambient noise levels can be used to characterise the existing environment. In particular background noise levels, as discussed above, provide a basis to consider the potential for noise from a proposal to emerge above the background noise. It would be appropriate for the acoustic assessment for the AMP to consider the emission noise levels in relation the current background noise levels.

Regulation 16AA

Motorsport is inherently noisy and there are limited practical options to attenuate noise from motorsport venues. Because significant noise reduction is not usually practical without substantially constraining a motorsport venue’s operations, comprehensive noise assessment is necessary early in the planning and development stages of a new venue proposal to ensure the siting is appropriate and the noise impacts are acceptable.

Division 3 of the Noise Regulations provides an “opt-in” approvals process that allows noise emissions from motorsport venues to exceed the assigned noise levels provided motor racing activities are carried out in accordance with an approved noise management plan for that venue. Because of the limited available options for noise reduction a noise management plan prepared under Division 3 is not expected to result in any significant change in noise levels from the venue. Instead the noise management plan aims to fix the venue operations in relation to the types of vehicles, the times of day, the number of events, noise testing of vehicles and alike. In this way a noise management plan fixes what the affected community might reasonably expect in relation to the venue.

A noise management plan for a venue is unlikely to be approved if the noise impacts are found to be unacceptable. Hence a proposal which is reliant on an approval under Division 3 in order to comply with Noise Regulations depends on an appropriate assessment of noise early in the venue planning.

It is premature to further discuss the application of Division 3 in relation to the current proposal until a reliable noise assessment has been completed. However, some of the proposed activities such as driver training, schools and manufacturer testing on a daily basis, may not be part of the occasional transient events that usually come under the auspices of motor sport organisations. As such, these activities may not fall within the scope of Division 3 and so may be required to meet the assigned noise levels.

### **4.3. “Any further information ENB believes relevant to the EPA in making its decision under section 48A of the EP Act.”**

#### Broader Planning Context

It may be relevant for the EPA to consider to what extent there are measures in place to limit the community’s future exposure to noise impacts should the motorsport facility proceed.

It is understood the proposal site and surrounds fall within an Industrial Buffer Area where the construction of dwellings and other habitable structures are prohibited. To some extent this limits future exposure to noise. However, subject to further assessment, the noise impacts associated with the AMP are likely to extend beyond the current industrial buffer so there exists a risk that detrimental noise exposure may increase with further noise sensitive development in the area.

Section 7.2 of the Assessment identifies the existing industrial buffer and residential acoustic treatments as possible options to mitigate the potential for future noise exposure. An expansion of the existing buffer could prohibit further noise sensitive development in areas most affected by AMP noise. The designation of a special control area under the Local Planning Scheme could require noise sensitive

development in less affected areas to implement acoustic treatments to mitigate noise from the AMP.

While such measures have been identified in section 7.2 of the Assessment and acoustic treatment of new residential development are mentioned in section 6.2.4 of the *City of Albany Local Planning Scheme No. 1 Scheme Amendment 35, Scheme Amendment Report*, no discussion as to how such provisions will be practically implemented and no commitment to such an implementation is provided.

### 5. Limitations

Technical expert advice in any field is subject to various limitations. Important limitations to the advice include:

- No attempt has been made to verify the modelling or assessment beyond what has been described above.

### 6. References

ERM Mitchell Cotter Pty Ltd (1999) *Public Environmental Review For Western Australian Sports Centre Trust Kwinana International Motorplex*

## Attachment 1- Advice to South Coast Region

From: [Jon Button](#)  
To: [Karen McKeough](#)  
Cc: [Emma Bridgeman](#)  
Subject: RE: Noise reports for Motorsports development in Albany  
Date: Friday, 29 March 2019 1:38:00 PM

Hi Karen

I have finally had an opportunity to look at his one. My apologies for the delay in getting this advice to you, but as I mentioned, unfortunately I have had to prioritise other matters.

I have focused on sections 9 “Preliminary noise assessment and management plan” (noise assessment) of the *City of Albany, Albany Motorsport Park Site Feasibility Study – Lot 5780 Down Road South, Drome* (feasibility study), with reference to other sections of the report as required. I have also consider the new residence you advise me of by email on the 11 March.

### **7. Noise Modelling**

Noting the noise assessment is preliminary, it nevertheless lacks the detail typically expected of a noise assessment for a proposed motor sport venue. In particular table 3-1 of the feasibility study list a range of motorsport activities to be undertaken at the facility. Comparing table 3-1 to table 9-4, it is apparent that only a small subset of the potential vehicle types/events have been considered in the noise assessment. For those that have been consider there is no information about the particular class of vehicle which has been assumed or explanation as to why that class is representative of the ‘worst-case’.

Take the multi-use track (MUT) events, table 9-4 indicates that a “stock race car” has been assumed for the noise model with a sound power level (SWL) of 120 dB(A). It is not explained what class this car is or why it was selected. Generally the term ‘stock car’ appears to refer to an America style of race car which currently do not seem to be regularly raced in Australia.

The Confederation of Australian Motor Sport (CAMS) has general requirements for racing vehicles. CAMS specify vehicle noise is not to exceed 95 dB(A) at 30m. This equates to a SWL of 132.5 dB, so an assumed SWL of 120 dB(A) for the modelling emissions from the MUT would appear to significantly understate the potential noise levels.

For other events such as “burnout days”, “tractor pulls” and “drifting days”, no modelling has be provided. As far as I understand ‘burnouts’ and ‘tractor pulls’ are not CAMS regulated and have no noise limits imposed by the competition rules so the noise levels could exceed those under the CAMS rules. I also understand that some drag racing classes have no imposed noise limits, so the basis for the selected SWLs used in the noise assessment needs explanation.

On the basis of the above observations I am inclined to the view, that the modelling may have



significantly underestimated the levels received at nearby noise sensitive premises.

There are three other issues with the modelling that may further affect the predicted noise levels, these are:

1. *The use of a ground absorption factor of 1 throughout*

A ground absorption factor of 1 represents soft ground with very high noise absorption. In reality the ground in the source region will be sealed track, hard ground with an absorption factor close to 0. The ISO 9613 prediction method is sensitive to ground types close to the source and receiver. The assumption of a ground absorption factor of 1 close to the source when in fact it should be near 0, is likely to result in a significant under prediction of the received noise levels.

2. *The use of 5 metre ground contours*

One metre ground contours are typically available. Five metre ground contours are generally too coarse for predictive noise modelling. This is particularly relevant where noise sources are close to the ground. In this case, it is expected that race cars would be modelled with a source height of no more than 0.5 m above ground. No information has been provided in the noise assessment regarding the assumed source heights.

3. *The specific modelled meteorological conditions have not been stated*

The noise assessment notes “the ISO 9613-2 algorithm also takes into account the presence of a well-developed moderate ground based temperature inversion, such as commonly occurs on clear, calm nights or downwind conditions which are favourable to sound propagation. As a result, predicted received noise levels are expected to represent a worst case scenario.” While this is true of the ISO 9613-2 method, in Western Australia default night and day time meteorological modelling inputs are generally relied upon to represent the ‘worst-case’ scenarios. Consequently, it is important that the specific inputs be stated and where alternatives to the default worst-case meteorological conditions are proposed they are justified on the basis of site-specific meteorological data.

## **8. Noise Assessment**

The noise assessment has considered the predicted noise levels against the assigned levels of the Noise Regulations, which is appropriate. The assessment assumes a compliance level of 5 dB below the assigned level on the basis that noise emissions from the Albany Motorsport Park (AMP) may ‘significantly contribute’ to a level which exceeds the assigned noise level. The ‘significantly contributing’ provision of the Noise Regulations only apply where there is noise from two or more emitters and the combined noise emissions exceeds the assigned noise levels. The provision is not typically applied to proposal assessments unless another contributing relevant noise source has been identified.

For the purpose of assessing the noise impact of the proposal, if the ‘significantly contributing’ provisions are relevant then the assessment would be expected to present the overall combined noise levels from the proposal and other contributing emitters, as well as the individual

contributions.

Comparison with the assigned levels under the Noise Regulations provides an initial indication of the impact of a noise emitting proposal, however it is not the only consideration in the assessment of the noise impact. The impact of a noise source introduced into an existing environment depends on the change which results from the introduction. Many rural areas can have background noise levels well below the assigned noise levels, so the comparison to the assigned levels alone can under represent the impact in terms of the introduced change.

Measurement of the existing ambient noise levels near the noise sensitive premises in the area is required to obtain an indication of the background noise level, which can then be compared to the predicted noise levels to provide a more complete assessment of the noise impact of the proposal. Ambient noise monitoring can also identify other noise emissions which are relevant to the consideration of the ‘significantly contributing’ provisions of the Noise Regulations.

In light of the issues raise above in relation to the noise modelling there is little value in commenting on the assessment results. Similarly, it is premature to consider the venues suitability for consideration under Division 3 – Motor sport venues, of the Noise Regulations until the noise impact of the proposal is fully understood.

In favour of the proposal, there are only few noise sensitive premises in the vicinity. This opens up the possibility of acoustic treatments to existing homes as a mitigation option if the noise impacts are deemed significant.

Should the proposal proceed consideration could be given to measures to limit further noise exposure through planning development controls on surrounding land. Special requirements or limits on noise sensitive develop in the vicinity of the AMP may assist in ensuring the long term viability of motorsport activities at the site by reducing the potential for prejudicial noise sensitive development. GHD suggests “as part of the proposed Albany Local Planning Scheme No.1 amendment for the Project Site (refer section 4.1), the City of Albany should also consider extending the existing industrial noise buffer IA4BA (refer section 2.3) to incorporate the cumulative noise impacts of the Mirambeena TPP and AMP. Whilst this would not be a requirement under the Environmental Protection (Noise) Regulations 1997, it would provide the City with the ability to restrict incompatible land uses and residential development in proximity to the AMP.” While the restriction on noise sensitive development is likely to be the most effective means to reduce noise exposure another option which has been implemented in areas surrounding motor sport venues is the introduction of special control areas where noise insulation is required to new noise sensitive buildings.

Should you have any queries about this advice, please get in touch. Kind

regards

Jon Button

Senior Environmental Officer (Noise)

## REPORT ITEM DIS245 REFERS

*Advice on City of Albany Local Planning Scheme 1 Amendment 35 – to allow for proposed motorsport complex, prepared for the Environmental Protection Authority*

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Environmental Noise Branch

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## ATTACHMENT 3



## Technical Expert Advice—Addendum

Details About Addendum	
Full title of expert report	Advice on City of Albany Local Planning Scheme 1 Amendment 35 – to allow for proposed motorsport complex, prepared for the Environmental Protection Authority
Advice requested by	Environmental Protection Authority (EPA)
Description	Review of proponent responses and revised noise assessment
DWER reference	DWERT3917
Previous DWER reference	DWERT3917

Additional Advice
Please write below if there is any additional advice.
<p><b>Background</b></p> <p>The EPA has requested further advice on the proponent’s responses to the matters identified in previous advice from the Environmental Noise Branch (ENB), dated 1 October 2019, and a revised noise assessment. Specifically EPA have requested advice in relation to:</p> <ol style="list-style-type: none"> <li>1. <i>Table of Response, Item 3. Daily noise monitoring results and rating background level:</i> advise whether the City has appropriately characterised the ambient noise environment;</li> <li>2. <i>Table of Response, Item 6. Noise assessment:</i> advise whether the City’s methodology used to derive the <math>L_{A10}</math> levels from the sound power levels is appropriate;</li> <li>3. <i>Noise Assessment, Section 7. Managing noise impacts:</i> please review and provide advice as to the suitability of the proposed mitigation measures including the Special Control Area, attenuation of existing sensitive receptors, and any possible alternatives that should be considered by the City in the scenario that existing landowners do not consent to attenuation measures; and</li> <li>4. Whether consideration of regulation 16AA of the Environmental Protection (Noise) Regulations 1997 is appropriate at the scheme amendment stage of the planning process, or whether it is more appropriately considered during detailed planning.</li> </ol> <p><b>Advice</b></p> <ol style="list-style-type: none"> <li>1. <i>Table of Response, Item 3. Daily noise monitoring results and rating background level:</i></li> </ol> <p>The matters raised in previous technical advice have not been adequately addressed. The ambient noise assessment has not been updated and remains reliant on <math>L_{Aeq}</math> measurements which are apparently affected by significant extraneous noise. The reason for the use of <math>L_{Aeq}</math> data provided in the proponent’s response is that no <math>L_{A90}</math> data was obtained due to equipment malfunction. However,</p>

it is quite unlikely that a correctly set up monitor would successfully record  $L_{Amin}$ ,  $L_{Amax}$  and  $L_{Aeq}$  data but fail to capture  $L_{A90}$  data and more unlikely that the same malfunction would affect all three monitors required for the simultaneous monitoring of the three sites. I note that the equipment that was used to obtain the data was reported to be Svan 955 sound level meters. It appears from the meter user manual (dated January 2007) that the meter only saves  $L_{min}$ ,  $L_{eq}$ ,  $L_{max}$  and  $L_{peak}$  data in logging mode and although the meter can obtain statistical values, such as  $L_{A90}$ , for one-off measurements it does not appear to save any in logging mode.

There are significant inconsistencies between the daily  $L_{Aeq}$  levels reported in Table 4-2 and the overall  $L_{Aeq}$  levels reported in Table 4-3, to the extent that the levels in Table 4-3 appear to be incorrectly calculated.

The filtering applied to remove extraneous noise for the data is limited and reliant on meteorological data obtained at the Albany Airport up to 8.5 km from the monitoring sites. Temporal wind speed and rain fall can vary significantly over such distance to the extent that such a filtering technique cannot be considered reliable. Automated filtering of noise monitoring data on the basis of meteorological data can only be reliably performed where the meteorological data is obtained from weather stations co-located with the noise monitor. An alternative is to enable audio recording on the noise monitor and review the audio recordings for the presence of rain or high wind noise.

Consideration should be given to other extraneous noise sources and techniques to remove their effect on the measured levels. It would be expected when reporting on ambient noise monitoring such consideration would be discussed.

Notwithstanding, in the absence of  $L_{A90}$  data, the previous technical advice provided a method to consider background noise levels with the exclusion of the most significant extraneous noise using the  $L_{Amin}$  data that is available. It was noted that the  $L_{Amin}$  value would be less than or equal to the  $L_{A90}$  level. As an example, from a previous ambient measurement in a rural area made by DWER it has been found that on (arithmetic) average the  $L_{A90}$  levels of 15 minute logs were less than 1 dB above the  $L_{Amin}$  for the logged period for night time and less than 3 dB above the  $L_{Amin}$  for the logged period for day time. The proponent has not progressed with any such analysis and subsequently the proponent has not undertaken an environment impact assessment in relation to how the noise environment will change as a result of the proposal. Previous advice explained further how such an assessment could be undertaken.

## 2. *Table of Response, Item 6. Noise assessment:*

Before comment on Item 6 is provided, comment on Item 5 is required. While the sound Power Levels (SWLs) and one-octave A-weighted spectral levels (Table 6-3) for the Road Registered vehicles and 4WD Off Road vehicles seem reasonable and are accepted, the SWL data for the Drag Race vehicles and Burnout vehicles are incorrect. Although ostensibly based on SWL data provided in the June 1999 *Public Environmental Review for the Kwinana International Motorplex* (Kwinana Motorplex PER) they are quoted incorrectly. The one-third octave levels provided in the Kwinana Motorplex PER were not summed to provide equivalent one-octave spectral levels, hence the one-octave spectral levels as used for modelling do not sum to the quoted overall broadband levels. As the modelling software utilises the frequency-specific data to predict broadband sound pressure levels the model is therefore based on one-octave SWLs that sum to broadband levels that fall short of the stated broadband levels by approximately 5 dB. The resulting noise contours for those sources are therefore some 5 dB under predicted for that reason alone. As the 5 dB error is an estimate the erroneous models need to be re-run with the correct spectral values.

No explanation is provide for the retention of the SWLs for Multi Use Track CAMS approved vehicles and Motocross bikes as presented in the original report. While spectral data is provided that correctly sums to the broadband level, the broadband SWL is still 129 dB(A). ENBs previous comment noted that the CAMs criteria implied a SWL of 132.5 dB(A) for these vehicles. The predicted noise contours may therefore be under predicted for this reason by some 3 dB.

In the proponent response it is stated that the noise levels were modelled on  $L_{Aeq}$  based on the SWLs presented in the report with a conversion method to obtain statistical and maximum

levels for assessment purposes. It is not apparent where or how this conversion for assessment was employed in the report.

Following adjustment for the factors mentioned above, if  $L_{Aeq}$  SWLs are representative of maximum levels then, other than for Drag Race events, the modelled levels would represent conservative values. While the proponent response regarding conversion from  $L_{Aeq}$  levels to statistical levels appears to be an attempt at addressing ENB's previous comments by referring to relationships obtained from monitoring undertaken at similar motorsport events, no information is provided on what the monitored events consisted of. Apart from not indicating where or how the relationships were incorporated, as the type of motorsport events are quite diverse and the relationships between the parameters will vary with distance from the track, it is unknown if the relationships have relevance for the Albany Motorsport Park proposal.

### 3. *Table of Response, Section 7. Managing noise impacts.*

As noted in ENB's initial advice there are limited practical options to attenuate noise from motorsport venues. Practical options for noise mitigation at source can be categorized as either management or engineering.

While management options such as scheduling are discussed, consideration of not holding events in the more noise-sensitive evening time period has not been discussed, particularly as the evening events are not envisioned as part of Stage 1 of the development and further stages would no doubt be subject to ongoing consideration of economic viability. It is however understood that evening events can have considerably higher levels of entertainment value.

While some engineering options exist to attenuate the noise at source and while options such as barriers/bunds/walls have been mentioned, no analysis has been provided to indicate their practicality and no modelling of such options has been provided to indicate their efficacy. Once again, to determine the reduction in noise impact, the resulting modelled levels can be compared to the assigned levels and to the emergence above background.

Practical options for noise mitigation at the receiver consists of exposure minimization usually performed via planning tools to reduce the number of households located in areas affected by the noise, or noise attenuation to the existing receiving premises.

Options for noise exposure minimisation via planning instruments have affect only on new developments, existing residences are not captured in planning instrument options. Development of special control areas can specify construction and noise attenuation standards for new developments. Construction requirements can be based on a "deemed to comply" package concept such as that considered under *State Planning Policy 5.4: Road and Rail Transport Noise and Freight Considerations in Land Use Planning (SPP5.4)*. Note however that the use of  $L_{Aeq}$  (an energy averaging process) in SPP 5.4, while appropriate for constant or quasi-constant noise sources such as traffic noise, does not consider the emergence character of transient noise sources such as trains. Drag events would have similar emerging transient characteristics. Considering however that the frequency of such events may be limited the "deemed to comply" packages concept may have value in this motorsport complex context. However the assessment of impact and the choice of building packages requires correctly modelled levels and appropriate information on existing background noise levels. Consideration of the cost of employing the attenuation options in this rural location is required to determine its viability as an option.

For existing noise sensitive premises the employment of attenuation may be an option. The success of this option depends on the willingness of the owners of the receiving properties to accept noise attenuation as an offset for the noise intrusion and on the practicality of attenuation of the existing noise sensitive premises. While brick buildings in good condition can be attenuated to a certain extent by the application of treatments to windows, doors and ceilings, weatherboard or fibro buildings, particularly in poor condition, have limited ability to be attenuated. Survey of the existing noise sensitive buildings for viability regarding noise attenuation and of the existing owners for willingness to participate is required to determine if this approach has any value. Note that while appropriate buildings can be significantly attenuated, mechanical ventilation may need to be

installed to make them habitable and protection to outdoor areas via barriers has technical limitations.

The owners of the affected noise sensitive premises are under no obligation to participate in a noise attenuation scheme and can initiate a prosecution under section 79 of the Environmental Protection Act 1986 if they consider the noise to be unreasonable. Mitigation in the form of an offset package to vacate the house during noisy events may be an option.


The effect of noise reaches well beyond the area of the Albany Motorsports Precinct. There is no indication that the level of noise would be acceptable to the existing noise sensitive receivers and potentially to the new noise sensitive receivers that may be introduced into the area. The acceptability and practicality of noise attenuation to existing receivers and the feasibility of the creation of a special control area to limit the impact on new receivers needs to be determined before the viability of the motorsport precinct itself is determined. The possibility for economic viability should also be investigated, should the development not be able to proceed past Stage 1.

4. Regulation 16AA

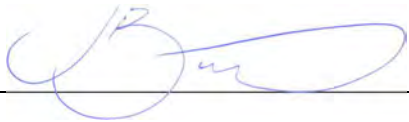
While development of a Noise Management Plan (NMP) for the purposes of r16AA of the *Environmental Protection (Noise) Regulations 1997* is premature at the scheme amendment stage, investigation into the underlying elements on which a NMP will rely is definitely required during this stage. NMPs include detailed information specific to the venue, some of which may be unknown until the venue has been operating. While modelling can indicate the likely noise levels that may be received at noise sensitive premises, direct experience by the receivers is more informative. Should noise mitigation subsequently be required it should be known what options are practicable. While r16AA allows for amendments to the NMPs to account for changes in operation, all broad brush elements required in a NMP have to be workable at the outset.

Hence at the scheme amendment stage investigation into at least the following is required:

- The practicality and efficacy of engineering noise mitigation at the source (bunds, enclosures etc),
- The practicality and viability of noise mitigation by management (limiting the number of events, no night time events etc),
- The acceptability of noise attenuation works to existing receiver premises,
- The practicality of noise attenuation to existing receivers (glazing, additional mass to ceilings etc),
- The feasibility of the creation of a special control area,
- The reasonability and practicality of requiring building attenuation packages in a special control area.

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ATTACHMENT 4

## REPORT ITEM DIS245 REFERS

### Attachment 4 - Department of Water and Environmental Regulation Comments on the Local Water Management Strategy

Item No.	Reference	Reviewer comment/advice
6	3.2.3 ASS mapping	The impacts of dewatering are considered in the ASS management plan if dewatering is required.
25	4.2 Wastewater servicing	Oil water separators, bunding and use of other measures are used to manage stormwater from vehicle maintenance areas and to minimise the impact of fuel and oil spills.
27	5. Stormwater management plan	A detailed stormwater management plan is referred to DWER for approval once the track designs and development footprint are finalised.
27	5.1 Stormwater quantity management	<ul style="list-style-type: none"> <li>• Uncontaminated runoff from imperious areas are only used for non-potable water supply.</li> <li>• Further information is provided within the stormwater management plan to address how the 2 m separation to groundwater of the basins will be achieved.</li> <li>• Further information is provided to show that all run-off from the tracks will be captured through swales and directed towards basins to ensure there is no water direct discharge into the creek.</li> <li>• Groundwater contours need to be shown within the stormwater management plan.</li> </ul>
29	5.1.2 Drainage management	<ul style="list-style-type: none"> <li>• The stormwater management plan should show how run-off from the tracks is captured through swales and directed towards treatment basins.</li> <li>• There should be no direct discharge of stormwater into the creek.</li> </ul>
37	5.2 Stormwater quality management	<ul style="list-style-type: none"> <li>• Bio-retention areas must be designed to treat stormwater contaminated with metals and hydrocarbons.</li> </ul>
37	5.2.3 Spill control and pollution management	Rainwater from chemical or fuel storage compounds should not be released unless tested and found to be uncontaminated. This water should be managed the same way as water in the oil/water separator.
39	5.2.4 Emergency response plan	The Emergency response plan is provided to the Water Corporation, City of Albany and Department of Fire and Emergency Services for advice
40	5.2.5 Non-structural measures - maintenance	Further information is provided on how cleaning of the drainage systems will be achieved without disturbing swale and basin vegetation
40	5.2.5 Non-structural measures – revegetation and landscaping	The Revegetation and landscaping plan is referred to DWER for approval Use of herbicides is in accordance with the <i>Use of herbicides in water catchment areas (Circular No: PSC88, Department of Health)</i>
40	5.2.6 Erosion and sediment control	A Construction Environmental Management Plan is referred to DWER for approval.
43	6.3 Groundwater monitoring strategy	The groundwater monitoring bore network is consulted with DWER prior to the operational phase of the facility. This includes monitoring bores used for the deeper aquifer.
45	7. Monitoring	<ul style="list-style-type: none"> <li>• The revised surface and groundwater monitoring plan is submitted to DWER for approval prior to operation of the facility.</li> <li>• Pre-development water monitoring data is used to identify water quality trigger levels at which a response is required.</li> <li>• A water quality response and contingency plan is prepared and provided to the Water Corporation, City of Albany and DWER for advice.</li> <li>• Annual water monitoring reports are submitted to DWER and the Water Corporation.</li> <li>• Water monitoring be required for the duration of the operation of the facility.</li> </ul>
45	7.1 Surface water monitoring	<ul style="list-style-type: none"> <li>• An upstream creek monitoring site is established.</li> <li>• Sampling is undertaken to assess performance of the basins in treating contamination.</li> </ul>

## REPORT ITEM DIS245 REFERS

		<ul style="list-style-type: none"> <li>• Microbial analysis is undertaken.</li> <li>• Monthly monitoring is required</li> <li>• Sampling is undertaken in response to spill events</li> </ul>
46	7.2 Groundwater monitoring	<ul style="list-style-type: none"> <li>• The proposed groundwater monitoring bore network is reviewed by DWER prior to the operational phase of the facility</li> <li>• Monitoring bores are established for the deeper aquifer to ensure contamination can be detected and remedial measures undertaken if required.</li> <li>• Microbial analysis is undertaken.</li> <li>• Monthly monitoring is undertaken.</li> <li>• A licence to construct a bore and take water is required</li> </ul>
47	7.4 Contingency measures	<ul style="list-style-type: none"> <li>• Pre-development water monitoring data should be used to identify water quality trigger levels at which a management response is required.</li> <li>• A water quality response and contingency plan is included in the surface and groundwater monitoring plan.</li> <li>• Other measures in addition to increased monitoring are used to address breaches of trigger levels.</li> </ul>



## **Guide to management of noise from motor sport venues**

*Environmental Protection (Noise) Regulations 1997*

**Produced and published by**

Department of Environment Regulation  
168 St Georges Terrace, Perth, Western  
Australia

July 2014

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## Purpose

The *Environmental Protection (Noise) Regulations 1997* (the Regulations) were amended in 2013 to introduce, among other things, specific management provisions for motor sport venues, shooting venues, major concert venues and waste collection and other works. The proposed amendment regulations went through a substantial public consultation in 2011, and have benefited from the input of local governments, key industry stakeholders and community members.

This document forms part of a series of guidelines prepared by the Department of Environment Regulation (DER) to assist users of the Regulations to implement them effectively.

These particular guidelines deal with Division 3 of the Regulations – motor sport venues.

Division 3 provides an ‘opt in’ approvals process that allows noise emissions to exceed the assigned noise levels in the Regulations provided motor racing activities in motor sport venues are carried out in accordance with an approved noise management plan for that venue.

In the vast majority of cases these approvals are to be granted by local government chief executive officers acting under delegation, the intention being that these decisions will be made at the local level. The Regulations set up a robust approval process designed to ensure transparency and accountability in the decision-making.

These guidelines on motor sport venues are intended for use by motor sport clubs, local governments and community members to aid in understanding the regulatory provisions; and to assist a venue in preparing its noise management plan and working through the approvals and appeals processes.

These guidelines have been developed with input from the following stakeholders:

- Confederation of Australian Motor Sport Ltd (CAMS);
- Department of Sport and Recreation;
- Kwinana Motorplex;
- Motorcycling Western Australia; and
- WA Speedway Commission Inc.

## Introduction

These guidelines have been prepared for use by local governments, motor sport venues and the community in the implementation of Division 3 – Motor sport venues, of the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

The Regulations set assigned (allowable) noise levels for various types of premises that receive noise from other premises. Those levels are set to provide a good level of protection for the noise receiver. There are many activities that occur in the community that cannot, however, reasonably and practicably meet those assigned levels, but retain a degree of acceptance, either because of the temporary nature of the activity or the perceived community benefit.

The Regulations make special provision for such activities, including construction noise, motor sports, recreational shooting, outdoor events and others.

In the case of a motor sport venue, good land use planning may be able to avoid noise problems in the first place – this may involve selection of a site for a new venue that is well away from sensitive receivers, or preventing encroachment by new residences into the noise-affected area around the venue.

Where a motor sport venue cannot practicably comply with the assigned noise levels, Division 3 of the Regulations allows the venue occupier to apply for a special approval. Under this approval the noise emissions from the venue are permitted to exceed the assigned levels in the Regulations provided the venue operates in accordance with an approved noise management plan (NMP) for the venue.

The NMP would be approved by the ‘delegate chief executive officer (CEO)’ – this means either the CEO of the Department of Environment Regulation (DER CEO), or the CEO of the local government (LG CEO), acting under delegated authority from the DER CEO. This delegation of authority was gazetted on 20 December 2013.

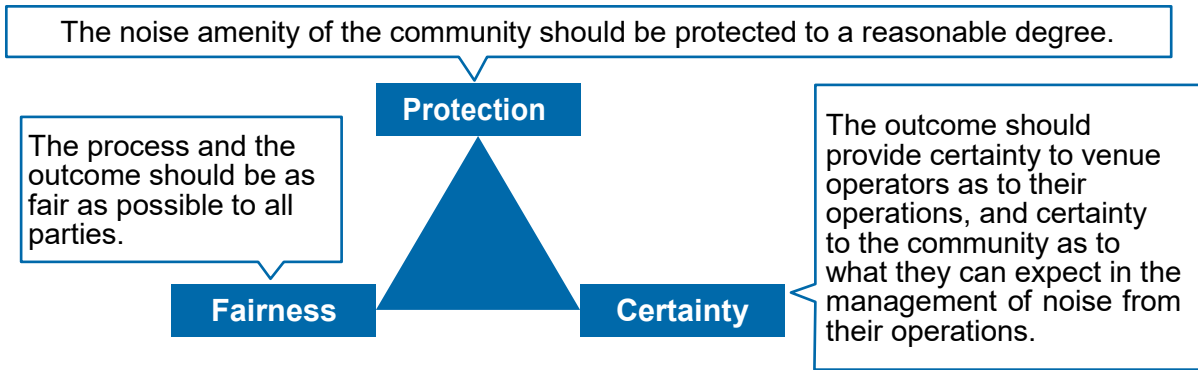
In general it is expected that applications under Division 3 would be made to the LG CEO, in order that the decision be made at the local level. Where an issue is of state significance the decision may be made by the DER CEO, however such decision would be made in consultation with the LG CEO. In this guideline, the term ‘delegate CEO’ will be used to refer to either the DER CEO or his delegate, the LG CEO, on the expectation that most issues will be dealt with by the LG CEO.

Division 3 contains several regulations within it that establish the process by which the approval is given, and the appeal provisions that allow for review of the delegate CEO’s decisions. These guidelines explain the various provisions within Division 3 and provide practical guidance on the implementation of the process.

The guidelines are not mandatory, but are intended to provide an effective approach to the process.

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One possible framework for consideration when working through the approval process is as follows:



## 1. Applying for approval of a noise management plan

### Regulation 16AA(1)

The occupier of a motor sport venue may apply to the CEO for approval of —

- (a) a noise management plan for the venue; or
- (b) an amendment of an approved noise management plan for the venue.

### 1.1. Who may apply?

The person who applies for approval must be the occupier of a ‘motor sport venue’, which is defined in regulation 16A to mean ‘premises approved or recognised by a motor sport organisation as premises at which motor vehicles or motor vessels may be raced’.

The venue must be a *bona fide* motor sport venue, approved or recognised by a ‘motor sport organisation’, if it is to qualify to have its noise management plan (NMP) approved. A list of motor sport organisations is included in regulation 16A (see [Appendix 1](#)).

The list of organisations also includes ‘any other motor sport organisation approved by the CEO for the purposes of this regulation’. This makes it possible for other relevant motor sport organisations not on the list to seek approval, in order that their affiliated venues may qualify to have their NMP’s approved. The ‘CEO’ who approves such an organisation must be the DER CEO, as the LG CEO does not have delegated power for this function.

A motor sport organisation seeking to use this provision is advised to contact DER in the first instance. The organisation would need to show evidence of its status as a *bona fide* motor sport organisation. When the DER CEO has approved a motor sport organisation, a motor sport venue that is approved or recognised by the organisation would be eligible to apply for approval of its NMP.

### 1.2. Is a venue required to apply?

No, the regulation states that a venue may apply, so it is the venue’s choice whether or not to avail themselves of this provision. A venue may be keen to apply if they feel it will assist in managing noise emissions within the overall scope of the Regulations.

The venues most likely to apply for approval of an NMP are those whose noise emissions are likely to exceed the assigned levels in the Regulations. This may (for example) become apparent through noise complaints, followed by noise monitoring by the local government. At this stage, the venue would become aware that it is vulnerable to potential enforcement action for breach of the assigned levels, and may see the need to seek the greater certainty offered by the Division 3 provisions.

### 1.3. Who does a venue apply to?

The application is made to the delegate CEO, who will generally be the CEO of the local government of the municipality where the venue is located (LG CEO); this person has delegated power to approve the application.

In the first instance the motor sport club would be well advised to contact their governing body to seek its guidance and support. The club (and perhaps the governing body representative) could arrange to meet with the delegate CEO and/or the environmental health section of the local government, and relevant local councillors, about making an application. The club could also consider contacting its neighbours who may experience noise, to seek their support.

### 1.4. Making an application

The application must be made by the venue occupier. Regulation 16AA does not require that an application be made on a specific form.

An application could include a draft NMP (see [4. Noise management plans](#)) and a covering letter from the applicant motor sport club. The application should confirm the affiliation with the governing body, and could include a letter of support from that body.

#### **Regulation 16AA(2)**

An application for approval under subregulation (1) is to be accompanied by an application fee of \$500, but the CEO may, in his or her discretion, waive or reduce the fee.

The application must be accompanied by an application fee of \$500. The intent is to provide for partial cost recovery for the resources that the local government will expend in processing the application; however, the fee has been set at a modest level to recognise the limited resources of many motor sport clubs.

The delegate CEO has discretion to waive or reduce the fee.

## 2. Consulting on the application

### Regulation 16AA(4)

Before making a decision under subregulation (3) the CEO —

- (a) must give the following a reasonable opportunity to make a submission on whether or not the plan or amendment should be approved —
  - (i) the occupier of any noise sensitive premises within 1 km of the motor sport venue;
  - (ii) the local government of each district in which noise emissions received from the venue are likely to fail to comply with the standard prescribed under regulation 7;
- and
- (b) may give any other person the CEO considers appropriate in the circumstances a reasonable opportunity to make a submission on whether or not the plan or amendment should be approved.

Before the delegate CEO makes a decision to approve, refuse or amend the application he or she must consult occupiers of neighbouring noise sensitive premises and affected neighbouring local governments. The delegate CEO may also consult other parties he or she considers appropriate in the circumstances.

### 2.1 Noise sensitive premises within one kilometre must be consulted

The delegate CEO is required to consult the occupier of any noise sensitive premises within one kilometre of the motor sport venue – the list of premises that are classed as noise sensitive premises is contained within Schedule 1 of the Regulations, and includes rural properties, residences, hospitals with fewer than 150 beds, educational premises, etc.

One way to ensure all relevant occupiers are consulted would be to draw a map with a line at one kilometre from the boundary of the motor sport venue premises; the occupiers of noise sensitive premises with land within the line would be consulted.

### 2.2 Affected neighbouring local governments must be consulted

The delegate CEO is required to consult ‘the local government of each district in which noise emissions from the venue are likely to fail to comply’ – this means that neighbouring local governments are to be consulted if the noise from the venue is likely to impact on their ratepayers. Noise measurements may be used to identify whether or not a neighbouring local government is affected; however, if it is not practicable to conduct measurements, the neighbouring local government could be consulted to gauge if the noise from the venue is clearly audible in the neighbouring shire. If unsure, it is sensible to err on the side of caution and consult.

### 2.3 The CEO may consult others as appropriate

Consultation with the occupiers of noise sensitive premises within one kilometre can be considered to be a minimum, and it is open to the delegate CEO to consult a wider group of interested persons. This wider group may include the owners and the occupiers of any commercial or industrial premises within the one kilometre line, and interested community members beyond.

It is also advisable that the LG CEO consult the CEO DER, who has oversight of the department's noise regulation function. The intent here is to utilise the department's noise expertise to ensure consistency of decisions and to assist in resolving difficult issues with the approval. Submissions could be sought from the relevant motor sport organisation and any other motor sport organisations with a direct interest. The delegate CEO may also give some thought as to whether there are others who should be consulted.

### 2.4 What form of consultation might be appropriate?

While regulation 16AA(4) requires that the delegate CEO seek submissions on 'whether or not the plan or amendment should be approved', this may be seen as a minimum standard; and consideration may be given to extending the consultation beyond the minimum, in order to provide an open process through which the community can have meaningful input into the decision on the NMP.

This open type of process is important in ensuring that issues are identified and articulated before a decision is made. These issues are best addressed at the local level, and indeed this is the clear intent of this regulatory system. Where the issues can be addressed in the NMP the outcomes are likely to be more positive than where the issues are put aside to be addressed through the appeals process.

### 2.5 Doing the consultation

It is common practice that the parties required to be consulted (see above), and others with a known interest, are contacted in writing. The consultation could also be advertised in a local newspaper and the relevant information placed on the local government's website and made available at their offices.

The delegate CEO could consider providing, or making available, a copy of the draft NMP for the venue and relevant supporting information such as an area map, summary of any noise monitoring results, and so on. Only an NMP which is complete, that is including all of the information required by regulation 16AA(7), would normally be referred for comment (see [4. Noise management plans](#)).

The various parties must be given 'a reasonable opportunity' to prepare their submissions. This may typically involve a period of at least four weeks (some local governments may need additional time in order to allow for council meeting dates).

The delegate CEO would be expected to consider all submissions carefully; a summary of submissions and responses could be prepared in order to provide feedback to submitters. It may also be appropriate to hold meetings with concerned

## Department of Environment Regulation

submitters in order to resolve issues and if necessary negotiate changes to the NMP that are workable for the venue occupier. It may also be appropriate to send out a revised NMP for further comment.

It is also important to document the steps in the consultation process, the issues addressed and any changes to the NMP.

### 3. Determining the application

#### **Regulation 16AA(3)**

The CEO may, in writing —

- (a) if the application is for the approval of a noise management plan — approve, or refuse to approve, the noise management plan for the motor sport venue; or
- (b) if the application is for an amendment of an approved noise management plan — approve, or refuse to approve, the amendment.

The decision will be made by the delegate CEO, generally the LG CEO acting under delegated powers. The decision will be confirmed in writing.

#### 3.1 Approval may be granted subject to conditions

#### **Regulation 16AA(5)**

An approval of a noise management plan under subregulation (3) —

- (a) may be granted subject to conditions imposed by the CEO; and
- (b) subject to subregulation (6) and regulation 16AC, has effect for the period specified in the approval.

In granting an approval the delegate CEO may set conditions that the approval is subject to. Where practicable, it is advisable to avoid such conditions and instead include these as measures in the NMP. Where an approval is granted subject to conditions, it is important in the interests of clarity that these conditions not impinge on or contradict the NMP, but that they instead relate to matters peripheral to the NMP. An example of a condition that the delegate CEO might set at the time of approval may be a condition requiring that the NMP be made publicly available at a specified location.

The delegate CEO may wish to seek legal advice in relation to proposed conditions to which the approval may be subject.



### 3.2 Length of approval

The notice of approval must specify the period for which the approval has effect. In setting this period the delegate CEO may give consideration to setting a period that is long enough to provide certainty of occupancy of the premises but not so long that the approval becomes obsolete.

By way of general guidance, the delegate CEO may consider setting an approval period of not less than five years and not more than 15 years. In the case of a venue's first approval, a period towards the shorter end of the range may be considered, thereby triggering a review of the NMP after a shorter initial period of operation. Where the premises on which the motor sport venue is situated are leased from the local government, the delegate CEO may consider setting the length of the approval to match the duration of the lease.

### 3.3 Ancillary measures

#### **Regulation 16AB(1) and (2)**

- (1) If the CEO approves or amends a noise management plan under regulation 16AA, the CEO may, by written notice given to the person whose plan was approved or amended, designate a measure in the plan to be an ancillary measure if the measure does not directly influence the level, duration or time of day of a noise emission.
- (2) An occupier of a motor sport venue must ensure that any ancillary measure relating to the venue is implemented.

Penalty: a fine of \$5 000.

The delegate CEO may also use the approval notice to designate a measure in the NMP as an 'ancillary measure' if the measure does not directly influence the level, duration or time of day of the noise emission. Examples of possible ancillary measures include the distribution of the program for race meetings and the operation of a complaints line – these measures do not influence the noise emission itself but are important in the management of the noise emissions.

It should be noted that only measures that are in the NMP can be designated as ancillary measures – for example the delegate CEO cannot designate a condition in his or her approval notice as an ancillary measure.

Ancillary measures are discussed further under [4. Noise management plans](#). A sample approval notice is at [Appendix 2](#).

### 3.4 Extension/renewal of a noise management plan

#### Regulation 16AA(6)

If the occupier of a motor sport venue for which an approved noise management plan (the **current plan**) has effect applies for approval of a new noise management plan for the venue not later than 3 months before the current plan would, apart from this regulation, cease to have effect (the **expiry day**), the current plan is taken to continue in effect from the expiry day until —

- (c) if the CEO approves the new noise management plan — the day on which the new plan has effect; or
- (d) if —
  - (i) the CEO refuses to approve the new noise management plan; and
  - (ii) at the end of the period within which an appeal against the decision may be lodged under regulation 16AE, no appeal has been lodged,
 the day after that period ends; or
- (e) if —
  - (i) the CEO refuses to approve the new noise management plan; and
  - (ii) an appeal is lodged under regulation 16AE against the decision to refuse to approve the new noise management plan,
 the day the appeal is concluded.

The period of approval can extend beyond the date set in the original approval, provided the venue applies for a new approval not later than three months before the current NMP ceases. In this case the approval will continue in effect until a decision is made on the new NMP, thus providing continuity. Venue occupiers who wish to apply for a new NMP approval should therefore note this date and ensure that the application for a further approval is made in good time.

### 3.5 Giving notice of approval or refusal

#### Regulation 16AD(1) and (2)

- (1) In this regulation —  
***appellable decision*** has the meaning given in regulation 16AE(1).
- (2) The CEO —
  - (a) must give a written notice of an appellable decision in respect of a noise management plan for a motor sport venue to the occupier of the motor sport venue; and
  - (b) may give written notice of the appellable decision to such other persons as the CEO thinks fit; and
  - (c) must cause notice, and such particulars as the CEO thinks fit, of the appellable decision to be published in the *Gazette*.

Many of the delegate CEO's decisions are open to appeal – these are called 'appellable decisions', and the delegate CEO is required to give written notice of these decisions.

Written notice must be given to the occupier of the motor sport venue and may be given to other such persons as the delegate CEO thinks fit. These persons could include those who made submissions on the NMP as part of the consultation process.

Particulars of the appellable decision must also be published in the *WA Government Gazette* – this sets the date for the start of the appeals period.

A sample *Gazette* notice advising of an appellable decision is in [Appendix 3](#).

Further guidance on appeals is presented under [6. Appeals](#).

## 4. Noise management plans

### 4.1 Preparing a noise management plan

#### Regulations 16AA(7) and (8)

- (7) The CEO must not approve a noise management plan for a motor sport venue unless the plan —
- (a) contains a map (current at the time of the application) showing the motor sport venue, including the area where motor vehicles or motor vessels are raced or prepared for racing and car parks used by competitors in races at and visitors to the venue; and
  - (b) contains a description of the types of racing activities that can reasonably be expected to be conducted at the venue and classes of vehicles or vessels that can reasonably be expected to race at the venue; and
  - (c) sets out limitations on the racing activities to be conducted and the times during which racing activities may be conducted; and
  - (d) contains details of reasonable and practicable measures to be implemented to control noise emissions from the venue during the conduct of a racing activity at the venue; and
  - (e) contains details of when and the manner in which notice of racing activities at the venue is to be published or distributed to members of the public; and
  - (f) specifies the persons who will be responsible for implementing the approved noise management plan and sets out each person's responsibilities; and
  - (g) contains a complaint response procedure.
- (8) For the purposes of subregulation (7)(f), the plan may —
- (a) specify a person by name; or
  - (b) specify a particular officer, or the holder of a particular office, by reference to the title of the office concerned.

The content that is required in an NMP is set out above, and the NMP can not be approved unless it addresses all seven items listed in regulation 16AA(7).

A sample NMP for a motor sport venue is included at [Appendix 4](#). Note that this is only an example, and the NMP should be developed so as to be specific to the venue.

In identifying the activities that the NMP will cover, note the broad definition of 'racing activity' in regulation 16A (see [Appendix 1](#)). Others may be able to assist in the drafting of the NMP, including the motor sport governing body, an acoustic consultant, the local government or DER.

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Where a motor sport venue operates under an industry code for the noise certification of race vehicles, the NMP could refer to the code in item (d) under ‘reasonable and practicable measures to control noise emissions’, and to the procedures for implementing the code. A copy of the code could be attached to the NMP so it is clear which code and version of the code is being followed when the NMP is approved.

Item (d) could also refer to other noise controls, e.g. for the public address system, for the arrival and departure of patrons and competitors, as relevant in the situation.

The NMP may also contain a procedure for informing club members of the NMP and their responsibilities in ensuring it is complied with.

### 4.2 Compliance with the noise management plan

#### **Regulation 16AA(9)**

Regulation 7 does not apply to noise emitted from a motor sport venue during the conduct of a racing activity at the venue if the racing activity is conducted in accordance with an approved noise management plan, excluding any ancillary measure, for the venue.

When the venue is operated in accordance with an approved NMP, the normal assigned noise levels in the Regulations do not apply to the noise emission. The NMP provides a form of exemption from the requirement to comply with the normal assigned levels.

If, however, the NMP is not being complied with – for example if a race meeting goes over the finishing time specified in the NMP – the exemption ceases to have effect and the assigned levels apply to the noise emission. The venue occupier would then be open to possible enforcement action for causing noise emissions that exceed the assigned levels. Similarly, if an activity takes place on a day that is not a nominated practice or meeting day, the assigned noise levels would apply.

It is therefore critical that the venue has the procedures in place to ensure that racing activities are conducted in accordance with the NMP.

### 4.3 Ancillary measures

If the delegate CEO has used the approval notice to designate a measure in the NMP as an ‘ancillary measure’ (i.e. a measure that does not directly influence the level, duration or time of day of the noise emission), the venue occupier must ensure that the measure is implemented (see [3.3 Ancillary measures](#)).

For example if an ancillary measure requires the distribution of the program for race meetings by a set date, then the club must ensure that the program is distributed by that date.

Ancillary measures differ from the other measures in the NMP. A breach of an ancillary measure may result in a direct penalty, but does not remove the exemption

provided by the approval of the NMP. On the other hand, as noted above, a breach of measure that relates directly to the noise emission removes the exemption provided by regulation 16AA(9) and allows the application of enforcement actions related to exceedence of the assigned levels.

## 5. Amendment and revocation of a noise management plan

### 5.1 How can a venue occupier have the noise management plan amended?

Where an NMP has been in place for some time, there may be a need for amendments to reflect changes in racing activities, and in this case the venue occupier may apply for approval of an amendment to an approved NMP (see [1. Applying for approval of a noise management plan](#)). This application is essentially the same as for approval of a new NMP and is to be accompanied by the \$500 application fee.

Before approving the amendment the delegate CEO must consult in the same manner as for a new NMP (see [2. Consulting on the application](#)).

Any person who disagrees with the delegate CEO's decision to approve or refuse the amendment to the NMP can appeal (see [6. Appeals](#)).

### 5.2 Can the CEO amend the noise management plan?

No, however if the delegate CEO would like an amendment then he or she could negotiate the amendment with the motor sport club. The club may then agree to apply for the amendment (see above).

If these negotiations are unsuccessful, the delegate CEO has the option of commencing revocation (see [5.3. Revocation of a noise management plan](#)), but only if the grounds for revocation are satisfied.

### 5.3 Revocation of a noise management plan

#### Regulation 16AC(1), (2), (3), (4) and (5)

- (1) An approved noise management plan for a motor sport venue ceases to have effect if approval of the plan is revoked under this regulation.
- (2) The CEO may revoke the approval of a noise management plan for a motor sport venue by written notice given to the occupier of the venue.
- (3) The grounds for revocation of a noise management plan for a motor sport venue are that the CEO is satisfied that —
  - (a) there has been a breach of a measure, other than an ancillary measure, in the plan; or
  - (b) there has been a breach of a condition imposed by the CEO under regulation 16AA(5)(a); or
  - (c) information contained in the plan, or contained in or supporting the application for approval of the plan, was false or misleading in a material respect; or
  - (d) the noise emissions from the venue have increased during the period the noise management plan has been in effect.
- (4) The CEO, before exercising the power of revocation under subregulation (2), must —
  - (a) give the occupier of the motor sport venue a reasonable opportunity to show cause in writing why that power should not be exercised; and
  - (b) give the persons referred to in regulation 16AA(4)(a) a reasonable opportunity to make a submission on whether or not that power should be exercised.
- (5) An opportunity is not a reasonable opportunity for the purposes of subregulation (4) unless the relevant person is informed of the right to show cause or make a submission under that subregulation not less than 90 days before the day on which the CEO exercises the power in question.

A delegate CEO who has approved an NMP also has the power to revoke it. In order to ensure fairness in the process, regulation 16AC sets out the procedures to be followed in relation to a revocation of an NMP approval.

Before starting a revocation process, the delegate CEO may consider first raising his or her concerns with the venue occupier to see if these can be resolved without resorting to revocation. If considering revocation, the delegate CEO must be satisfied that at least one of the grounds for revocation are met to the required standard (balance of probabilities), as set out above.

Essentially the process requires that the delegate CEO must give notice of his or her intent to revoke, thus initiating a 90-day consultation period. The delegate CEO

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must consult the venue occupier and the parties he or she was required to consult in assessing the original application for approval (see [2. Consulting on the application](#)). The intent is to allow time for negotiations to ensue to resolve issues, and to allow the venue occupier and residents time to prepare submissions. At the end of the 90-day period, if the delegate CEO decides to pursue revocation this is done by issuing a written notice to the venue occupier.

A decision to revoke an NMP approval can be appealed, and the approval remains in force while the appeals are being determined (see [‘6. Appeals’](#)).

In general it is expected that revocation would be used as a last resort, and that the approval normally be allowed to run for the period specified in the original approval. However, a decision not to revoke an approval should not stop other enforcement action being taken for a breach of the approval.

## 6. Appeals

### Regulation 16AE(1), (2), (3), (4) and (5)

- (1) A person aggrieved by any of the following decisions (an **appellable decision**) of the CEO may lodge with the Minister an appeal in writing setting out the grounds of that appeal —
  - (a) the approval of a noise management plan for a motor sport venue;
  - (b) the refusal to approve a noise management plan for a motor sport venue;
  - (c) the approval of an amendment to an approved noise management plan for a motor sport venue;
  - (d) the refusal to approve an amendment to an approved noise management plan for a motor sport venue;
  - (e) the imposition of a condition on the approval of a noise management plan for a motor sport venue;
  - (f) the specification under regulation 16AA(5) of a period as the period for which the approval of a noise management plan for a motor sport venue has effect;
  - (g) the revocation of the approval of a noise management plan.
- (2) The appeal must be lodged within 21 days of publication of notice of the decision under regulation 16AD(2)(c).
- (3) Pending the determination of an appeal lodged under subregulation (1) (a), (b) or (f), the decision against which that appeal is lodged continues to have effect.
- (4) Pending the determination of an appeal lodged under subregulation (1) (c), (d), (e) or (g) the decision is to be taken not to have been made.
- (5) Sections 105 to 110 of the Act apply to an appeal lodged under subregulation (1) as if that appeal were an appeal referred to in section 102(1) of the Act.



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An 'appealable decision' is a decision of the delegate CEO that can be appealed. Appeals under these regulations are dealt with by the Appeals Convenor (see the *Environmental Protection Act 1986*) with the decision being made by the Minister for Environment.

### 6.1 Can I appeal the delegate CEO's decisions?

Any person who is aggrieved by an appealable decision may lodge an appeal, that is, the venue occupier or any member of the community. Most of the decisions made by the CEO under these regulations can be appealed (see above). There are two decisions of the delegate CEO that cannot be appealed:

- decision to waive or reduce the application fee under regulation 16AA(2); or
- decision to designate a measure in an NMP as an 'ancillary measure' under regulation 16AB(1).

### 6.2 How will I know when an appeal can be lodged?

Regulation 16AD requires the delegate CEO to give adequate notice of the appealable decision (see [3.5 Giving notice of approval or refusal](#)). He or she must give written notice to the venue occupier, and may give notice to other persons as he or she sees fit (generally those who have made a submission in relation to the NMP). The delegate CEO must also publish notice of the decision in the *Government Gazette*. This publication date starts the 21-day appeal period, and appeals must be lodged within 21 days of the gazettal date.

If you have an interest in the delegate CEO's decision it is recommended that you contact the local government concerned and ask to be notified of the gazettal of the decision.

### 6.3 How do I lodge an appeal?

Appeals are to be addressed to the Minister for Environment and lodged with:

**Appeals Convenor for the Environmental Protection Act**  
**Level 22, Forrest Centre**  
**221 St Georges Terrace**  
**PERTH WA 6000**

Appeals can also be lodged by hand delivery, by email to [admin@appealsconvenor.wa.gov.au](mailto:admin@appealsconvenor.wa.gov.au) or by fax to (08) 6467 5199.

The grounds for the appeal must be clearly stated. The appeal must be accompanied by a \$50 fee.

For further information about appeals, see 'Types of appeal, Noise Regulations' on the Appeals Convenor's website [www.appealsconvenor.wa.gov.au](http://www.appealsconvenor.wa.gov.au) or phone (08) 6467 5190.

## 6.4 What happens to the CEO's decision while under appeal?

Regulations 16AE(3) and (4) specify what happens to a decision of the delegate CEO while it is under appeal. Decisions to approve or refuse an NMP and to set the period of approval remain in force while the appeals are being determined. This means for example that, if the delegate CEO has decided to approve an NMP, then the approval remains in force while any appeals are being determined.

## 6.5 How is the appeal decision made?

In considering appeals, the Appeals Convenor follows the procedures given under Part VII of the *Environmental Protection Act 1986*. The Appeals Convenor must consult the delegate CEO, but may also consult other persons, and in doing so can consider any or all of the information that the delegate CEO's decision was based upon. The Appeals Convenor's advice on the appeal is sent to the Minister for Environment, who makes the final decision about the appeal.

## Appendix 1

### *Environmental Protection (Noise) Regulations 1997* Division 3 – Motor sport venues

**Note:** The following is not an official reprint of the legislation.

#### Division 3 — Motor sport venues

*[Heading inserted in Gazette 5 Dec 2013 p. 5673.]*

#### 16A. Terms used

In this Division —

**ancillary measure** means a measure designated to be an ancillary measure under regulation 16AB(1);

**approved noise** management plan means a noise management plan approved under regulation 16AA, as amended from time to time, that has effect;

**motor sport organisation** means any of the following organisations —

- (a) Australian National Drag Racing Association;
- (b) Australian Power Boat Racing Association;
- (c) Confederation of Australian Motor Sport Limited;
- (d) Motorcycling Australia;
- (e) Motorcycling Western Australia;
- (f) National Association of Drag Racing Inc.;
- (g) National Association of Speedway Racing;
- (h) Western Australian Speedway Commission;
- (i) any other motor sport organisation approved by the CEO for the purposes of this regulation;

**motor sport venue** means premises approved or recognised by a motor sport organisation as premises at which racing activities may be conducted;

**racing activity** means racing of motor vehicles or motor vessels conducted as part of a competition day, practice or training session, exhibition run, trial, test, entertainment event, promotion or other similar activity.

*[Regulation 16A inserted in Gazette 5 Dec 2013 p. 5673 -4.]*

#### 16AA. Approval of noise management plan: motor sport venue

- (1) The occupier of a motor sport venue may apply to the CEO for approval of —
  - (a) a noise management plan for the venue; or
  - (b) an amendment of an approved noise management plan for the venue.

## Department of Environment Regulation

- (2) An application for approval under subregulation (1) is to be accompanied by an application fee of \$500, but the CEO may, in his or her discretion, waive or reduce the fee.
- (3) The CEO may, in writing —
- (a) if the application is for the approval of a noise management plan — approve, or refuse to approve, the noise management plan for the motor sport venue; or
  - (b) if the application is for an amendment of an approved noise management plan — approve, or refuse to approve, the amendment.
- (4) Before making a decision under subregulation (3) the CEO —
- (a) must give the following a reasonable opportunity to make a submission on whether or not the plan or amendment should be approved —
    - (i) the occupier of any noise sensitive premises within 1 km of the motor sport venue;
    - (ii) the local government of each district in which noise emissions received from the venue are likely to fail to comply with the standard prescribed under regulation 7;
 and
  - (b) may give any other person the CEO considers appropriate in the circumstances a reasonable opportunity to make a submission on whether or not the plan or amendment should be approved.
- (5) An approval of a noise management plan under subregulation (3) —
- (a) may be granted subject to conditions imposed by the CEO; and
  - (b) subject to subregulation (6) and regulation 16AC, has effect for the period specified in the approval.
- (6) If the occupier of a motor sport venue for which an approved noise management plan (the **current plan**) has effect applies for approval of a new noise management plan for the venue not later than 3 months before the current plan would, apart from this regulation, cease to have effect (the **expiry day**), the current plan is taken to continue in effect from the expiry day until —
- (a) if the CEO approves the new noise management plan — the day on which the new plan has effect; or
  - (b) if —
    - (i) the CEO refuses to approve the new noise management plan; and
    - (ii) at the end of the period within which an appeal against the decision may be lodged under regulation 16AE, no appeal has been lodged, the day after that period ends; or
  - (c) if —
    - (i) the CEO refuses to approve the new noise management plan; and
    - (ii) an appeal is lodged under regulation 16AE against the decision to refuse to approve the new noise management plan, the day

the appeal is concluded.

- (7) The CEO must not approve a noise management plan for a motor sport venue unless the plan —
- (a) contains a map (current at the time of the application) showing the motor sport venue, including the area where motor vehicles or motor vessels are raced or prepared for racing and car parks used by competitors in races at and visitors to the venue; and
  - (b) contains a description of the types of racing activities that can reasonably be expected to be conducted at the venue and classes of vehicles or vessels that can reasonably be expected to race at the venue; and
  - (c) sets out limitations on the racing activities to be conducted and the times during which racing activities may be conducted; and
  - (d) contains details of reasonable and practicable measures to be implemented to control noise emissions from the venue during the conduct of a racing activity at the venue; and
  - (e) contains details of when and the manner in which notice of racing activities at the venue is to be published or distributed to members of the public; and
  - (f) specifies the persons who will be responsible for implementing the approved noise management plan and sets out each person's responsibilities; and
  - (g) contains a complaint response procedure.
- (8) For the purposes of subregulation (7)(f), the plan may —
- (a) specify a person by name; or
  - (b) specify a particular officer, or the holder of a particular office, by reference to the title of the office concerned.
- (9) Regulation 7 does not apply to noise emitted from a motor sport venue during the conduct of a racing activity at the venue if the racing activity is conducted in accordance with an approved noise management plan, excluding any ancillary measure, for the venue.

*[Regulation 16AA inserted in Gazette 5 Dec 2013 p. 5674 -7.]*

#### **16AB. Ancillary measures: motor sport venue**

- (1) If the CEO approves or amends a noise management plan under regulation 16AA, the CEO may, by written notice given to the person whose plan was approved or amended, designate a measure in the plan to be an ancillary measure if the measure does not directly influence the level, duration or time of day of a noise emission.
- (2) An occupier of a motor sport venue must ensure that any ancillary measure relating to the venue is implemented.

Penalty: a fine of \$5 000.

*[Regulation 16AB inserted in Gazette 5 Dec 2013 p. 5677.]*

**16AC. Revocation of noise management plan for motor sport venue**

- (1) An approved noise management plan for a motor sport venue ceases to have effect if approval of the plan is revoked under this regulation.
- (2) The CEO may revoke the approval of a noise management plan for a motor sport venue by written notice given to the occupier of the venue.
- (3) The grounds for revocation of a noise management plan for a motor sport venue are that the CEO is satisfied that —
  - (a) there has been a breach of a measure, other than an ancillary measure, in the plan; or
  - (b) there has been a breach of a condition imposed by the CEO under regulation 16AA(5)(a); or
  - (c) information contained in the plan, or contained in or supporting the application for approval of the plan, was false or misleading in a material respect; or
  - (d) the noise emissions from the venue have increased during the period the noise management plan has been in effect.
- (4) The CEO, before exercising the power of revocation under subregulation (2), must —
  - (a) give the occupier of the motor sport venue a reasonable opportunity to show cause in writing why that power should not be exercised; and
  - (b) give the persons referred to in regulation 16AA(4)(a) a reasonable opportunity to make a submission on whether or not that power should be exercised.
- (5) An opportunity is not a reasonable opportunity for the purposes of subregulation (4) unless the relevant person is informed of the right to show cause or make a submission under that subregulation not less than 90 days before the day on which the CEO exercises the power in question.

*[Regulation 16AC inserted in Gazette 5 Dec 2013 p. 5678 -9.]*

**16AD. Notice of appellable decision**

- (1) In this regulation —
 

***appellable decision*** has the meaning given in regulation 16AE(1).
- (2) The CEO —
  - (a) must give a written notice of an appellable decision in respect of a noise management plan for a motor sport venue to the occupier of the motor sport venue; and
  - (b) may give written notice of the appellable decision to such other persons as the CEO thinks fit; and
  - (c) must cause notice, and such particulars as the CEO thinks fit, of the appellable decision to be published in the *Gazette*.

*[Regulation 16AD inserted in Gazette 5 Dec 2013 p. 5679.]*

**16AE. Appeals against decisions in respect of noise management plan for motor sport venue**

- (1) A person aggrieved by any of the following decisions (an **appellable decision**) of the CEO may lodge with the Minister an appeal in writing setting out the grounds of that appeal —
  - (a) the approval of a noise management plan for a motor sport venue;
  - (b) the refusal to approve a noise management plan for a motor sport venue;
  - (c) the approval of an amendment to an approved noise management plan for a motor sport venue;
  - (d) the refusal to approve an amendment to an approved noise management plan for a motor sport venue;
  - (e) the imposition of a condition on the approval of a noise management plan for a motor sport venue;
  - (f) the specification under regulation 16AA(5) of a period as the period for which the approval of a noise management plan for a motor sport venue has effect;
  - (g) the revocation of the approval of a noise management plan.
- (2) The appeal must be lodged within 21 days of publication of notice of the decision under regulation 16AD(2)(c).
- (3) Pending the determination of an appeal lodged under subregulation (1)(a), (b) or (f), the decision against which that appeal is lodged continues to have effect.
- (4) Pending the determination of an appeal lodged under subregulation (1)(c), (d), (e) or (g) the decision is to be taken not to have been made.
- (5) Sections 105 to 110 of the Act apply to an appeal lodged under subregulation (1) as if that appeal were an appeal referred to in section 102(1) of the Act.

*[Regulation 16AE inserted in Gazette 5 Dec 2013 p. 5679 -80.]*

## Appendix 2

### Sample approval notice of a noise management plan for a motor sport venue

#### Local Government A

#### **ENVIRONMENTAL PROTECTION (NOISE) REGULATIONS 1997 DIVISION 3 – MOTOR SPORT VENUES**

#### **NOTICE OF APPROVAL OF A NOISE MANAGEMENT PLAN FOR A MOTOR SPORT VENUE**

1. WHEREAS I AM SATISFIED THAT:

- (a) Motor Sport Venue Occupier A is the occupier of MS Venue X (full address of MS Venue X) ('the venue');
- (b) the venue, being approved by the Confederation of Australian Motor Sports as premises at which racing activities may be conducted, is a motor sport venue for the purposes of Division 3 of the *Environmental Protection (Noise) Regulations 1997* ('the Regulations');
- (c) Motor Sport Venue Occupier A has applied for approval of a noise management plan, being the 'Noise Management Plan – MS Venue X' dated XX Month 20XX ('the plan') for the venue in accordance with regulation 16AA(1) of the Regulations;
- (d) the plan includes the information required by regulation 16AA(7) of the Regulations; and
- (e) the persons specified in regulation 16AA(4) of the Regulations have been given a reasonable opportunity to make a submission on whether or not the plan should be approved,

NOW I HEREBY APPROVE the plan, subject to the conditions contained in Clause 3 below, for the purposes of Division 3 of the Regulations ('the approval').

2. The approval has effect for a period of ten (10) years from the date of publication in the *Gazette*.
3. The approval is subject to the following conditions:
  - (a) The venue occupier is to notify the CEO of Local Government A of the name and contact details of the person appointed as the speedway manager within 30 days of such appointment.
4. The following measures in the plan are HEREBY DESIGNATED AS ANCILLARY MEASURES for the purposes of Division 3 of the regulations:
  - (a) Measure 6. Notice of Racing Activities – Items 1 to 5
  - (b) Measure 7. Complaint Response Procedure – Items 1 to 6
  - (c) Measure 8. Records – Items 8.1, 8.2 (Items 1 to 5) and 8.3.

Dated the XX day of Month 20XX

(Signed)

**CHIEF EXECUTIVE OFFICER**

Local Government A

(Person delegated under section 20 of the *Environmental Protection Act 1986*)



## Appendix 3

### Sample gazettal notice of an appellable decision

**ENVIRONMENTAL PROTECTION ACT 1986  
NOTICE OF APPELLABLE DECISION**

It is hereby notified for public information that the Chief Executive Officer of Local Government A, acting under delegation from the CEO under the *Environmental Protection Act 1986*, has made the following appellable decisions pursuant to Division 3 of the *Environmental Protection (Noise) Regulations 1997*, in relation to an application for approval of a Noise Management Plan for a motor sport venue, namely the 'Noise Management Plan – MS Venue X' dated XX Month 20XX:

- (a) approval of the noise management plan for the motor sport venue;
- (b) the imposition of conditions on the approval of the noise management plan for the motor sport venue; and
- (c) the specification of the period of 10 years as the period for which the approval has effect.

Copies of the noise management plan and the approval notice, including the conditions of the approval, are available from Local Government A offices at full address of Local Government A, or from Local Government A's website: [www.localgovernmenta.wa.gov.au](http://www.localgovernmenta.wa.gov.au).

Any person who is aggrieved by any of the above decisions may lodge an appeal.

An appeal must be lodged within 21 days from the date of publication of this notice in the *Gazette*. The grounds for the appeal must be clearly stated.

Appeals are to be addressed to the Minister for Environment and lodged with –

**Appeals Convenor for the Environmental Protection Act  
Level 22, Forrest Centre  
221 St Georges Terrace  
PERTH WA 6000**

Appeals can also be lodged by hand delivery, by email to [admin@appealsconvenor.wa.gov.au](mailto:admin@appealsconvenor.wa.gov.au) or by fax to (08) 6467 5199.

The appeal must be accompanied by a \$50 fee. For further information about appeals, see 'Types of appeal, Noise Regulations' on the Appeals Convenor's website [www.appealsconvenor.wa.gov.au](http://www.appealsconvenor.wa.gov.au) or phone (08) 6467 5190.

Dated the XX day of Month 20XX

(Name)  
**CHIEF EXECUTIVE OFFICER**  
Local Government A

## Appendix 4

### Sample noise management plan for a motor sport venue

(SAMPLE ONLY)

#### MOTOR SPORT VENUE OCCUPIER A NOISE MANAGEMENT PLAN – MS VENUE X

This noise management plan ('the NMP') has been approved by the CEO of Local Government A ('the CEO') for the purposes of Division 3 of the *Environmental Protection (Noise) Regulations 1997*.

#### 1. VENUE DETAILS

- Name of venue:** MS Venue X ('the speedway')
- Location of venue:** Full address of MS Venue X
- Occupier of venue:** Motor Sport Venue Occupier A ('the occupier')
- Affiliations:** Confederation of Australian Motor Sport (CAMS)  
WA Speedway Commission
- Venue maps:** Attachment 1 – Map of venue showing facilities  
[regulation 16AA(7)(a)]

#### 2. APPLICATION

The NMP applies –

- 1) while the occupier is the leaseholder of the speedway;
- 2) to racing activities at the speedway organised by the occupier;
- 3) to the emission of noise during a racing activity at the speedway; and
- 4) from the date of approval by the CEO until the expiration of the approval.

Regulation 7 of the *Environmental Protection (Noise) Regulations 1997* does not apply to noise emitted from the speedway during a racing activity if the activity is conducted in accordance with the NMP.

The occupier must ensure that the conditions and ancillary measures designated as such in the CEO's approval notice are implemented.

#### 3. TYPES OF RACING ACTIVITIES AND CLASSES OF VEHICLES [regulation 16AA(7)(b)]

##### 3.1 Types of racing activities covered by the NMP:

Club meets, state trials, practice sessions, vehicle tests, exhibitions and special events.

**3.2 Classes of vehicles:**

Super sedans, sprint cars, late model sedans, special exhibition vehicles and various other vehicles of smaller engine capacity.

**4. LIMITATIONS ON RACING ACTIVITIES [regulation 16AA(7)(c)]****Scheduled race meetings and practice sessions**

The following limits apply to scheduled race meetings and practice sessions at the speedway:

1. A race meeting or practice session can only take place between 1 October of one year and 31 May of the following year ('season').
2. Racing can only take place at a race meeting or practice session.
3. Racing vehicles are not to be operated at the speedway at any time other than a race meeting or practice session.
4. No more than 10 race meetings are to be held during a season.
5. Race meetings are to be held only on Friday or Saturday, except that a race meeting may be held on a Sunday preceding a public holiday.
6. In addition to the 10 race meetings per season, a preliminary meeting may be held to conduct tests on racing vehicles to establish their compliance with the NMP.
7. A race meeting can only be held on consecutive days once per season.
8. The races at a meeting can only take place within a five-hour period on any one day.
9. The five-hour period must be between midday and 10.00 pm. on any one day.
10. A practice session may be held in the four-hour period immediately preceding the start of a race meeting, but is not to commence before 9.00am.

**Special events**

Where a special event that is to be open to the public is proposed to be held at the venue, but the event cannot be conducted within the limits for scheduled race meetings and practice sessions, the occupier is to apply to the CEO for approval of the event under regulation 18.

**5. MEASURES TO CONTROL NOISE EMISSIONS [regulation 16AA(7)(d)]****5.1 Access to race track**

In order to prevent noise emissions due to unauthorised use of the race track by racing vehicles, the gates to the race track are to remain locked at all times other than:

- a) in preparation for and during race meetings, practice sessions and special events approved by the CEO;

- b) during maintenance or improvement of speedway facilities; and
- c) when in use for equestrian activities authorised by the speedway manager.

### **5.2 Public address system noise**

The PA system consists of eight loudspeaker towers placed at the back of the spectator areas, facing towards the track and angled down at 45 degrees. The loudspeakers are not to be moved or adjusted by any person without the approval of the speedway manager.

Noise emissions from the public address system at the speedway are to be under the control of the speedway manager, who is to designate persons who are authorised to use the system.

The public address system controls are to be set to provide a suitable audience sound level during the preliminary meeting each year, with the assistance of such persons as the speedway manager requires, ensuring the minimum practicable 'spill' of sound into nearby noise-sensitive areas.

The public address cabinet is to be locked for access only by the speedway manager and his authorised assistants at all other times.

The public address system will only be used during race meetings; it is not to be used during practice sessions or at any other time except in the case of an emergency.

### **5.3 Certification of racing vehicles**

Each sprint car, super sedan or late model sedan that is to race at a race meeting at the speedway must have a current certificate indicating that its noise level does not exceed the noise limit specified in the CAMS test procedure when tested in accordance with that procedure ('noise limit').

The CAMS test procedure referred to above is attached to and forms part of this NMP.

### **5.4 Scrutiny of racing vehicles**

1. A steward shall be designated for the duration of a race meeting and practice session to verify noise certificates and to evaluate noise emissions from race vehicles.
2. The steward may reject a certificate and require a new test if not satisfied with the noise test on which the certificate is based or if he considers that a racing vehicle has been modified to the extent that the certificate is no longer representative of noise emission from the vehicle.
3. If a racing vehicle at the speedway emits a level of noise that is conspicuously louder than that of the other racing vehicles in the same class at the meeting, the steward may require that vehicle to immediately cease racing, and may prevent that vehicle from further racing at the speedway until that vehicle's noise level has been shown to comply with the noise limit.

**5.5 Review of racing activities in response to noise complaint**

If complaints are made during a racing activity the occupier will review racing activities to reduce noise where practicable for the remainder of that event.

**5.6 Written instruction to members**

The club management committee shall provide all club members with a written instruction explaining the noise issues, the member's responsibility to maintain the noise limitation requirements.

**6. NOTICE OF RACING ACTIVITIES [regulation 16AA(7)(e)]**

Notice of the program for racing activities for a season is to be published and distributed to members of the public as follows:

1. The notice is to be published in the '*Name of Local Community Newspaper*', showing proposed dates of racing activities (where known) for the coming season and the telephone number for noise complaints.
2. In addition to (1), the notice is to be delivered to the address of each noise sensitive premises at locations within 1km of the venue.
3. The notice is to be published and delivered during September of the year in which the season starts.
4. A change to the racing program is to be published in the '*Name of Local Community Newspaper*' and a notice provided in accordance with (2) above within four weeks before the changed meeting is to occur.
5. Notice of a special event approved by the CEO is to be given in accordance with the conditions of the approval.

**7. COMPLAINT RESPONSE PROCEDURE [regulation 16AA(7)(g)]**

1. A designated telephone line will be manned during racing activities for the receipt of noise complaints.
2. A complaint received will be recorded on the noise complaint form.
3. All complaints will be treated with due consideration and investigated and responded to as appropriate.
4. The occupier will as far as practicable provide advice to the complainant within 48 hours as to the outcomes of the investigation and where appropriate, any proposed modifications to operations.
5. The results of complaint investigations, details of measures taken or considered to reduce noise emissions under Measure 5.5 and an outline of the responses given to the complainant shall be recorded on the noise complaint form.
6. Completed noise complaint forms will be retained at the speedway for the period of the approval and made available to the CEO on request.

**8. RECORDS****8.1 Record of vehicle tests**

The occupier is to retain records of all tests of race vehicles under Measure 5.3 for a period of two years.

**8.2 Record of loud racing vehicles**

The occupier is to make a record of all racing vehicles that have been required to cease racing by the steward under Measure 5.4 (Item 3) and retain that record for 2 years in a form that shows:

- 1) details of the racing vehicle required to cease racing;
- 2) the racing vehicle's owner;
- 3) the date and time at which the request to cease racing occurred;
- 4) the action taken by the driver of the racing vehicle following the request; and
- 5) the action taken by the owner of the racing vehicle to remedy the excessive noise emissions.

**8.3 Records to be forwarded on request**

If requested to do so in writing by the CEO, the occupier is to forward a copy of all or any of the records made under Measure 8.2 within 21 days of the request.

**9. RESPONSIBILITIES [regulation 16AA(f)]**

<b>Club committee:</b>	Appointment of speedway manager Development of program for scheduled race meetings
<b>Speedway manager:</b>	Implementation of the NMP Designation and training of stewards Control of public address system
<b>Steward:</b>	Scrutiny of racing vehicles

Schedule of Submissions/Recommendations				
Local Planning Scheme Amendment No.35				
Lot 5780 Down Road South, Drome				
No.	Public/Agency	Summary of Submissions	City of Albany – Recommendations	City of Albany - Comment
<p><i>Note: This is a broad summary of the submissions only. A copy of the submissions in full has been provided to the Council as a separate document.</i></p>				
<b>GENERAL SUPPORT</b>				
1.	Public	<p>Extremely beneficial to Albany and districts by creating a safe governed area dedicated to motor enthusiasts.</p> <p>Motor sports are family orientated community events that utilise the services of many volunteers associated with each club or organisation.</p> <p>Sports encourage community spirit, social connectedness and healthy bodies and minds.</p> <p>There is currently nowhere for our youth to ride in the Albany area in a controlled environment.</p> <p>This development will be great for the local economy, there is a lot of pre-existing interest in motorsport in Albany so makes sense to create a purpose built venue. In 2013, Australian motor sport generated \$2.7 billion in direct industry output, \$1.2 billion in direct value add, and 16,181 direct jobs (Ernst and Young, 2013).</p>	<p>Note comment of support.</p> <p><b>No modifications recommended.</b></p>	<p>The City received several submissions with supporting comments.</p> <p>There is an evident need for a dedicated motorsports area.</p>
<b>STRATEGIC PLANNING</b>				
2.	Public	<p>The site selected for the proposed Motorplex complex (Lot 5780) is in conflict with, and does not comply with the Albany Local Planning Strategy 2019.</p> <p>For example, in relation to water resources, the Albany Local Planning Strategy states:</p> <p><i>Water resources within the City have important environmental, social and economic values. The availability and the quality of our water resources are critical to the City's environment and economy.</i></p> <p>In relation to potential land use conflict with neighbouring agricultural and rural land use, the Albany Local Planning Strategy states that the Strategy will:</p> <p><i>Protect rural land from urban sprawl and inappropriate subdivision and development.</i></p>	<p>Note comment relating to the City's Local Planning Strategy.</p> <p><b>No modifications recommended.</b></p>	<p>The amendment is considered to be a 'complex' amendment as it is not consistent with the endorsed local planning strategy for the scheme.</p> <p>The City's Local Planning Strategy seeks to ensure that future development occur such that environmental attributes and the integrity of agriculture is not implicated.</p> <p>The amendment report has provided justification to ensure that environmental attributes and agriculture integrity is not implicated. The amendment report has validated that:</p> <ul style="list-style-type: none"> <li>• No significant effect will occur on agricultural land protection objectives of the region (the subject Lot represents just 0.23% of the total Priority Agriculture zoned land in the City of Albany); and</li> <li>• The proposal to develop the land for motorsport facilities is to occur in accordance with an environmental management plan, which is to ensure development occur such that environmental factors (e.g. groundwater and flora and fauna) are not impacted.</li> </ul>

		<p>Furthermore, in relation to protecting environmental assets and values, the Albany Local Planning Strategy states:</p> <p><i>Biodiversity in the south-west is globally significant, due to rare and priority flora and Threatened and Priority Ecological Communities, including the diverse plants, animals and habitat types that minimise the risk of soil erosion and rising water tables. The natural environment is also a key attractor for many residents and visitors to the district.</i></p>		
3.	Public	<p>The amendment is based on two facilities being built, one for motocross and one as a multi-use track.</p> <p>Once the City of Albany has successfully amended Lot 5780 Down Road South and leased it to interested parties to develop into a Motorsports Park, the property will be altered significantly. When the Great Southern Motorplex ceases leasing this land will it be required to restore the land to be suitable for grazing again?</p>	<p>Note comment relating to the restoration of the site.</p> <p><b>No modification recommended.</b></p>	<p>The scheme amendment proposes a provision, which requires the development and implementation of a Decommissioning Management Plan.</p> <p>A Decommissioning Management Plan identifies action for rehabilitation of the site, if / when motorsports cease to operate at the Lot 5780.</p>
<b>TOURISM</b>				
4.	Agency Tourism WA	<p>Tourism WA is generally supportive of the project and resulting scheme amendment.</p>	<p>Note comment relating to Tourism.</p> <p><b>No modifications recommended.</b></p>	<p>No tourism related issues were raised by Tourism WA.</p> <p>Motor sporting activities developed in a controlled area is expected to bring tourism related benefits to the Great Southern Region.</p>
5.	Public	<p>The proposed motorsports complex has environmental implications and is therefore not in-keeping with Albany's vision for tourism in the region.</p> <p>Amazing South Coast brand comprises of pristine, natural, eco-friendly attractions that have minimal impact on the environment.</p> <p>If left unchecked, large-scale tourism development can damage ecosystems, pollute environments and exploit local communities.</p> <p>According to the Centre for Responsible Travel, Responsible tourism aims to minimize tourism's negative impacts on the environment and maximize the positive contributions tourism can make to local communities.</p>		<p>Motorsport supplements the quality of tourists' experience and has become a vital component in the marketing mix for many tourist destinations.</p> <p>The scheme amendment seeks to introduce conditions to ensure that a motorsport facility at Lot 5780 is undertaken to minimize negative impacts on the environment and local residents. Environmental management measures for incorporation into the development of a motor sporting facility at the subject site include:</p> <ul style="list-style-type: none"> <li>• Water management plan</li> <li>• Hydrocarbon management plan</li> <li>• Dust management plan</li> <li>• Acid sulfate soils management plan</li> <li>• Vegetation management plan</li> <li>• Decommissioning management plan</li> <li>• Visual management plan.</li> </ul> <p>The scheme amendment proposes a provision (Provision 4a) to ensure the development and implementation of a Noise Management Plan (NMP). A NMP is a document that demonstrates how environmental noise pollution will be managed for a particular site and any developments on the site.</p> <p>Vehicles that may compete in events at a motorsports venue must comply with the relevant governing body specification. These governing</p>



				<p>bodies being Motorsport Australia, Motorcycling Australia and Motorcycling Western Australia.</p> <p>As a component of a Development Application, a NMP would need to be approved by the chief executive officer of the local government. The outcome should provide certainty to venue operators as to their operations, and certainty to the community as to what they can expect in the management of noise from their operations.</p> <p>The scheme amendment seeks to provide the following certainty:</p> <ul style="list-style-type: none"> <li>• Limitations on hours of operation as follows:             <ul style="list-style-type: none"> <li>○ Sundays: 9 am – 6 pm;</li> <li>○ Monday – Saturday: 8 am – 6 pm.</li> </ul> </li> <li>• Events not occurring on both the multi-use track and the motocross track at the same time;</li> <li>• Frequent/ongoing monitoring and reporting on noise emissions; and</li> <li>• Provide notification of events to stakeholders / landholders.</li> </ul> <p>The above limitations do not necessarily mean that the site will be in use 7 days a week. The NMP may seek to further limit operations. For example:</p> <ul style="list-style-type: none"> <li>• The Venue Manager shall provide all clubs and approved groups committees using the venue with a written instruction explaining the noise management issues and the Albany Motorsport Park Code of Conduct document which the venue user committee shall explain to all participants at a briefing prior to starting the event each day.</li> <li>• Notice of the program for racing activities for a season is to be published and distributed to members of the public;</li> <li>• Practice / training sessions may be limited to certain days of the week and certain hours of the day;</li> <li>• The noise level for a racing vehicle is to be obtained at or before the first meeting of the season at which that racing vehicle is entered to race;</li> <li>• An Accredited Scrutineer shall be designated for the duration of a race meeting and practice session to verify noise certificates and to evaluate noise emissions from race vehicles;</li> <li>• The public address system controls are to be set to provide a suitable audience sound level during the preliminary meeting each year, with the assistance of such persons as the Venue Manager requires, ensuring the minimum practicable 'spill' of sound into nearby noise sensitive areas;</li> <li>• If complaints are made during a racing activity the Venue Manager will review racing activities to reduce noise where practicable for the remainder of that event.</li> </ul>
<p><b>AGRICULTURE</b></p>				

6.	Public	<p>The subject land is excellent food producing land in near proximity to Albany. The subject land is within a location that is surrounded by other premium livestock industries.</p> <p>The subject land is zoned Priority Agriculture. Priority Agriculture is a category that is above General Agriculture. It identifies land that has greater nutrient retention capacity and access to suitable water resources and should not be rezoned for any other purpose resulting in the establishment of sensitive land uses on land within, adjacent to, or in close proximity to priority agricultural land which could prejudice current or potential agricultural activities and production.</p>	<p>Dismiss comment relating to loss of excellent quality agriculture land.</p> <p><b>No modifications recommended.</b></p>	<p>The potential removal of the subject land from the City's Priority Agriculture zone is considered to have no significant effect on agricultural land protection objectives of the region.</p> <p>A site specific study has shown that:</p> <ul style="list-style-type: none"> <li>• 90% of the site has 'fair' to 'low' capability for grazing;</li> <li>• 80% of the site has 'fair to 'low' capability for perennial horticulture;</li> <li>• Approximately 40% of the site is constrained due to remnant vegetation;</li> <li>• The subject Lot represents just 0.23% of the total Priority Agriculture zoned land in the City of Albany;</li> </ul> <p>As per the above dot-points, Lot 5780 is not unique in terms of the nature of its soils and landforms, and hence its agricultural capability.</p>
<b>HERITAGE</b>				
7.	Agency Department of Planning, Lands and Heritage	The land does not intersect with the boundary of any lodged or registered Aboriginal sites. Therefore no approvals are deemed necessary under section 18, Aboriginal Heritage Act 1972.	<p>Note comment relating to Aboriginal Heritage.</p> <p><b>No modifications recommended.</b></p>	No heritage related issues were raised.
<b>INFRASTRUCTURE</b>				
8.	Agency Western Power	An engineering and design consultant can determine if the current power capacity can support a motorsport facility.	<p>Note comment relating to electrical power.</p> <p><b>No modifications recommended.</b></p>	No infrastructure related issues were raised.
9.	Agency ATCO Gas	ATCO does not currently operate gas mains nor infrastructure within Lot 5780 nor do we operate gas mains and infrastructure within the surrounding road reserves. For the purposes of this proposal ATCO has no objection.	<p>Note comment relating to gas.</p> <p><b>No modifications recommended.</b></p>	
10.	Agency MRWA	The emergency fire exit onto Albany Highway is not to become a secondary access to the site, and is to be managed in such a way to avoid this scenario.	<p>Note comment relating to emergency fire exit.</p> <p>An emergency fire exit is proposed for use in emergency situations only (e.g. escape route in the instance of a bushfire).</p> <p><b>No modifications recommended.</b></p>	
<b>RESOURCES</b>				
11.	Agency Department of Mines, Industry	This proposal raises no significant issues with respect to mineral and petroleum resources, geothermal energy, and basic raw materials.	<p>Note comment relating to resources.</p> <p><b>No modifications recommended.</b></p>	No resource related issues were raised.

	Regulation and Safety			
<b>FLORA/FAUNA</b>				
12.	Agency  Department of Water and Environmental Regulation (DWER).	A requirement for fencing of the 50m development exclusion area is supported to prevent public access.	Note the comment from DWER.  <b>It is recommended that the condition relating to the requirement for preparation of the Protected Exclusion Zone Management Plan (originally identified as No.4(g)), of the proposed scheme amendment is modified as follows:</b>  <b>5(g) Protected Exclusion Zone Management Plan addressing management responsibilities (e.g. fencing of Protection Exclusion Zone), revegetation, and vegetation condition and wetland water quality monitoring.</b>	A 'Protection Exclusion Zone' has been identified for protection and should be fenced to prevent public access. Refer to the scheme amendment report with includes a 'Precinct Plan' showing a 'Protection Exclusion Zone'.
13.	Public	The flora and fauna survey appears to be predominately desktop based, and the report admits the data includes very old records. A more thorough survey should be conducted in this instance, including reconnaissance during different times of year.  Given the area contains suitable foraging habitat and potential hollows and roosting trees for some of the species listed above as well as the significant number of fauna species recorded within the survey area alone, there are substantial concerns over the impact of the motorsport proposal development.  The documents provided are absent from detailing any specifics in relation to fauna or flora management plans should the proposal proceed.  It is recommended that no changes to zoning occur until the full extent of clearing, development and ongoing motorsport on the flora and fauna (particularly threatened species) has been assessed by the Environmental Protection Agency (EPA).	Dismiss comment relating to flora and fauna survey.  <b>No modifications recommended.</b>	The amendment was referred to the Environmental Protection Authority (EPA). The EPA liaised with the Department of Biodiversity, Conservation and Attractions (DBCA) on the matter of flora and fauna. The DBCA commented that:  <i>The report presents a comprehensive assessment of the flora and fauna values associated with the property on which the Motorsport Park is proposed.</i>  The EPA decided that the proposal is not significant to warrant a formal environmental assessment.
<b>GROUND-WATER RESOURCE</b>				
14.	Public	This site is a Priority 2 (P2) Water Reserve (Marbellup Water Reserve).  The water quality and volume running from the Motorplex property into the Marbellup Brook could be affected. This could be caused by inappropriate waste disposal, litter from patrons and silt running off bare, de-vegetated ground. Motorplex activities generate a great deal of solid and liquid waste, including litter, tyres, oil, fuel spillage and human waste (food,	Note comment relating to contamination risk to a Priority 2 water source reserve.  <b>No modifications recommended.</b>	Lot 5780 is located within a Priority 2 (P2) public drinking water sources special control area within the Marbellup Brook Catchment Area.  Priority 2 (P2) areas are defined and managed to maintain or improve the quality of the drinking water source with the objective of risk minimisation.  Groundwater sources are normally referred to as underground water pollution control areas or water reserves. If a drinking water source

		<p>packaging, greywater, blackwater).</p> <p>According to the Department of Water, P2 water sources are classified as 'incompatible' with motor vehicle repairs and washing, sporting or recreation clubrooms, permanent motorsport facilities and below ground fuel and chemical storage tanks. It also states that:</p> <p>Incompatible land uses receiving planning approval should:</p> <ul style="list-style-type: none"> <li>• Be consistent with a region or local planning scheme or a local planning strategy that has been endorsed by the Western Australian Planning Commission;</li> <li>• Be in the best interest of the community and</li> <li>• Pose no unacceptable contamination risk to water quality.</li> </ul> <p>How can the amendment of Lot 5780 Down Road South receive approval for all these incompatible developments and pose no unacceptable contamination risk to water quality?</p> <p>There are many other cleared sites well away from waterways that could have been selected for this major motorsport complex.</p> <p>People who attend motorsport events do not do so to quietly appreciate wildlife and enjoy nature; as well as noise and disturbance to wildlife, there are many types of oil, chemical and petrol pollutants that will be emitted from the vehicles and will enter the water catchment system.</p> <p>Sealing the ground with cement and bitumen sterilises the land and risk oils, chemicals and other industrial volatiles to leach down the drain into the lower landscapes and water reserve of the 7-Mile / Marbellup Catchment.</p>		<p>becomes contaminated, there is an increased risk to the health of consumers.</p> <p>This public drinking water source area (PDWSA) is not currently used but has been identified as a potential future water source option in the <i>Great Southern Regional Water Supply Strategy 2014</i> (DoW, 2014).</p> <p>The Minister for Water has formally provided advice to the City of Albany (Kelly, 2018) that while a motorsport facility is incompatible with a P2 PDWSA (DoW, 2016), "there are measures that can be put in place to protect water quality should the City proceed to approve the development".</p> <p>The amendment report includes a Local Water Management Strategy, which has utilised groundwater information collected from the site to develop a satisfactory hydrogeological conceptual model. This discusses the connectivity between surface water and groundwater and pathways for contamination.</p> <p>It is proposed that hydrocarbon-impacted stormwater from high risk areas such as the pits and vehicle maintenance areas shall be contained within covered hardstand areas and directed to oily water separators (OWS) for primary treatment. Treated water from the OWS will be directed into the stormwater drainage system. Collected waste and oily residue from the OWS will be collected and disposed to an approved off-site location, as per DWER's advice.</p> <p>The DWER is supportive of the strategy to manage stormwater from vehicle maintenance areas with oil water separators, and the use of bunding and other measures to minimise the impact of fuel and oil spills.</p> <p>On-site sewage will need to comply with the Government Sewerage Policy (2019).</p> <p>Should motor-sporting activities discontinue, a 'Decommissioning Plan' (as required by the scheme), is to be implemented, to ensure rehabilitation of the land back to the natural state.</p>
15.	Agency Department of Water and Environmental Regulation (DWER)	<p>It is recommended that monthly surface water and groundwater monitoring be required. Water monitoring will be required for the duration of the operation of the facility rather than as specified for the three years following practical completion. This is to allow any groundwater level or water quality changes as a result of construction or operation to be identified with remedial action taken if necessary.</p> <p>Additional water management measures (Attachment 4 of DWER submission) should be included as provisions within the scheme amendment proposal.</p>	<p>Dismiss comment relating to the inclusion of additional water management provisions.</p> <p><b>No modifications recommended.</b></p>	<p>The amendment report includes a Local Water Management Strategy (LWMS), which has been modified to comply with Department of Water and Environmental Regulation requirements.</p> <p>It is proposed that any development and operation of motor-sporting facilities at the subject site is undertaken to address water management and contamination measures, in accordance with the (LWMS) and a water management plan and a hydrocarbon management plan.</p> <p>The water and hydrocarbon management plans are developed and implemented at the development stage. The water management plan is to include measures associated with stormwater.</p> <p>Refer to the proposed provisions 4(b) and 4(c), which state:</p>

				<p>4. Any application for development approval for the site shall be accompanied by an Environmental Management Plan for the site that addresses:</p> <p>(b) Water Management Plan for construction and operation of the site.  (c) Hydrocarbon Management Plan for operation of the site.</p>
<b>WIND EROSION/SILICA DUST</b>				
16.	Public	<p>If the proposed 4WD tracks, motocross track, carparks and marshalling areas are not sealed, dust will become a major issue.</p> <p>Silica dust in large volumes can cause Silicosis, a lung disease caused by the inhalation of crystalline silica. Silicosis is your body's reaction to silica dust build-up in your lungs. When you breathe in silica, the tiny particles of dust settle deeply into your breathing passages. Scar patches form on your lung tissue. Scarring stiffens and damages your lungs, and this makes it hard to breathe. If you have chronic Silicosis, you're at higher risk for TB, flu, and pneumonia. Silicosis also raises your odds of getting these serious lung diseases: Lung cancer, Chronic obstructive pulmonary disease (COPD), Chronic bronchitis, Scleroderma and Tuberculosis.</p>	<p>Note comment relating to dust.</p> <p><b>No modifications recommended.</b></p>	<p>It is proposed that the development and operation of motor-sporting facilities is undertaken in accordance with a Dust Management Plan (see scheme amendment condition 4e).</p> <p>Dust management plans generally consider the following:</p> <ul style="list-style-type: none"> <li>• Details of management measures to minimise dust during construction and operation (e.g. use of water truck);</li> <li>• Ongoing monitoring;</li> <li>• Complaint response procedures.</li> </ul>
<b>BUSHFIRE</b>				
17.	Agency Department of Fire and Emergency Services	<p>Recommend modification of the Bushfire Management Plan to adopt access 'Option 2' with a public road constructed.</p> <p>'Option 2' involves the development of a public road west to Marbelup Road, to provide an alternative escape route in the instance of a bushfire (escape to the west).</p>	<p>Note the comment from DFES.</p> <p><b>It is recommended that the condition No.6, of the proposed scheme amendment is modified as follows:</b></p> <p><b>6. Development shall be in accordance with an approved Bushfire Management Plan that has been implemented to the satisfaction of the Local Government, and Department of Planning, Lands and Heritage, and the Department of Fire and Emergency Services.</b></p>	<p>Although not impossible, development of an emergency access to the west (Option 2), is considered environmentally unsustainable as an extensive amount of remnant vegetation would need to be cleared.</p> <p>A Bushfire Management Plan prepared to support the scheme amendment recommends the development of an 'Option 4'. The 'Option 4' proposes an environmentally sustainable emergency access (via Right of Way), through cleared farmland areas, from Down Road South to Albany Highway (secondary escape to the east).</p> <p>In addition to a Bushfire Management Plan, a Bushfire Emergency Evacuation Plan has been prepared to provide contingency actions in accordance with the requirements of the <i>Draft Position Statement: Tourism land uses within bushfire prone areas</i> (WAPC, 2018). Contingencies include:</p> <ul style="list-style-type: none"> <li>• Early closure of the site during high risk situations;</li> <li>• Off-site evacuation; and as a last resort;</li> <li>• Refuge on site in a suitable building or open space.</li> </ul> <p>The scheme amendment includes a provision (Provision No.6), which requires the approval of the Department of Fire and Emergency Services</p>

				<p>for the implementation of a Bushfire Management Plan. The provision states:</p> <p>6. Development shall be in accordance with an approved Bushfire Management Plan that has been implemented to the satisfaction of the Local Government, Department of Planning, Lands and Heritage, and the Department of Fire and Emergency Services.</p> <p>The Department of Fire and Emergency Services is a referral agency for advisory purposes and not an approval or compliance agency. It is therefore recommended that the condition 6 is amended as follows:</p> <p>6. Development shall be in accordance with an approved Bushfire Management Plan that has been implemented to the satisfaction of the Local Government, <del>and</del> Department of Planning, Lands and Heritage, <del>and the Department of Fire and Emergency Services.</del></p>
18.	Public	<p>We recently suffered extensive fencing and pasture loss from a bushfire in Redmond (May 2018) that got onto our property from a neighbouring property.</p> <p>We were extremely fortunate as other farms in the area also lost hay and farm infrastructure.</p> <p>Whilst we know any machinery can start a fire, including agricultural machinery, the increased number of vehicles and the possibility of a vehicle catching fire at a Motorplex site increases the risk many times.</p> <p>The Bushfire Management Plan states that “the proposed Albany Motorsport Park (AMP) is defined a high-risk industry due to: motorsport activities giving rise to risk of ignition and bushfire; and exposure of the community, fire fighters and environment to dangerous substances from vehicles igniting. It also states that “the external remnant forest areas (including plantations) present Extreme Bushfire Hazard levels (as defined by WAPC) to the AMP development”.</p> <p>The Bushfire Management Plan recommends “that The Great Southern Motorplex must observe and comply with “Total fire ban days” and “Vehicle movement restrictions/bans” as set by LGA and that no events be held during Catastrophic Fire Danger Rating (FDR) days.”</p> <p>It recommends “that Motorplex events be held at night during FDR days.” This is not an acceptable solution due to the noise pollution created at these events.</p>	<p>Note the comment from the public relating to bushfire.</p> <p><b>No modification recommended.</b></p>	<p>A Bushfire Emergency Evacuation Plan has been prepared to provide contingency actions in accordance with the requirements of the <i>Draft Position Statement: Tourism land uses within bushfire prone areas</i> (WAPC, 2018). Contingency include early closure of the site during high risk situations.</p> <p>As proposed by the scheme amendment, motorsporting events are not to occur at night time, regardless of any Catastrophic Fire Danger Rating during the day. The scheme amendment proposes:</p> <p>a) Limitations on hours of operation as follows:</p> <ul style="list-style-type: none"> <li>• Sundays: 9am - 6pm;</li> <li>• Monday – Saturday: 8am – 6pm.</li> </ul>
<b>ODOUR</b>				
19.	Public	<p>There are two types of emissions that impact on the environment:</p>	<p>Note the comment from the public relating to odour emissions and climate change.</p>	<p>The air quality during motor-sporting activities is not expected to impact human health or well-being.</p>

	<ul style="list-style-type: none"> <li>Greenhouse gas emissions, such as carbon dioxide (CO<sub>2</sub>), which can trap additional heat from the sun in the earth's atmosphere, causing the 'greenhouse effect' and climate change. CO<sub>2</sub> is the main greenhouse gas produced by motor vehicles, but vehicles also produce the greenhouse gases nitrous oxide and methane.</li> <li>Air pollutant emissions, such as hydrocarbons, oxides of nitrogen and particulate matter can lead to smog and adverse health impacts such as respiratory illness, cardiovascular disease and cancer. National Pollutant Inventory data indicates that in Australia motor vehicles remain a major cause of air pollution in urban areas.</li> </ul> <p>Albany is in a biodiversity hotspot of the Southwest Australian Floristic Region. It has high plant diversity and endemism and a broad range of threatening processes, resulting in a high proportion of rare and threatened plant species. Key threats include diseases, fragmentation, invasive weeds, altered fire regimes, grazing, altered hydro-ecology and climate change.</p> <p>The City of Albany's Environmental Policy states "that the City of Albany commits to taking action on climate change, recognising that while uncertainty is present in existing climate science, this does not present a reason for inaction or delay of action, and that the "precautionary principle" should be applied, [including] a commitment to evaluating and reducing the City's [carbon] footprint and the provision of practical strategies for reduction, offsetting and / or sequestration [of carbon]."</p> <p>Council have committed to seven actions in the declaration including developing emission reduction targets, developing a climate change communications strategy and continued engagement with YAC. A copy of the City of Albany Climate Change Action Declaration can be found on the City of Albany website." It states:</p> <p>The City of Albany commits to:</p> <ul style="list-style-type: none"> <li>measuring and reporting on our corporate and community greenhouse gas emissions and developing emission reduction targets;</li> <li>developing a Corporate Energy Plan that aims to transition the City's assets to renewable energy to achieve 100% renewable energy by 2030;</li> <li>developing a climate change communication strategy to effectively engage, encourage and empower the Albany community on climate change actions; and</li> <li>reviewing the Climate Change Action Declaration every two years to ensure that climate actions identified within the declaration are undertaken.</li> </ul>	<p><b>No modification recommended.</b></p>	<p>The motor-sporting facility is expected to comply with best practise measures for air quality (National Environment Protection (Ambient Air Quality) Measure).</p> <p>The subject Lot 5780 has good separation to sensitive land uses. The nearest dwelling is located approximately 1.4km from the proposed motor-sporting facility.</p> <p>The aspiration is to achieve a sustainable outcome that meets the needs of current and future generations through an integration of environmental protection, social advancement and economic prosperity. Improving environmental impact is the main challenge facing motor-sporting, thus, the following options exist to address climate change:</p> <ul style="list-style-type: none"> <li>Replacing combustible engines with electric ones</li> <li>Establishing a racing category for electric motors</li> <li>Using an alternative fuel for combustible engines</li> <li>Limiting the number of events</li> <li>Re-use of resources (e.g. tyres)</li> </ul>
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NOISE				
20.	Public	<p>We do not want this to go ahead.</p> <p>We live in the country for the life style.</p> <p>Excessive noise from the Motorplex would make living in the area very unpleasant and not the peaceful, serene atmosphere our young family and us hoped to enjoy one day.</p> <p>Noise pollution for local residents will undoubtedly be an issue as the constant drone of vehicles will carry across to surrounding residents.</p> <p>The vehicle noise will commence from 8am Mon-Sat and 9am on Sunday, not concluding until 6pm. This is in addition to the peak parking and traffic management needed during larger and special events.</p> <p>The City or Albany proposal suggests that this Motorplex will operate every day. It will therefore continuously generate elevated racing, circuit, gymkhana &amp; motor cycle noise and exhaust pollution daily in this area. This, coupled with significant attendance traffic noise with the suggestion of approximately 500 cars/week could most likely be an overly conservative number of attendees.</p> <p>This will have a negative effect on the current tranquillity of the area and will have a depressing effect on land values, with Albany planning and landowners like us unable to utilise surrounding land for building homes in the future.</p> <p>We are running the Albany-Marbelup Hidden Valley Bed &amp; Breakfast &amp; Farm-stay Accommodation that is also a Beef Cattle Property that has been a ground up BnB/Farmstay development &amp; construction in line with City of Albany's encouraged tourism &amp; accommodation guidelines. The BnB site itself just happens to be the closest site location on our property to the proposed Motorplex and will be at around 35dB according to one of the GHD test proposals. That is a disaster for us! No one seeks to holiday in a noisy and polluted environment. We are likely to lose customers as well as revenue.</p> <p>If this Motorplex project goes ahead then we would seek to have a permanent full time noise motoring expert trackside for every event as well as any practice held. The absolute minimum Australian standards to be met and enforced should be those of Motor Sport Australia, but we think that the City of Albany needs to achieve better than this. This would at least ensure that all motor cycle and vehicle participants never exceeded designated noise pollution standards and could not compete unless their vehicle(s) complied with the prescribed acceptable Australian Noise Standards.</p>	<p>Note concern relating to noise and compensation associated with noise and property values.</p> <p><b>No modification recommended.</b></p>	<p>A noise assessment has been completed to demonstrate that for multi-use track and motocross events, there are occasions when the predicted noise levels from Albany Motorsport Park exceed assigned noise levels (defined by the Noise Regulations) at four different sensitive receptors (refer to below Map - SR01-SR04).</p>
				<p>Generally speaking, motor sporting venues exceed assigned levels during events. As such, the <i>Environmental Protection (Noise) Regulations 1997</i> have been amended to allow motor-sports to exceed the assigned levels, provided the activity operates in accordance with an approved noise management plan.</p>
				<p>The scheme amendment proposes a provision, which requires the developed and implemented of a noise management plan at the development stage and which is to include the following:</p>
				<ul style="list-style-type: none"> <li>a) Limitations on hours of operation as follows:             <ul style="list-style-type: none"> <li>• Sundays: 9am - 6pm;</li> <li>• Monday – Saturday: 8am – 6pm.</li> </ul> </li> <li>b) Events not occurring on both the multi-use track and the motocross track at the same time.</li> <li>c) Frequent/ongoing monitoring and reporting on noise emissions; and</li> <li>d) Provide notification of events to stakeholders / landholders.</li> </ul>



		<p>Research work has also demonstrated evidence of the negative impacts of excessive noise on biodiversity. For example see the work by Romain Sordello et al. (2020) published in <i>Environmental Evidence</i>, Vol.9 (20). This research highlighted how excessive noise impacted wildlife in a range of ways, including, by making communication more difficult (for example warning of predators, mating behaviour) and by excessive noise leading to disturbance of animals and subsequent avoidance of nearby habitat areas.</p> <p>Torbay Catchment Group is particularly concerned about the potential impacts of noise on the resident population of Critically Endangered Western Ringtail Possums within the Down Road bushland reserve. Torbay Catchment Group is currently undertaking State funded research and on-ground work within Torbay Catchment, aimed at improving long-term outcomes for Western Ringtail Possums.</p>		<p>As events are only planned during the day time period, predicted noise levels are not expected to lead to sleep disturbance, and therefore will be less intrusive.</p> <p>The scheme amendment was referred to the Environmental Protection Authority who decided that the proposal is not significant to warrant a formal environmental assessment.</p> <p>Under s 174(1) of the <i>Planning and Development Act</i>, compensable injurious affection can arise <u>only</u> in respect of land that is <u>reserved</u>. In accordance with the <i>Planning and Development Act</i>, injurious affection may not be obtainable in respect of land affected by a neighbouring development or land use.</p> <p>The Environmental Protection Authority has decided that the proposal is not significant to warrant a formal environmental assessment.</p>
<b>BUFFER</b>				
21.	Public	<p>The amendment of Lot 5780 Down Rd South includes a proposal to extend the noise buffer zone currently in place for the Woodchip Mill.</p> <p>504 Marbellup Rd North is within this buffer zone so will likely be affected by the proposal to extend it.</p> <p>If we are not able to build a dwelling on our property because of this extension, will I be entitled to compensation for injurious affection.</p>	<p>Note concern relating to noise buffer.</p> <p><b>No modification recommended.</b></p>	<p>The scheme amendment does not propose to extend the noise buffer currently in place for the Woodchip Mill.</p>
22.	DevelopmentWA	<p>DevelopmentWA notes that the motorsport facility is likely to be an activity which generates significant off-site noise impacts.</p> <p>DevelopmentWA would not normally seek to place an activity with significant off-site noise impacts within the buffer as it has the potential to compromise the effect of the buffer for existing and future industry operating in the Timber Precinct industrial area and may impact on surrounding sensitive uses.</p>		<p>The scheme amendment proposal was referred to the Environmental Protection Authority for assessment of environmental implications.</p> <p>The Environmental Protection Authority has decided that the proposal is <u>not significant</u> to warrant a formal environmental assessment.</p> <p>The proposal for motor sporting facilities does not compromise the effect of the buffer for existing and future industry operating in the Timber Precinct industrial area. Industrial activities are required to comply with assigned levels referred to in the <i>Environmental Protection (Noise) Regulations 1997</i>. Motor-sporting facilities are exempt from having to comply with assigned levels and instead are required to comply with a Noise Management Plan.</p>
<b>STRESS ON LIVESTOCK</b>				
23.	Public	<p>Recent research suggests environmental sound has considerable influence on the behaviour and physiological response of beef cattle and that has important implications for handling and managing them.</p>	<p>Note concern relating to stress on livestock and associated safety risks.</p> <p><b>No modification recommended.</b></p>	<p>Excessive noise may impact on livestock behaviour.</p>

		<p>Will the City of Albany or the Great Southern Motorplex take responsibility for injuries to people and livestock caused by excessive noise from motorbikes, ATVs, racing cars and PA systems on Lot 5780, Down Rd South that are causing stress to livestock on neighbouring properties.</p>		<p>Mammals appear to react to sudden higher intensity noise, with responses including the startle response, freezing, and fleeing from the sound source.</p> <p>Although mammals may react to sudden noise, most animals become less responsive to sounds emitted for long periods or at regular intervals.</p> <p>If livestock become agitated or excited, allowing them to calm down for a few minutes will make them easier to handle.</p> <p>The scheme amendment requires the development of a Visual Impact Assessment, which is to outline appropriate physical treatments (tree planting) to mitigate visual impact to adjacent land. A Precinct Plan shows areas for physical treatment to mitigate visual impact. The physical treatment may help to reduce any impact to livestock on surrounding landholdings.</p>
<b>VISUAL AMENITY</b>				
24.	Public	<p>The development will spoil natural views in the area, again unfairly reducing local land values.</p> <p>Even though some areas are ear-marked for revegetation, natural degradation of the land will occur as parts are bulldozed and sealed with cement and bitumen, and public facilities are put in, allowing for greater run-off, water and wind erosion.</p>	<p>Note comment relating to degradation of natural areas.</p> <p><b>No modifications recommended.</b></p>	<p>Development of the site is in-keeping with the industrial development (wood chip mill and pellet plant) located on the other side of the Down Road.</p> <p>In-order to reduce any visual impact to neighbouring agriculture properties, the scheme amendment requires the planting of vegetation along the southern farming boundary of the subject site. Vegetation screens already exist on the other boundaries</p> <p>As stated by the scheme amendment, any application for development approval for the site shall be accompanied by an Environmental Management Plan for the site. Matter for consideration is to include:</p> <ul style="list-style-type: none"> <li>• Management of stormwater</li> <li>• Management of hydrocarbons</li> <li>• Management of waste</li> <li>• Management of dust</li> <li>• Management of acid sulfate soils</li> <li>• Management associated with bushfire</li> <li>• Management of visual attributes.</li> </ul> <p>The scheme amendment proposes: a provision 3, which requires compliance with a Precinct Plan; a provision 4(b), which requires the development of a Water Management Plan for construction and operation of the site; and a provision 5, which requires the developed of a Visual Impact Assessment.</p> <p>The Water Management Plan and the Visual Impact Assessment will outline appropriate physical treatments to mitigate visual and stormwater impact. The Precinct Plan shows areas for physical treatment to mitigate visual impact.</p>

TRAFFIC IMPACT				
25.	Public	<p>Heavy haulage trucks frequently travel Down Road coming from the sawmill. They will intermingle with visitors to the motorsport complex and pose a safety risk for families.</p> <p>The recent proposal for the Link Road upgrade separates heavy trucks and general traffic; this development does just the opposite and is a future safety concern.</p> <p>Some of the larger and special events are proposed to attract in excess of 500 attendees from all over the state.</p>	<p>Note concern relating to public safety risk associated with motor sporting attendees and haulage trucks using Down Road.</p> <p><b>No modification recommended.</b></p>	<p>Traffic management for larger events will require careful planning and consultation with relevant stakeholders and neighbouring businesses, as well as preparation of a detailed traffic management plan.</p> <p>The scheme amendment proposes a provision, which requires the developed and implemented of a traffic and parking management plan, at the development stage. The provision states:</p> <p><i>7. Any application for development approval for the site shall be accompanied by a Traffic and Parking Management Plan for construction and operation of the site, including consideration of peak parking and traffic management during larger and special events (i.e. events attracting greater than 500 attendees).</i></p> <p>The traffic and car parking plan needs to consider the following:</p> <ul style="list-style-type: none"> <li>• Entry to the subject site is proposed via an eastern entry point off Down Road.</li> <li>• A left turn lane is recommended at the access location to minimise the impacts on large trucks using Down Road. Austroads Guide to Road Design indicates the length of the turn lane should be 180 m at 110 km/h.</li> </ul> <p>Note:</p> <ul style="list-style-type: none"> <li>• The intersection of Albany Highway/Down Road has recently been upgraded to accommodate CBH traffic (for grain haulage) and no further upgrade is anticipated to be required for general use of the site as a regional motorsports facility.</li> <li>• The current speed limit on Down Road is 110 km/h. This is considered too high in view of the likely activity associated with the proposed motorsports facility and should be reduced to a maximum of 80 km/h. Main Roads WA has been consulted regarding this matter. Main Roads WA commented that: <p><i>It is very unlikely that Main Roads would reduce the speed limit on this section of road due to events occasionally generating increased traffic volumes, the environment is rural with good geometry.</i></p> <p><i>...suggest the following alternatives:</i></p> <ul style="list-style-type: none"> <li>• <i>Traffic management for events process.</i></li> <li>• <i>Ensure all accesses to the Motorplex has safe intersection sight distances and appropriate turn treatments.</i></li> </ul> </li></ul>

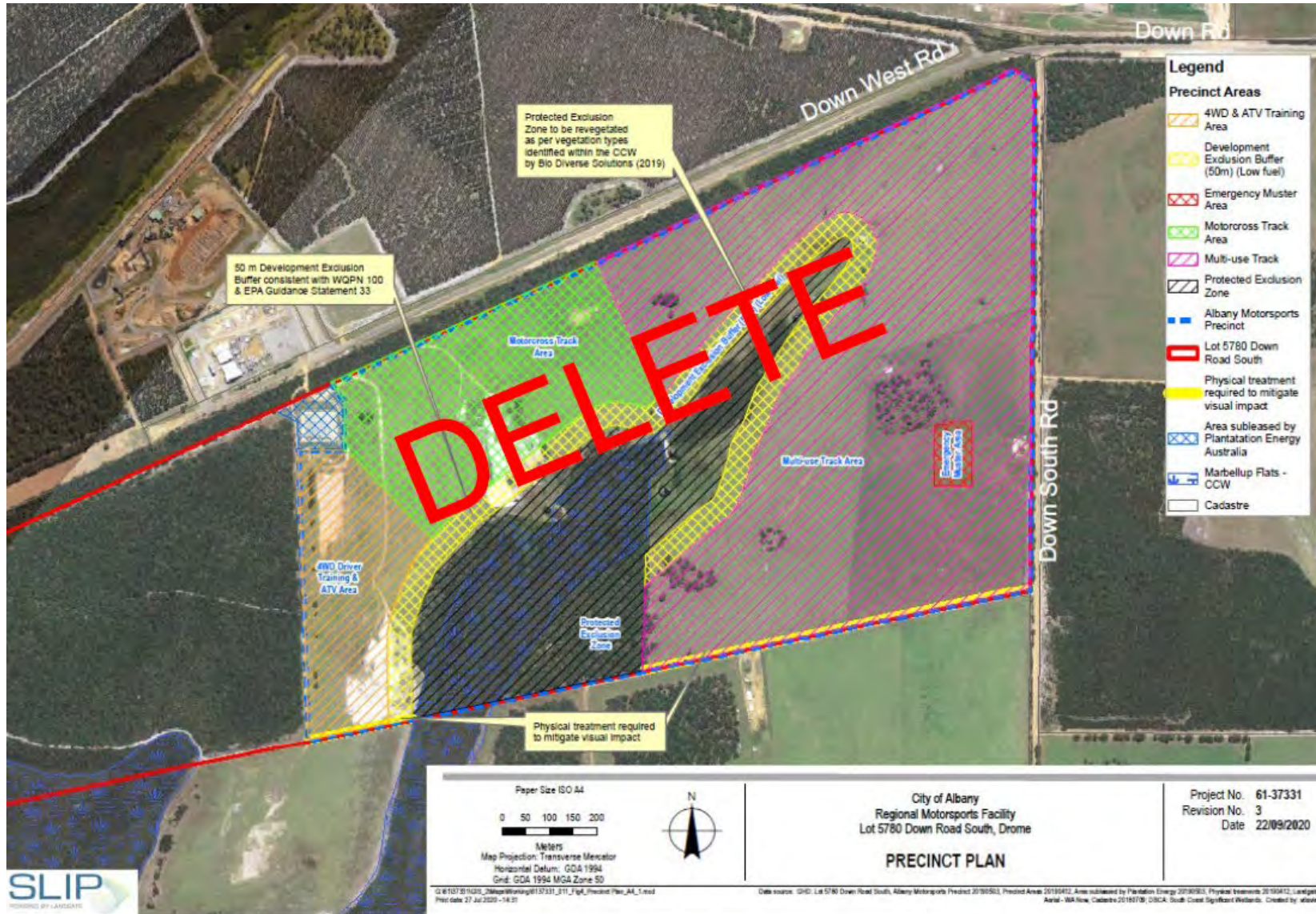
Final recommended modifications (red text) to Council initiated and advertised Scheme Amendment No.35.

No.	Description of Land	Special use	Conditions
SU26	Lot 5780 Down Road South, Drome	<p><del>Motorsport based recreation and incidental uses</del></p> <p>Recreation – private (motorsport based)</p> <p>Club premises (motorsport based)</p>	<ol style="list-style-type: none"> <li>1. All development requires the development approval of the local government.</li> <li>2. Council may consider uses that are incidental to the Special Uses listed.</li> <li>3. Applications for development approval shall be advertised in accordance with clause 64 of the deemed provisions.</li> <li>4. All use and development is to be in accordance with the Albany Motorsport Park Precinct Plan and approved management plans.</li> <li>5. Any application for development approval for the site shall be accompanied by management plans to address environmental aspects, including an Environmental Management Plan for the site that addresses:               <ol style="list-style-type: none"> <li>a) A Noise Management Plan for construction and operation of the site, and which includes but is not limited to:                   <ol style="list-style-type: none"> <li>(i) Limitations on hours of operation as follows:                       <ul style="list-style-type: none"> <li>• Sundays: 9am - 6pm;</li> <li>• Monday – Saturday: 8am – 6pm.</li> </ul> </li> <li>(ii) Events not occurring on both the multi-use track and the motocross track at the same time</li> <li>(iii) Frequent/ongoing Monitoring and reporting on noise emissions; and</li> <li>(iv) Provide notification of events to stakeholders / landholders.</li> </ol> </li> <li>b) A Water Management Plan for construction and operation of the site.</li> <li>c) A Hydrocarbon Management Plan for operation of the site.</li> <li>d) A Waste Management Plan for construction and operation of the site.</li> </ol> </li> </ol>

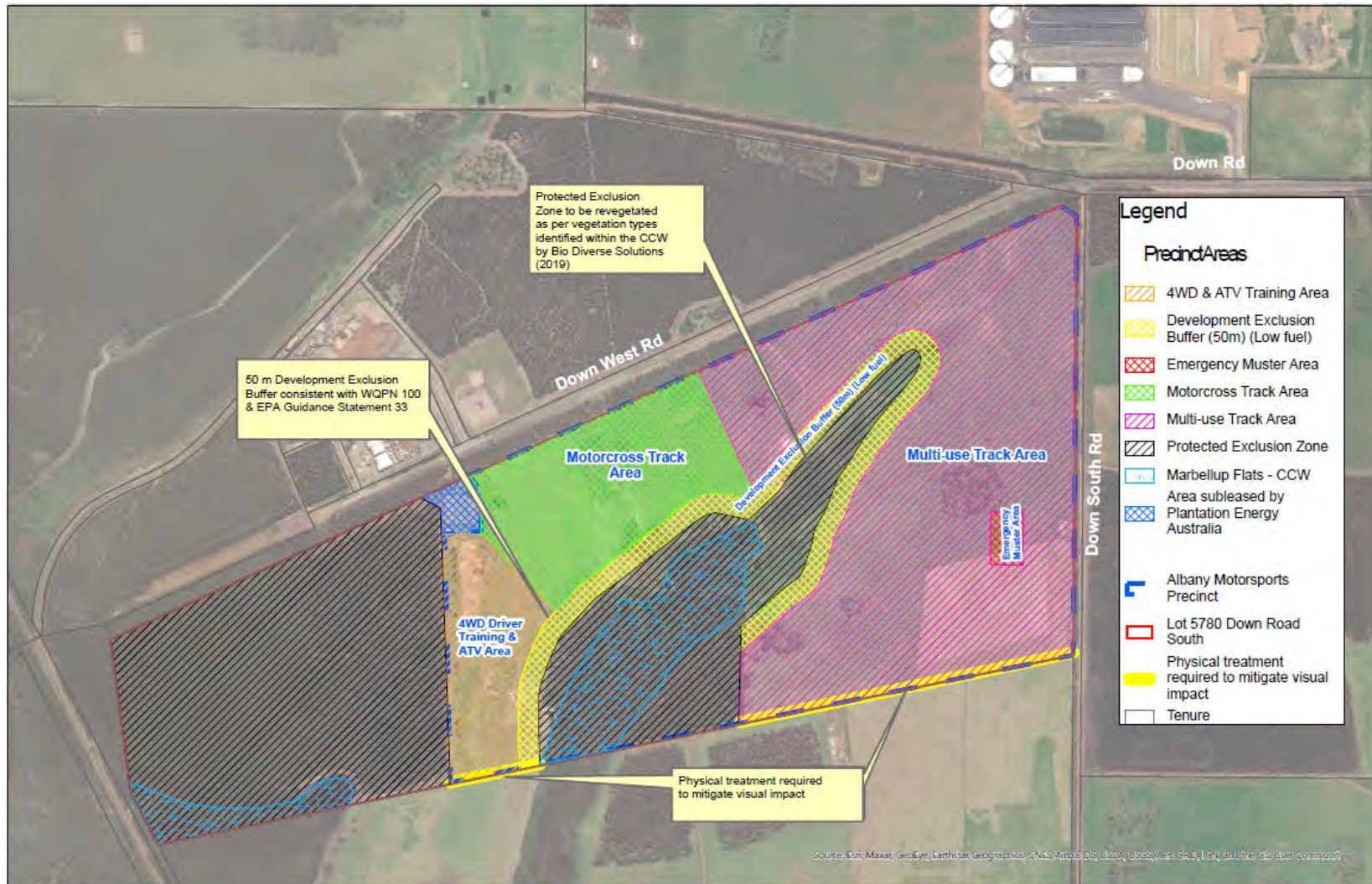
REPORT ITEM DIS245 REFERS

			<p>e) <b>A Dust Management Plan for construction and operation of the site.</b></p> <p>f) <b>An Acid Sulfate Soils (ASS) Management Plan to manage the risk from ASS during construction and operation of the site-risk.</b></p> <p>g) <b>A Protected Exclusion Zone Management Plan for construction and operation of the site, addressing management responsibilities (e.g. fencing of Protection Exclusion Zone), revegetation, and vegetation condition and wetland water quality monitoring.</b></p> <p>h) <b>A Decommissioning Plan for operation of the site that identifies actions for rehabilitation, if or when motorsports cease to operate at the Lot 5780.</b></p> <p>i) <b>A Construction Management Plan.</b></p> <p>6. Any application for development approval for the site shall be accompanied by a visual impact assessment to determine the appropriate physical treatments to mitigate visual impact to Lot 5781 Down Road South, Drome.</p> <p>7. Development shall be in accordance with an approved Bushfire Management Plan that has been implemented to the satisfaction of the Local Government, and Department of Planning, Lands and Heritage, <del>and the Department of Fire and Emergency Services.</del></p> <p>8. Any application for development approval for the site shall be accompanied by a Traffic and Parking Management Plan for construction and operation of the site, including consideration of peak parking and traffic management during larger and special events (i.e. events attracting greater than 500 attendees).</p>
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Delete initiated and advertised Precinct Plan



Replace initiated and advertised Precinct Plan with the following Precinct Plan, which illustrates the whole of the Lot 5780



SCALE @ A3:  
1:8,211  
Kilometres  
0 0.05 0.1 0.2  
Date Printed: 21/01/2021

City of Albany - Regional Motorsports Facility - Lot 5780 Down Road South

**PRECINCT PLAN**

**Albany**  
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Progress Report

October - December 2020 (Q2)

# Community Waste Resource Strategy 2019 - 2026

Infrastructure, Development and Environmental Directorate



Common Abbreviations:

Project Status Legend

- Complete
- In progress/On track
- Delayed/Manageable issues
- Critical Issues
- On hold/Parked

### Strategic Objective 1: Minimise Waste to Landfill

Key Focus Area	Priorities	Key Performance Measure	Project Status Q1	Project Status Q2
1.1 Waste Reduction & Recycling	1.1.1 Improve waste reduction and recycling within City of Albany operations, worksites and events	Decreased waste output and increased proportion of recycled material	Increased use of recycling bins at events. Greens from reserves increased. Reusing materials from construction	Green Team discussions regarding use of Terracycle bins at worksites, planned for Q3-4.
	1.1.2 Investigate and provide further opportunities to reduce waste outputs and increase recycling by commercial operators	Decreased waste to landfill and increased proportion of recycled material	Commercial & Industry Analysis conducted in 2019 as part of Behaviour Change Tools Development program.	No change
	1.1.3 Increase range of materials accepted for recycling	Increased number of products accepted at the MRF, waste facilities and across the community	Not able to influence what can be recycled just provide education.	No change

## REPORT ITEM DIS246 REFERS

	1.1.4 Explore options for the processing of C&D waste	Increased diversion volumes of C&D waste	Commercial & Industry Analysis conducted in 2019 as part of Behaviour Change Tools Development program.	No Change
1.2 Procurement	1.2.1 Develop a Sustainable Resource Management Plan for the City of Albany organisation which gives direction to procurement and planning across all business units	Implementation of Sustainable Resource Management Plan	Commenced in line with CPP. Commenced review of construction specification and procurement.	No change
	1.2.2 Investigate the inclusion of a waste management component to the evaluation criteria of City tenders and quotations	Inclusion of waste management criteria in tender and RFQ evaluation documentation	Commenced in line with CPP. Commenced review of construction specification and procurement.	No change
1.3. Diversion	1.3.1 Review product stewardship schemes for opportunity to target problematic waste streams	Report recommendations to Waste Management Working Group	Applied to DWER for Licence Variation to enable participation in Paintback scheme. Increased promotion of WA Tyre Recovery to customers.	Revised licence received Nov 2020, to allow participation in Paintback. Nespresso looking at Stewardship scheme with WALGA.

## REPORT ITEM DIS246 REFERS

	<p><b>1.3.2</b> Identify opportunities to support circular economy business initiatives</p>	<p>Dialogue held with government, business and community and reported back to Waste Management Working Group</p>	<p>Initial discussions as part of Behaviour Change Tools Development program in 2019.</p>	<p>Continued discussions.</p>
	<p><b>1.3.3</b> Promote Fossicker's Shop as a means of diverting goods</p>	<p>Increased number of customers using facility</p>	<p>Revenue has increased despite facility closed due to Covid-19</p>	<p>Revenue only slightly lower than same period last year despite reduced hours.</p>
	<p><b>1.3.4</b> Conduct a business analysis of the management of Fossicker's Shop and provide recommendation on its future development</p>	<p>Report recommendations to Waste Management Working Group</p>	<p>Not Started</p>	<p>Commenced review of revised opening hours post COVID.</p>

## Strategic Objective 2: Engage Stakeholders

Key Focus Area	Priorities	Key Performance Measure	Project Status Q1	Project Status Q2
2.1. Sustainability	2.1.1 Workshop potential synergies with sustainability enterprises	Report recommendations to Waste Management Working Group	Charitable Organisation Waste Fee promoted in 2019-20. Provided shed space to E'Co Australia to divert clothing from landfill. Permit underway for placement of E'Co Australia textile bins at 3 locations.	Charitable Organisation Waste Fee promoted in 2020-21 – approvals granted to 8 charities. Development Application approved for 3 locations and permit developed for placement of E'Co Australia textile bins at 3 locations.
	2.1.2 Regularly investigate social enterprise opportunities	Report recommendations to Waste Management Working Group	Community Waste & Sustainability Grant scheme distributed in 2018-19 & 2019-20	Community Waste & Sustainability Grant scheme promoted for 2020-21. One grant approved this quarter.

REPORT ITEM DIS246 REFERS

	2.1.3 Review how waste sustainability integrates into the City's organisational sustainability plan	Report recommendations to Executive Director Infrastructure , Development and Environment	Not started although waste team provide input to regular meetings of staff Green Team.	Participation in monthly Green Team discussions.
2.2. Littering	2.2.1 Review the City of Albany's organisational approach to litter and public dumping, including data collection, intervention and compliance	Present report to Executive Management Team	Inter-departmental discussions on litter and dumping commenced in August 2020.	Continued inter-departmental discussions. Data gathered for inclusion in Waste Plan.
	2.2.2 Provide support to community groups working to minimise littering along roadsides and in public open space	Reduced volumes of litter collected during scheduled roadside pickups	Roadside Litter from community collections accepted free at Hanrahan from 2020. Assistance provided to groups including Keep Albany Beautiful and Keep Australia Beautiful WA as required.	Continued

<p>2.3. Community</p>	<p>2.3.1 Develop and implement a communications plan to guide community education, engagement and responsibility</p>	<p>Present Community Waste Engagement Plan to Waste Management Working Group</p>	<p>Community and engagement plan completed and will be presented to Waste Management Working Group at next meeting</p>	<p>Community engagement plan included in the Waste Plan submission to DWER and discussed at both the Waste Management Working Group and the Elected Member Strategic Workshop held in September 2020.</p>
	<p>2.3.2 Build community waste networks including community groups, agencies and business representatives</p>	<p>Creation of a formalised community waste network</p>	<p>Not started</p>	<p>No change, though agencies, businesses and community groups have been engaged as part of FOGO consultation.</p>

## REPORT ITEM DIS246 REFERS

	3.3 Inform the community of waste targets and achievements	Community engagement implemented via Community Waste Engagement Plan	Commenced	Data included in the annual report and Waste Guide being developed.
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## Strategic Objective 3: Lead and Advocate for Best Practice Waste Management

Key Focus Area	Priorities	Key Performance Measure	Project Status Q1	Project Status Q2
3.1. Advocacy	3.1.1 Develop profile as waste resource recovery innovator	Increased representation on external waste industry committees based on 2018 participation (x1)	MCE on WALGA MWAC OAG representing South Coast Waste Sustainability Alliance. Waste staff participate in Consistent Communications Collective and Waste Educators Network Group.	Ongoing representation.
		Increased number of COA led community waste initiatives based on 2018 participation (x1)	Coordination of WALGA Bin Tagging program in South Coast. Compost Revolution participation (with Shire of Plantagenet). Household Hazardous Waste Program ongoing. Commitment to host 2021 Regional Waste Summit with South Coast partners.	Coordination of WALGA Bin Tagging program in South Coast continued. Household Hazardous Waste Program ongoing. Working with South Coast partners to develop programme to host

## REPORT ITEM DIS246 REFERS

Community Waste Resource Strategy Action Plan 2019-2026  
Progress Report: October 2020 – December 2020 (Q2)

				2021 Regional Waste Summit.
	3.1.2 Increase involvement in waste industry discussions	Increased number of COA led industry waste initiatives based on 2018 participation (0)	Commitment to host 2021 Regional Waste Summit with South Coast partners.	Working with South Coast partners to develop programme to host 2021 Regional Waste Summit.
	3.1.3 Actively lobby all levels of government for changes to waste-related policies and funding for new waste initiatives	Increased number of submissions to government on waste-related issues based on 2018 figures (x4)	South Coast Sustainable Waste Alliance submissions to: 2019 State Consultation on Reducing Single-Use Plastic 2020 National Inquiry into Australia's waste management and recycling industries Comments to:	No submissions

			<p>2019 WALGA submission on DWER Approved Methods for Mandatory Reporting under WARR Regulations</p> <p>2020 DWER Closing the Loop: Waste Reform for a Circular Economy and Review of the Waste Levy</p>	
3.2. Waste Infrastructure	3.2.1 Investigate and select suitable site for new waste facility with regional capacity	Recommend site for new waste facility to Council	<ul style="list-style-type: none"> <li>• Site selection study by external consultant</li> <li>• Suitable site on Crown land is unlikely</li> <li>• Focus shift to freehold properties</li> <li>• Staff will report to Council on options once investigations are complete</li> </ul>	Two suitable consultants sourced for site selection review.
	3.2.2 Plan and construct operational infrastructure for new waste facility	Construction and commissioning of a new waste facility	Not Started	Not Started

## REPORT ITEM DIS246 REFERS

Community Waste Resource Strategy Action Plan 2019-2026  
Progress Report: October 2020 – December 2020 (Q2)

	<p><b>3.2.3 Maximise lifespan of Hanrahan Landfill and plan for its future closure</b></p>	<p>Present Post-Closure Plan to Waste Management Working Group</p>	<p>Post-Closure Plan draft reviewed by Waste Services and in the process of being amended.</p>	<p>GHD commissioned to update Post-Closure Plan including details for extension of life of existing site.</p>
	<p>3.2.4 Implement capital works projects associated with the Hanrahan Landfill Post-Closure Plan</p>	<p>Successful project delivery</p>	<p>Not Started</p>	<p>Not Started</p>
<p><b>3.3. Regional Partnerships</b></p>	<p>3.3.1 Continue to grow South Coast Sustainable Waste Alliance Collaboration</p>	<p>Regular Sustainable Waste Alliance meetings</p>	<p>Looking at providing assistance to programs such as HHW, etc.</p>	<p>Meeting held and scorecard of objectives updated.</p>

## REPORT ITEM DIS246 REFERS

	<p>3.3.2 Implement and periodically review the South Coast Waste Alliance Strategic Vision</p>	<p>Provide regular implementation updates to the South Coast Economic Alliance</p>	<p>Strategic vision has been endorsed by all parties and objectives agreed and will be reported on quarterly. Regular meetings held. Attendance at Economic Alliance meetings on an ongoing basis.</p>	<p>Attendance at Economic Alliance meetings on an ongoing basis.</p>
	<p>3.3.3 Implement effective audits and recommendations of regional approaches</p>	<p>Review through Sustainable Waste Alliance meeting</p>	<p>Not Started.</p>	<p>Not Started.</p>

## Strategic Objective 4: Encourage Innovation

Key Focus Area	Priorities	Key Performance Measure	Project Status Q1	Project Status Q2
4.1. Alternative Practices	4.1.1 Regularly review alternative waste practices such as waste to fuel, anaerobic digestion and waste to energy	Update Alternative Waste Technology information folder	Four meetings held last financial year and one business case received.	Provided details of business case to current green waste processor for future consideration.
	4.1.2 Openly consult with business to discuss alternative waste practice opportunities	Document discussions and update folder	Workshop attended for Containers for Change. Attendance at the WALGA MWAC OAG.	Continued attendance at the WALGA MWAC OAG.
	4.1.3 Investigate the viability of using landfill gas from Hanrahan Landfill as a potential energy source	Present consultant's report to Waste Management Working Group	Investigation completed and report being reviewed by Waste Services Team. Still to be presented to WMWG.	Review continued.

4.2. Technology & Development	4.2.1 Investigate and implement alternative methods to divert target waste streams from landfill	Present report to Waste Management Working Group	FOGO roll out planned for Q3 this financial year.	FOGO tenders and quotations have been issued. Bins, lids, caddies and liners will start to arrive in January. Project is still due to be commenced in Q3.
	4.2.2 Investigate new technologies to manage waste at landfills, transfer stations and MRF	Present report to Waste Management Working Group	Not Started	Not Started
	4.2.3 Review process for design, planning and installation of public place bins and waste infrastructure	Present report to Executive Management Team	Review of current public place bins underway.	No change.
	4.2.4 Investigate smart technology for public	Template for grant funding submissions	Not Started	Not Started.

	place bins and collection fleets			
<b>4.3. Data Collection</b>	4.3.1 Review data collection, weighbridge software and reporting methodology	Increased reporting on waste categories	Mandalay system is being transitioned over to Cloud based Mandalay system with the introduction of hand held devices at transfer stations	Mandalay is now Cloud based and an external audit is underway to ascertain any improvements.
	4.3.2 Improve data collection of household waste habits	Present results of kerbside assessments to Waste Management Working Group	Mandalay system is being transitioned over to Cloud based Mandalay system with the introduction of hand held devices at transfer stations. Results still to be presented to WMWG	Mandalay is now Cloud based and an external audit is underway to ascertain any improvements.
	4.3.3 Regular audits of waste composition at landfill and recovery sites	Present results of waste audits to Waste Management Working Group	Visual audit of general waste conducted in 2018. Another planned for Q2 2020-21.	Visual audits of residential waste planned prior to the roll out of FOGO.



## Strategic Objective 5: Provide a cost effective service

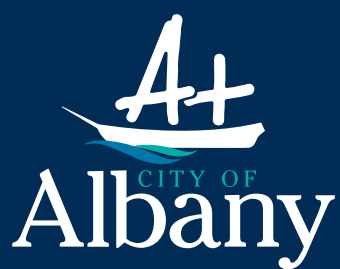
Key Focus Area	Priorities	Key Performance Measure	Project Status Q1	Project Status Q2
5.1. Contracts	5.1.1 Explore opportunities for contract sharing among Alliance partners	Present options and costs to South Coast Alliance	Discussions commenced but implementation cannot commence until current contracts expire (5 years away for collection and processing at MRF).	Ongoing.
	5.1.2 Review and tender the City's waste services contract to maximise resource recovery and community confidence	New contract in place	New green waste collection and separate green waste processing contracts are being developed for FOGO.	Green waste collection contract return being reviewed. Green waste processing contract currently out for submissions.
	5.1.3 Investigate other contractual opportunities which may benefit waste operations	Present options to Waste Management Working Group	Containers for Change is the first contract that was reviewed. Although signed on to had to be cancelled as scheme coordinator would not	Green waste collection contract return being reviewed. Green waste processing

## REPORT ITEM DIS246 REFERS

			consider partnering arrangements.	contract currently out for submissions.
5.2. Collection	5.2.1 Integrate food organics into kerbside garden organics collection	Successful project delivery	Delay due to approvals required for processing facility.	On track for rollout in Q3.
	5.2.2 Develop criteria for extending collection services to include new residential areas	Residential Waste Collection Service Implementation Guidelines	Commenced	Ongoing
	5.2.3 Audit and regularly review collection schedule and location of public place bins, including frequency during peak and seasonal times	Annual public place bin report	Commenced	Ongoing
5.3. Flexibility	5.3.1 Survey residents and conduct visual	Report to Waste Management Working Group	Bin Tagging program from last year was delayed due to Covid-19 but has recommence	Bin tagging has now concluded and awaiting final report.

## REPORT ITEM DIS246 REFERS

	audits on kerbside bin usage and capacity		which will form part of an audit on bin usage and capacity.	
	5.3.2 Review bin size and collection model and determine feasibility of offering a tailored collection service	Report to Waste Management Working Group	Not Started	Not Started
	5.3.3 Review separated waste pricing options for commercial operators	Report to Waste Management Working Group	Not Started	Not Started



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## Local government waste plan

### City of Albany

## Part 1 - services and performance

### 1.0 Introduction

Part 1 of the City of Albany waste plan establishes the city's waste profile and baseline information in relation to the objectives and targets set out in the Waste Avoidance and Resource Recovery Strategy 2030 (Waste Strategy):

**Avoid** - Western Australians generate less waste.

**Recover** - Western Australians recover more value and resources from waste.

**Protect** - Western Australians protect the environment by managing waste responsibly.

Where data was available, the Department of Water and Environmental Regulation (DWER) has pre-filled sections of Part 1. If any of the pre-filled information is incorrect, please amend accordingly and advise of the changes.

Please take the time to ensure that you complete each section, where relevant. In some tabs, you may need to scroll down to ensure that you have not missed any sections.

## Part 1 - Services and performance

### 2.0 Integrated planning and reporting

All local governments plan for the future<sup>1</sup> through the development of strategic community plans and corporate business plans. Waste plans form part of local government integrated planning and reporting as an issue-specific informing strategy.

Table 1: Links between plan for the future and waste management (Please complete the table, even if the answer is "waste isn't mentioned in our SCP or CBP")

<b>Strategic Community Plan</b>	
Title:	Albany 2030 Community Strategic Plan
Came into force:	26/09/2017
Date of next review:	2021
Waste-related priorities:	Objective 3.3.2 Deliver a sustainable and progressive approach to waste management including collaboration with neighbouring local governments.
<b>Corporate Business Plan</b>	
Title:	2017 to 2021 Corporate Business Plan
Came into force:	2017
Date of next review:	2020 - annually
Waste-related priorities:	<p>Effective waste management practices and implementation of Strategic Waste Strategy priorities:</p> <ol style="list-style-type: none"> <li>1. Effective management of the City's Waste Contract; Community Perception rating above LG average;</li> <li>2. Provide best practice management of landfill sites to meet all regulatory requirements; Compliance with annual DER reporting and inspection;</li> <li>3. Deliver actions in the City's Community Waste Resource Strategy 2019-2026; Strategic plan actions delivered within stated timeframe.</li> </ol> <p>The City of Albany CEO's KPIs for 2020-21 include:</p> <ol style="list-style-type: none"> <li>1. Present to Council a business analysis of a proposed long term waste management model with an ability to incorporate emerging waste disposal and recovery technologies and realise best practice standards.</li> <li>2. Provide Council with .... a work plan required to develop a longer term strategic direction and outcome for future Waste Management.</li> <li>3. Provide Elected Members with a quarterly report on Waste Management including current operations and strategic direction.</li> </ol>

<sup>1</sup> 'Plan for the future' means a plan made under section 5.56 of the *Local Government Act 1995* and Division 1 and 3 of Part 5 of the *Local Government (Administration) Regulations 1996*.

# Part 1 - Services and performance

## 3.0 Avoid

Avoidance of waste generation is the preferred waste management option in the waste hierarchy. This section looks at waste generation rates and the reduction required to contribute to the state’s waste generation reduction targets - **2025**: Reduction in MSW generation per capita by 5%, **2030**: Reduction in MSW generation per capita by 10%.

Reviewing this data is a critical element of waste planning as it can show how waste generation has changed, identify potential reasons for changes and indicate areas to target in *Part 2 – Implementation plan* (Table 21).

Table 2: City of Albany population, households and waste generation compared with state averages and targets for 2025 and 2030

*(Local government to review prefilled data)*

	Actual				Targets	
	2014-15 (baseline)	2015-16	2016-17	2017-18	2024-25	2029-30
<b>Population</b> <sup>(1)</sup>	36,822	37,500	37,846	38,192	41,142	43,796
<b>Households</b> <sup>(1)</sup>	15,343	15,625	15,769	15,913	17,143	18,248
<b>Total domestic waste generated</b> <sup>(2)</sup>	14,602	16,634	20,188	18,613		
<b>Waste generation per capita/year (kg)</b> <sup>(2)</sup>	397	444	533	487	377	357

(1) Source (except 2014-15): Western Australia Tomorrow Population Report No. 11 <https://www.dph.wa.gov.au/information-and-services/land-supply-and-demography/western-australia-tomorrow-population-forecasts>. Population for 2014-15 from Western Australia Tomorrow Population Report No. 10. Population for intercensal years extrapolated. Households estimated using 'Average people per households' from 2016 ABS Census Quickstats.

(2) Source: Local Government Census data - domestic waste

**Additional comments** *(local government to insert any additional comments that may be applicable)*

# Part 1 - Services and performance

## 4.0 Recover

Where waste generation is unavoidable, efforts should be made to maintain the circulation of materials within the economy. Table 3 gives the overall recovery rate for your local government compared to Waste Strategy targets and the state average. This is broken down into the proportion of the recovery which was materials recovery (reuse, reprocessing or recycling) or energy recovery. The Waste Strategy includes a target that from 2020, energy should only be recovered from residual waste (see *Guidance Document – Table 1* , for more information).

Table 3: City of Albany population, households and recovery rate compared with state averages and targets for 2020, 2025 and 2030

*(LG to review the pre-filled data and amend/update if necessary. Add additional comments if necessary.)*

	2014-15	2015-16	2016-17	2017-18	2020 target	2025 target	2030 target
<b>Population<sup>(1)</sup></b>	36,822	37,500	37,846	38,192			
<b>Households<sup>(1)</sup></b>	15,343	15,625	15,769	15,913			
<b>Overall recovery (%)<sup>(2)</sup></b>	33%	37%	30%	34%	40%	50%	55%
<b>Materials recovery</b>	33%	37%	30%	34%	50%	50%	55%
<b>Energy recovery</b>	0%	0%	0%	0%	0%	0%	<20%
<b>Perth metro average<sup>(3)</sup></b>	36%	38%	40%	41%			

(1) Source (except 2014-15): Western Australia Tomorrow Population Report No. 11 <https://www.dph.wa.gov.au/information-and-services/land-supply-and-demography/western-australia-tomorrow-population-forecasts>. Population for 2014-15 from Western Australia Tomorrow Population Report No. 10. Population for intercensal years extrapolated. Households estimated using 'Average people per households' from 2016 ABS Census Quickstats.

(2) Source: Local Government Census data - domestic

(3) Source: Waste Authority data fact sheets <http://www.wasteauthority.wa.gov.au/programs/data/data-fact-sheets/>

**Additional comments** *(local government to insert any additional comments that may be applicable)*

With regard to targets:

- Energy recovery is currently not practical from a regional perspective, although we will continue to advocate for and explore potential opportunities.
- Current regional infrastructure, funding limitations and state recycling infrastructure limits the ability for regional local governments to meet the State Waste Strategy targets without significant financial and infrastructure support from the state government.



**Part 1 - Services and performance**

**5.0 Protect**

Objective 3 of the Waste Strategy is to protect the environment by managing waste responsibly, with targets for achieving better practice, reducing litter and illegal dumping. **By 2030 all waste is managed by and/or disposed to better practice facilities, by 2030 move towards zero illegal dumping and zero littering.**

**5.1 Better practice**

Adoption of better practice approaches to waste management is an important way in which local government can better protect the environment from the impacts of waste, and contribute to achievement of the targets under objective 3 of the Waste Strategy. See *Guidance Document - 5.0 Better practice, Table 4* for a summary of the Waste Authority's current and planned better practice guidelines.

Table 4: Better practice approaches and programs adopted by the City of Albany (LG to complete the table)

Waste management activity/service	Waste Authority better practice guideline or program	Date of adoption/ implementation	Comment
Kerbside waste collection - FOGO	Better Bins Kerbside Collection Guidelines	Funding received 2019. Implementation planned for 2020-21.	Currently 3 bin GO system; implementation of FOGO 2020/21.
Kerbside waste collection - bin lid colours	Better Bins Kerbside Collection Guidelines	Funding received 2019. Implementation planned for 2020-21.	Change to Australian standard bin lid colours. Implementation 2020.
Waste Education - Bin Tagging	WALGA Bin Tagging Program	Funding received 2018 for Round One 2019-20. Funding received 2020 for Round Two for 2020-21.	Collaboration with Shires of Denmark and Plantagenet. Tailored feedback to households.
Waste Local Law	WALGA Template Waste Local Law	2018	Completed 2018 based on model law template.
Fossicker's Tip Shop	WALGA Better Practice Reuse Shop Guidelines	Ongoing	Management of facility in line with guidelines.
Education and Behaviour Change	Waste Sorted	2020 - ongoing	Waste Sorted toolkit used for marketing and communications: FOGO implementation / bin tagging / education campaigns and programs.

**5.2 Litter**

The data in Table 5 was reported by the your local government in the 2017-18 local government census. Additional information to be provided by the local government in Table 6 if available.

Table 5: 2017-18 litter data (LG to review prefilled and complete the table)

	Response and comments
Litter hotspot used on a regular basis for littering in 17-18	Whole length of Mercer Rd / Lower King Rd / Lower Denmark Rd / Menang Dr / Frenchman Bay Rd / Chester Pass Rd / Skate Park / Bayonet Head / Spencer Park / Town Jetty / Pull in bay Bakers Junction
What are the main items littered at these hotspots?	Takeaway food packaging, takeaway drink cups with lids and straws, takeaway serviettes, aluminium cans, beer bottles, plastic drink bottles, variety of pieces of plastic.

Table 6: Additional litter information (LG to complete the table where information is available)

Is littering increasing or decreasing in your local government authority?	Steady between 2017/18 to 2018/19 then increase year to date for 2019/20.
How were the costs associated with cleaning up litter calculated? Employee time? Dollar value? Both?	Both, including contractor costs.
Does the city have a litter strategy? If not, what is the ETA for completing one?	No litter strategy. No plans at present to develop stand alone document. Action to review organisational approach in Community Waste Resource Strategy 2019-26.
Have any of the city's compliance and waste education officers undergone training on litter prevention? If so, what training?	No official training. Litter collection undertaken as standard Reserves Officer duties.
What current policies and guidelines does your council enact to prevent litter? E.g. Event planning guidelines on the use of balloons in council facilities and the release of helium balloons; no cigarettes on the beach; no single use plastics at events.	Smoke-Free Outdoors Policy / Event Approval Guidelines (discourages use of helium balloons, confetti & rice in outdoor areas) / Event Approval Application (requirement to organise additional waste and recycling bins if needed; recommendation to implement Waste Management Plan for events) / The Environmental Code of Conduct - Guidelines for Works on Council Controlled Land / Memorial Plaque & Seat Policy & Guideline / Public Parkland Policy - makes it an offence to litter roadsides and other speicired public places

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<b>Current measures aimed at contributing towards the zero littering target</b>	Placement of public place bins; contracted litter collection services; annual participation in Clean Up Australia Day (March); promotion to the community via newspaper and social media; support of Adopt-A-Spot program, Keep Albany Beautiful committee and other community litter volunteers; free disposal of roadside litter at waste facility; Report It function on website and phone app; rangers on patrol; butt bins provided at Centennial Park; promotion of Containers for Change; litter volunteers featured in Community Calendar and Sustainable Heroes social media and video campaign.	
<b>Estimated cost of cleanup (due to collection, disposal, education, infrastructure and enforcement)</b>	\$110,000	Includes collection and disposal of litter and dumping, contracted litter services and education.

Source: Local government Census data 2017-18

<b>Additional comments (local government to insert any additional comments that may be applicable)</b>
Associated actions in the City of Albany's Community Waste & Resource Strategy 2019-26: - Review the City of Albany's organisational approach to litter and public dumping, including data collection, intervention and compliance - Provide support to community groups working to minimise littering along roadsides and in public open space

### 5.3 Illegal dumping

The data in Table 7 was reported by your local government in the 2017-18 local government census. Additional information to be provided by the local government in Table 8 if available.

Table 7: 2017-18 Illegal dumping data (LG to review prefilled data and complete the table)

	Response and Comments	
<b>Cost of cleaning up illegally dumped waste during 2017-18</b>	See above combined with Litter costs	In August 2020, City staff started working on improving the data reporting of illegal dumping incidents, and how to more accurately capture the cost of cleaning up illegally-dumped waste. It is anticipated this will also improve separation of litter and dumping expenses.
<b>Sites used on a regular basis for illegal dumping in 2017-18. Where possible, please provide site address/es</b>	Skate Park, Hare Street, Mount Clarence, Bayonet Head various / Spencer Park Various	Most locations on verges and areas adjacent to bushland
<b>What are the main items dumped at these sites?</b>	Mattresses / tyres / clothing / furniture	
<b>Current measures aimed at contributing towards the zero illegal dumping target</b>	Online Report It function / occasional use of covert cameras / pursue prosecution when evidence available / participation in drumMuster program	

Source: Local government Census data 2017-18

<b>Additional comments (local government to insert any additional comments that may be applicable)</b>
As above. Data in Table 9 is sourced from Customer Service Requests (from members of public, business owners and City staff) for both illegal dumping and litter. Data indicates main repeat items are mattresses /tyres/ clothing / asbestos / bags of general waste. In 2018-19, there were 68 litter and illegal dumping Customer Service Requests and 4 reports of illegal dumping of green waste. Statistics were higher in 2019-20 with 108 Customer Service Requests for illegal dumping plus 7 reported incidents of illegal dumping of green waste.

Table 9 indicates the type of detailed data local governments may collect to enable better targeted monitoring and enforcement of illegal dumping. Please provide this information here, if available.

Table 9: Detailed illegal dumping data collection by the City of Albany

(LG to complete the table if data available)

Date of data collection: 2017/18

<b>How does your local government measure the effectiveness and impact of programs designed to reduce littering and illegal dumping?</b>	At present the City of Albany collects data from various sources but has not undertaken any assessments to review the effectiveness or trending of programs. There is an opportunity to improve measurement and evaluation of programs.
<b>Which division/unit/section of your organisation is responsible for litter management/prevention? Waste services? Compliance (e.g. Rangers)? Infrastructure?</b>	Health & Compliance / Rangers / Reserves / Operations / Waste Services
<b>How important is litter management to your organisation? (1 - Not at all important; 5 - Highly important).</b>	3

Table 8: Additional illegal dumping information (LG to complete the table where data is available)

<b>Is illegal dumping increasing or decreasing in your local government authority?</b>	Minimal increase
<b>How does your local government measure the effectiveness and impact of programs designed to reduce illegal dumping?</b>	Effectiveness and impact have not routinely been measured to date, although some data can be extrapolated. Currently working to improve data gathering for future evaluation.
<b>Which division/unit/section of your organization is responsible for illegal dumping management/prevention? Waste services? Compliance (e.g. Rangers)? Infrastructure?</b>	Compliance Rangers / Reserves / Operations / Waste Services

REPORT ITEM DIS248 REFERS

Waste Type	# of incidents	Total approximate Weight (tonnes)	Change from previous year	Regulatory notices issued
C&I			-4	
C&D	6	N/A	+4	nil
E-waste	3	N/A	+2	nil
Household waste	43	N/A	+10	nil
Mulch & green waste			-7	
Scrap metal	1	N/A	-2	nil
Soil & excavated material				
Hazardous/problem waste	7	N/A	-10	nil
Other		N/A	-12	
<b>TOTAL</b>	<b>60</b>		<b>-19</b>	
<b>Cleaned up by</b>	<b>% of total incidents</b>		<b>Cleanup costs (\$)</b>	
Local government	100		\$85,000 (COA staff & plant costs, plus disposal to landfill - litter and dumping)	
Land owner				
Offender				
<b>TOTAL</b>	<b>100</b>			

**Part 1 - Services and performance**  
**6.0 Waste management tools**

**6.1 Waste services**

Local government data relating to the waste collected, recovered and landfilled is presented in Table 10. It is important to review this data when developing *Part 2 – Implementation Plan*, as it can:

- provide an understanding of how different systems are performing (e.g. recovery levels)
- highlight the need for any new collection systems or infrastructure
- identify the timing and capacity of any new collection systems or facilities required to meet the changing needs of local governments.

In working towards alignment with the Waste Strategy, the local government should focus on the materials resources with the greatest potential to support the objectives and targets of the Waste Strategy.

NB: DWER is currently developing a range of better practice guidelines. Better practice rates will need to be updated as the guidelines are released.

Table 10: Significant sources and generators of waste in 2017-18 (LG to review pre-filled data and amend/update if necessary. Add additional comments if necessary)

Service/Sources	Tonnes collected	Tonnes recovered	Recovery rate	Better Practice rate	Target rate 2025	Target rate 2030
Kerbside	mixed waste	6,934	Nil			
	comingled recyclables	3,289	2,289	33%	N/A	
	green waste	1,633	1,633			
	FOGO	Nil	Nil			
Vergeside	green waste	495	495	68%	N/A	
	hard waste	820	400			
Drop-off	mixed waste	860	Nil			
	dry recyclables	365	350			
	green waste	1,001	1,001	61%	N/A	55% major regional centres
	hard waste	202	126			60% major regional centres
	hazardous waste	5	5			
Public place	mixed waste	311	Nil	N/A	N/A	67% Perth and Peel
	comingled recyclables	No data available	No data available			70% Perth and Peel
Special event	mixed waste	No data available	Nil	N/A		
	comingled recyclables	No data available	No data available			
Commercial	mixed waste	6,481	Nil			
	comingled recyclables	N/A	Nil	N/A		
	paper/cardboard	N/A	Nil			
Local government waste	illegal dumping clean up	95	Nil			
	street sweepings	1484	Nil			
	roadworks	6916	44	2%	N/A	
	other C&D activities					
	roadside pruning	105	105			
	other - dead animals	40	Nil			
<b>TOTAL</b>		31,016	6,448	21%		

Source: Local Government Census Data 2017/18

**Additional comments** (local government to insert any additional comments that may be applicable)

41,035 tonnes of cleanfill was segregated for landfill capping in 2017-18, including some received from local government roadworks.  
 The City is seeking to improve collection of data on public place and special event waste as this data is currently unavailable.  
 Commercial mixed waste is waste received at landfill from sources including C&D and C&I. The City does not accept commercial comingled recyclables or paper/cardboard.  
 Roadside pruning (Local government waste) includes pruning from City reserves.  
 Measurement of waste from City of Albany facilities not currently available but the City is seeking to improve collection of this data.

Table 11 provides space for the local government to include bin audit information for kerbside waste services, if available. Bin audits can help local governments understand the material composition in kerbside bins, highlight where additional efforts are required to increase performance and assist in planning for future service options such as FOGO collection. **See Appendix for full breakdown of composition categories**

Table 11: Compositional audit data for kerbside waste services (Complete if data is available. Add additional comments if necessary).

General waste bin	
Yield per household (kg/hh/week)	8.7kg/hh/wk
Per capita (kg/per capita/week)	3.7kg/pp/wk
Audit year	2018
Composition	
	Total %
Recyclables (paper, cardboard, plastics, steel, aluminium, glass)	20%
Organics (organics, wood/timber, textiles, earth)	30%
Hazardous (medical, sanitary/ hygiene, nappies, chemicals, paint, batteries, fluorescent tubes, light bulbs, oil, building material)	10%
Other (electronic waste, miscellaneous)	40%

Recycling bin	
Yield per household (kg/hh/week)	4.1kg/hh/wk
Per capita (kg/per capita/week)	1.76kg/pp/wk
Audit year	N/A
Composition	
	Total %
Recyclables (paper, cardboard, plastics, steel, aluminium, glass)	N/A
Organics (organics, wood/timber, textiles, earth)	N/A
Hazardous (medical, sanitary/ hygiene, nappies, chemicals, paint, batteries, fluorescent tubes, light bulbs, oil, building material)	N/A
Other (electronic waste, miscellaneous)	N/A

Garden organics or FOGO bin	
Yield per household (kg/hh/week)	2.05kg/hh/wk
Per capita (kg/per capita/week)	.88kg/pp/wk
Audit year	N/A
Composition	
	Total %
Recyclables (paper, cardboard, plastics, steel, aluminium, glass)	<1%
Organics (organics, wood/timber, textiles, earth)	>97%
Hazardous (medical, sanitary/ hygiene, nappies, chemicals, paint, batteries, fluorescent tubes, light bulbs, oil, building material)	<1%
Other (electronic waste, miscellaneous)	<1%

**Part 1 - Services and performance**

**6.0 Waste management tools**

**6.2 Waste infrastructure**

The number, type, capacity and location of key existing local government owned and/or operated waste and resource recovery infrastructure is required to understand the future need for different facility types. **This section is not relevant to local governments that do not own/operate waste facilities.**

Table 12: Current waste and resource recovery infrastructure operated by the local government (LG to complete the table)

Facility name (and licence number if applicable)	Facility Type	Location	Managed by	Licence category and approved production or design capacity	Material type	Service/activity	Remaining Capacity (if applicable)	Anticipated Closure (year)
Albany Refuse Site L6925/1997/9	Class II Putrescible Landfill Site	37 Maxwell Street Mount Melville WA 6330	City of Albany	Category Number 62.. Solid Waste Depot 30 050 tonnes per annual period  Category Number 64. Putrescible Landfill Site 100 000 tonnes per annual period	Inert Waste type 1		513,636 m3	approximately 2027
					Inert Waste type 2			
					Special Waste type 1 (Asbestos)			
					Special Waste type 2 (Biomedical)			
					Putrescible Waste			
					Clean Fill			
					Quarantine Waste			
					Contaminated Solid Waste			
					Hazardous Waste			
Bakers Junction Waste Facility L7048/1997/11	Class II Putrescible Landfill Site	Reserve 31472 Chester Pass Road	City of Albany	Category Number 64 Putrescible Landfill Site Not more than 50 000 tonnes per year	as above		656,916 m3	approximately 2035
South Stirling Transfer Station L8738/2013/1	Putrescible Waste transfer Station	Lot 324 on Plan 71100 South Stirling WA 6324	City of Albany	Category Number 62 Solid Waste Depot 1180 tonnes per year	Putrescible Waste Recycling		Not applicable. Nothing stored at this site.	Not applicable. Nothing stored at this site.
Other								

Table 13 provides space for local governments to provide information about planned waste and resource recovery infrastructure, if relevant.

Table 13: Planned waste and resource recovery infrastructure (LG to complete the table)

Location	Managed by	Licence category and approved production or design capacity (if known)	Waste type	Service/activity	Estimated operation start date
nil at this stage					

**Additional comments** (local government to insert any additional comments that may be applicable)

The City of Albany and its partners in the South Coast Sustainable Waste Alliance are currently searching for a suitable site to locate a new joint waste facility that will replace the Albany Refuse Site which has an estimated 7-10 year lifespan remaining.

## Part 1 - Services and performance

### 6.0 Waste management tools

#### 6.3 Policy and procurement

##### 6.3.1 Contracts

Information on your local government's existing waste contracts should be detailed in Table 14. When reviewing services, it is a good opportunity to evaluate how they are performing, opportunities for regional collaboration and to identify any opportunities for improvement, review or renegotiation.

Table 14: Existing waste management contracts (LG to complete the table)

Contractor	Services		Notes/comments
Cleanaway	General waste and recycling kerbside collection	Recycling processing at MPF Education	Waste and recycling contract expires June 2022 Greenwaste contract expires February 2021
	Greenwaste collection	Bulk vergeside - hard and greenwaste	Contractor works across the region. Regional Waste Alliance works to maximise collaborative opportunities working with the same contractor
	Soil Solutions	Greenwaste processing	Contract expires February 2021
Total Green	E-waste collection		Contract expires 2022
WALGA	Hazardous Household Waste	E-waste	WALGA contract with Waste Authority expires on 30 June 2023
West Coast Analytical Services	Landfill water monitoring and reporting services		Contract expires on 27 June 2022
Sims Metal	Steel and scrap metal		Renewed and tendered as needed
TBA	Paint collection		Paintback Scheme to be arranged through WALGA
TBA	Vehicle battery recycling		

##### 6.3.2 Waste local laws and policies

Information on your local government's existing local laws, strategies or policies that may complement/support this waste plan and contribute to the Waste Strategy objectives should be detailed in Table 15.

Table 15: Existing waste-related local laws, strategies and policies (LG to complete the table)

Type of local law, strategy or policy	Name of local law, strategy or policy	Came into force	Comments
local law	Waste Local Law	2017	
local law	Waste Amendment Local Law	2018	
local law	Animals Local Law - keeping of poultry	2001	
strategy	Carbon Footprint Strategy	2014	Objectives 5.1 / 5.2 / 5.3
strategy	Community Waste Resource Strategy	2019	
policy	Supply of Mobile Garbage Bins Policy	2019	

##### 6.3.3 Land use planning instruments

Information on your local government's existing local planning instruments which contribute to the management of waste should be detailed in Table 16.

Table 16: Existing waste-related land use planning instruments related to waste management (LG to complete the table)

Local Planning Strategy	TITLE:	
		City of Albany Local Planning Strategy

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	ENDORSED BY WAPC:	2019
	NEXT REVIEW DUE:	10-15 years
	Is waste considered and reflected in the Local Planning Strategy?	Yes
		<b>Extract: Strategic direction:</b> Meet the service infrastructure requirements for Albany's settlement growth. <b>WASTE DISPOSAL SITE REQUIREMENTS</b> 7. Secure and protect any new landfill site identified by application of an appropriate local scheme reserve and Special Control Area in the Local Planning Scheme. 8. Introduce Special Control Areas under the Local Planning Scheme to protect regionally significant infrastructure from incompatible or sensitive land uses as necessary.
Does the Local Planning Strategy identify current and future waste facility sites?	Yes	
	Current waste facilities and transfer stations. No new sites identified	
Does the Local Planning Strategy identify buffers around existing and/or future sites to avoid land use conflict?	No	
	Mention is made of the need to set aside land for a future site and the establishment of the Regional Waste Alliance to progress site selection	
<b>Local Planning Scheme</b>	TITLE:	Local Planning Scheme No. 1
	GAZETTED:	2014
	NEXT REVIEW DUE:	2020
	Are resource recovery facilities, waste disposal facility and waste storage facility defined as land uses (as per <i>Planning and Development (Local Planning Schemes) Regulations 2015</i> ) and included in the council Local Planning Scheme zoning table, with either a P/I/D/A/X permissibility?	No
		This can be incorporated as part of the next Scheme Review in 2020.
	If these land uses are not defined and not in the zoning table, how does the Scheme deal with such land uses (i.e. is an alternative definition used to that in the <i>Regulations 2015</i> ? Or are these land uses zoned as "Use not listed")?	Use not Listed'
Does the Local Planning Scheme identify statutory buffers as Special Control Areas for strategic waste infrastructure facilities to avoid encroachment by incompatible land uses?	No	
	Can be incorporated as part of the next Scheme Review in 2020 - buffer guidance would need to be provided for indicative sites	
<b>Local planning policies</b>	TITLE:	No Local Planning Policies related to waste management
	ADOPTED BY COUNCIL:	
	RELATIONSHIP TO WASTE STRATEGY OBJECTIVES:	
	Does the local government have any local policies which relate to the objectives of the Waste Strategy (reduce generation, increase recovery, protect the environment)?	YES NO
		<b>If YES please provide comments:</b>

Other	TITLE:	
	ADOPTED BY COUNCIL:	
	RELATIONSHIP TO WASTE STRATEGY OBJECTIVES:	

**6.3.4 Sustainable procurement**

Local governments can be significant consumers whose purchasing decisions and procurement policies can have positive impacts. This section reviews activities relating to procurement of infrastructure, goods and services that avoid waste, promote resource recovery or encourage greater use of recyclable and recycled products. Information on existing sustainable procurement policies or practices that may contribute to the Waste Strategy objectives should be detailed in Table 17.

*Table 17: Existing sustainable procurement policies and practices (LG to complete the table)*

Sustainable procurement policy or practice	Date adopted by council	Actions implemented e.g. switching to recycled	Alignment with Waste Strategy targets, objectives or focus materials
No specific policy as at September 2020.			

**Additional comments** *(local government to insert any additional comments that may be applicable)*

Although the City of Albany does not currently have a designated Sustainable Procurement Policy, it does have purchasing practices which contribute to the Waste Strategy objectives. For example, the Reserves staff regularly purchase from Replas WA 100% recycled plastic bench seats and bollards for parks and trails. We also buy 100% recycled Australian made toilet paper for City workplaces and public toilets. The City did do a trial of recycled copier paper but feedback from staff and Elected Members identified some issues. However, the City does buy copier paper which is PEFC Australian Forestry Standard paper that support sustainable forest management. The City's copier paper usage has halved since Elected Members were given laptops in 2018 and now only 5 of our 13 Elected Members request hardcopies of various documents.



## Part 1 - Services and performance

### 6.0 Waste management tools

#### 6.4 Behaviour change programs and initiatives

Communication and engagement with waste generators and managers underpins many local government waste management activities, and are vital in driving behaviour change needed to achieve the objectives and targets of the Waste Strategy.

Behaviour change programs and initiatives refers to activities that increase awareness, skills and knowledge; provide consistent messaging; help people to use waste infrastructure; and encourage the adoption of specific, positive waste behaviours and attitudes.

Most local governments have existing behaviour change programs and initiatives and it is important to evaluate their effectiveness. This section includes an opportunity for a high level qualitative assessment process to understand what has worked and what has not. The results can be used to inform actions for *Part 2 – Implementation plan (Table 21)*.

Information on the local government's existing waste behaviour change programs or initiatives should be detailed in Table 18. This may include participation in Waste Authority funded programs, or programs/initiatives run by the local government.

Table 18: Behaviour change programs and initiatives, including Waste Authority programs and other local government initiatives (LG to complete the table)

Local government program/initiative	Description	Outcomes achieved as a result of the program (Qualitative/quantitative)	Evaluation method	What's worked/not worked	Suggested improvements
Garage Sale Trail	<a href="http://www.garagesaletrail.com.au">www.garagesaletrail.com.au</a>	4,113 participants / 376 sales / 27,461kg waste reused. 669kg per sale / \$28,760 money changed hands locally	Participant survey post event	Raises profile of event and waste issues	Need to expand duration and manage community disposal of remaining waste
Clean Up Australia Day	<a href="http://www.cleanupaustaliaday.org.au">www.cleanupaustaliaday.org.au</a>	Corporate clean up with COA staff collected 200kg of waste. Public participated in program at various clean up sites	Weight of waste calculated on weighbridge during disposal	Greater publication and promotions	Data sourced from Cleanaway when bags collected from sites
City of Albany App	Online app for waste services information / bin days / a-z recycling guide / tips	1,169 registered users / accessed 5,000 times	Data generation from software with number of users and times app is accessed	Easy to use; instant information. Some issues with incorrect data; uses legacy code	Explore alternative options for easier updating of information when required
Annual Community calendar and waste guide	Waste disposal information / tips on waste minimisation	15,000 households viewed	NA	Format and styling is popular with the community	Develop stand-alone Waste Guide with complementary information in calendar
Events Recycling Trailer	Free loan of Events Recycling Trailer	1350 kg of waste diverted annually	Trailer usage records	Data and record keeping and trailer design needs upgrades	Upgrade of trailer and increased promotion
AWARE Waste Education Tours	Free community and school program with tours / talks and information run by Cleanaway Education Officer	2,000 participants in 2019	Record keeping of participant numbers	Accessible for all community members / tailored to user groups	Consider alternative delivery days and times
Compost Revolution	Community program for subsidised compost bins and online tutorial education program	266 bins purchased / 245 aerators purchased / 240 households composting / >45,000kg of waste diverted or 2.3kg week per household	Record of participants by external provider	Easy to use / online service. Some administrative burden and issues with bin quality	Improved bin design; consider local business partnerships
Green Fair on the Square	Annual waste and environment themed event at town square with music, stalls and entertainment	2,500 participants in 2019	Participant counts	Very popular, family friendly, good location	Refocus on activities that will lead to behaviour change
Social Media	Regular social media posts highlighting options and problem areas	TBA	Post engagement	Posts with local information; interest in what can/can't be recycled	FOGO/Better Bins campaign will include significant social media campaign

Community Waste Minimisation Workshops	Range of workshops on waste education themes (composting, worm farming)	500 participants in 2019	Participant counts	Popular, intimate workshops	Create post events surveys to track behaviour change over longer term
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**Additional comments** *(local government to insert any additional comments that may be applicable)*

Waste education undertaken directly by the City of Albany and in partnership with other organisations where required including Waste & Recycling contractor Cleanaway and local community groups.

**6.5 Data**

Table 19 provides an opportunity to assess existing waste data practices, identify strengths and gaps and consider the kinds of data activities which could be included in the *Part 2 – Implementation Plan* to improve the local government’s waste data. It should be completed based on the data/information covered in *Part 1* of this document, as well as the individual experience of the officer/s responsible for collecting and using waste data.

Where ‘no’, please comment on:

- the kinds of data that is missing, where data gaps exist
- barriers to collecting or accessing adequate data
- the kinds of data collection, analysis or reporting practices that are not currently in place which would assist local government waste management functions.

Table 19: Assessment of waste data *(LG to complete the table)*

	Please ✓		Comment
	YES	NO	
Does the local government have access to adequate waste data to complete Part 1 of the waste plan?	YES		Majority of data is available on large scale reporting. More specific data still needs to be collected as needs arise
Does the local government use waste data when undertaking planning activities for waste projects/programs?	YES		Improved collection of some data is needed, to inform planning e.g., litter and dumping
Does the local government have access to adequate waste data for this purpose?		No	
Does the local government use waste data when monitoring or assessing waste projects/programs?	Yes		
Does the local government have access to adequate waste data for this purpose?	Yes		
Does the local government use adequate waste data to measure progress toward the targets and objectives of the Waste Strategy?	Yes		
Does the local government have access to adequate waste data for this purpose?	Yes		
Does the local government have access to adequate waste data to fulfil annual data reporting obligations under the WARR Regulations? (previously undertaken through the Waste and Recycling Census)	Yes		
Are there any types of waste data that the local government does not currently collect or have access to that would be helpful/useful?			Unsure.
Are there any ways which local government waste data collection, storage or use could be improved?	Yes		Littering and illegal dumping - needs greater detail in customer service requests including type of waste reported and volumes

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<p>Is the data collected by the local government accurate? Are any new strategies needed to improve accuracy?</p>	<p>Yes</p>		
<p>Does the pre-filled data provided in this template align with the data the local government has? i.e. is this pre-filled data accurate?</p>			<p>There are some inconsistencies, as noted in P1 3&amp;4</p>
<p>Any additional comments?</p>			

**Part 1 - Services and performance**

**7.0 Summary**

The purpose of *Part 1* of the waste plan is to consolidate information about current waste management practices, to enable you to assess and identify:

- current waste management performance
- alignment between current waste management practices and the Waste Strategy
- strengths and successes, as well as gaps and opportunities for improvement.

Table 20 provides space to analyse the data and information presented in *Part 1*, and should be used to determine waste management priorities for the short, medium and long term, and translate these priorities into actions in *Part 2 – Implementation plan (Table 21)*.

*Table 20: Assessment of current waste management performance and prioritisation of future actions. (Completing this table is optional)*

<p><b>Waste management achievements</b> (for example, performance/achievement against Waste Strategy targets or objectives or where particular waste management objectives have already been met)</p>	<p>Early adopter of three bin GO system                  Tip shop upgrade with increased transactions and reduction in materials to landfill                  Bulk green waste service                  Participation in South Coast Sustainable Waste Alliance</p>
<p><b>Opportunities for improvement</b> (for examples, where performance against Waste Strategy targets or objectives could be improved or where waste management objectives have not been met)</p>	<p>Investigate potential options to increase diversion from landfill, such as recovery of material from C&amp;I and C&amp;D sources and recycling of bulk hard waste including mattresses</p>
<p><b>Priority areas for action in Part 2 – Implementation plan</b></p>	<p><b>Ongoing (activities currently under way and/or continuously undertaken)</b>                  - Implementation of FOGO and change of bin lids to Australian standard colours</p>
	<p><b>Short term (within the next 1-2 years)</b>                  - Complete implementation of FOGO                  - Investigate options to increase diversion from landfill, such as recycling of bulk hard waste, particularly mattresses, and recovery of materials from C&amp;I and C&amp;D sources</p>
	<p><b>Medium term (within the next 3-5 years)</b>                  - Investigate new landfill site (potentially to accept regional waste)</p>
	<p><b>Long term (more than five years)</b>                  - Continue investigating potential regional waste to energy options. Waste to energy options will only be considered post FOGO implementation and for residual waste streams only.</p>

**Part 2 - Implementation plan**

This implementation plan outlines the actions which your local government will take over the next 5+ years to contribute to the achievement of relevant Waste Strategy targets and objectives. It is where the priorities described in the summary (Part 1 – 7.0 Summary, Table 20) are translated into actions. Please refer to the Guidance Document under sections: **4.0 How to complete Part 2 – implementation plan, 5.0 Better practice and 6.0 Waste management tools**, when developing this implementation plan.

Table 21: Implementation plan

Waste Management Tool	Objectives (OR link to existing local government plan/document that details this activity)	Is the action new or existing?	Detailed actions (OR link to existing local government plan/document that details this activity)	Target (SMART - Specific, Measurable, Achievable, Relevant, Timed)	Key Performance Indicators	Timeframe for delivery (completion date)	Cost of implementation incorporated into annual budget and Corporate Business Plan? Y/N - (if not, why?)	Aligns to Waste Strategy Objectives			Responsibility for Implementation (branch, team or officer title, not the names of individual officers)	Identified risks (Impact/consequences and mitigation strategies)
								Avoid	Recover	Protect		
Waste services	Integrate food organics into kerbside garden organics collection using guiding principles from the Better Bins Plus: Go FOGO Program. (Albany Community Waste Resource Strategy 2019-2026 - Objective 5.2.1)	Existing	1. Go to tender for caddies, liners and lids.	1. Contract signed by November 2020	Reduce organic waste to landfill by 1,500 tonnes in the first year. By September 2021, all residents with a refuse charge will have access to the FOGO service.	Sep-22	FOGO is included in 2020-21 budget.	ü	ü		Waste Team	<b>Risks:</b> Community push back, high contamination rates, transitioning to smaller bins/less frequent collection, cost overruns. <b>Mitigation:</b> education, behavior change program for pre/during/post roll-out, test contamination plan during trial, have options for people with nappies/large families, plan carefully.
			2. Tender for FOGO processing.	2. Contract signed by February 2021								
			3. Tender for FOGO collection.	3. All contracts signed by Feb 2021								
			4. Variation to waste and recycling contract.	4. Variation endorsed by March 2022								
			5. Roll out the service including a behaviour change program with material from the modified WasteSorted communication toolkit and in different languages to align with identified CALD groups in Albany.	5. By September 2021, all residents with a refuse charge will have access to the FOGO service.								
			6. Undertake monitoring and evaluation.	6. Monitoring and evaluation completed by Sept 2022.								
Waste infrastructure	Maximise lifespan of Hanrahan Landfill and plan for its future closure. (Albany Community Waste Resource Strategy 2019-2026 - Objective 3.2.3)	Existing	1. Develop project scope.	1. May 2021	Extend life of landfill beyond estimated closure in 2026.	Dec-23	Investigation work and budget for new landfill site is included in the LTFP.			Waste Team	<b>Risks:</b> Cost, negative outcome with lost time for future planning. <b>Mitigation:</b> Continue looking for new site in parallel.	
			2. Appoint consultant.	2. August 2021								
			3. Undertake feasibility study on extending landfill lifespan.	3. February 2022								
			4. Investigate required approvals.	4. February 2023								
			5. Implement findings.	5. December 2023								
Policies and procurement	Investigate the viability of using landfill gas from Hanrahan Landfill as a potential energy source. (Albany Community Waste Resource Strategy 2019-2026 - Objective 4.1.3)	Existing	1. Develop project scope.	1. May 2021	Completion of feasibility study.	Dec-23	Yes		ü	Waste Team	<b>Risks:</b> Council or community opposition to potential recommendations <b>Mitigation:</b> Regular communications/engagements/briefings a required during the project.	
			2. Appoint consultant.	2. August 2021								
			3. Undertake feasibility study.	3. February 2022								
Data	Review, develop and implement modified data collection methodology including improved weighbridge hardware and reporting methodology to improve transparency, operational efficiency and increase ease of data reporting. (Albany Community Waste Resource Strategy 2019-2026 - Objective 4.3.1)	Existing	1. Undertake an independent external audit to review how data is accessed and used.	1. Review completed by December 2020.	5% reduction in reporting errors.	Dec-21	Yes	ü	ü	Waste Team	<b>Risks:</b> Becomes too onerous for staff. Reputation risk by slowing customer flow. May not improve data accuracy. <b>Mitigation:</b> Off the shelf system. Plan to ensure training for all staff. Make as simple and easy to use as possible.	
			2. Implement changes to software and optimise operations/reporting functions	2. June 2021.								
			3. Undertake staff training.	3. December 2021.								
Behaviour change programs and initiatives	Develop & implement a communications plan to guide community education, engagement and responsibility. (Albany Community Waste Resource Strategy 2019-2026 - Objective 2.3.1)	Existing	1. Establish working group.	1. Waste communications working group already established to develop communications plan.	Contamination of FOGO waste is less than 5%.	Dec-22	Yes	ü	ü	ü	Waste, Communications, Leasing, Customer Service and Rates staff	<b>Risk:</b> Competing priorities delays achievement of milestones. Lack of stakeholder commitment, lack of Councilor support <b>Mitigation:</b> manage expectations so that timelines established are able to be met, ensure sufficient time is allocated for delivery. Develop robust stakeholder communications plan, ensure clear communication of project objectives.
			2. Develop communications and engagement plan including engagement with residents, body corporate and landowners.	2. Endorsed Communications Plan completed by end of October 2020.								
			3. Develop (using the modified Waste Sorted communication toolkit) and distribute education material and promote messages at community events.	3. Deliver and distribute education material in accordance with endorsed Communications Plan.								
			4. Undertake monitoring and evaluation.	4. Monitoring and evaluation completed by December 2022.								
Behaviour change programs and initiatives	Regularly review alternative waste practices such as waste to fuel, anaerobic digestion and waste to energy. (Albany Community Waste Resource Strategy 2019-2026 - Objective 4.1.1)	Existing	1. Meet with business entities and/or receive business cases for viable alternative waste practices and technologies.	Provide annual update to Elected Members	Provide annual update to Elected Members	Jun-26	N/A	ü	ü	CEO, Mayor and Waste Team	<b>Risk:</b> Albany does not produce enough waste to make most alternative waste technologies viable. Lack of financial support from State and Federal Governments, despite Local Government enthusiasm. <b>Mitigation:</b> Broaden scope to include waste from South Coast Economic Alliance partners and	
			2. Advocate to State and Federal Governments for their input into waste infrastructure in the Great Southern.									

**Bin Audit Composition Category Details**

Recyclable Components						
1	2	3	4 Descriptors			
Recyclables	Paper	Recyclable Paper	Newspaper	Newspapers, Newspaper like pamphlets,		
			Glossy Paper	magazines (glossy) pamphlets, present wrapping paper,		
			Office Paper	A4 document paper, writing pads, letters, stationery papers, Print / Writing Paper, envelopes		
			Coloured Paper	Coloured Paper		
		Non-Recyclable Paper	Composite Paper	Composite paper items where the weight of the paper is estimated to be greater the weight of the other materials, envelopes with transparent windows		
			Contaminated Paper	Paper towel, Paper Napkins, Contaminated Paper - soiled not recyclable		
			Other Paper	Non-Recyclable Paper, greaseproof paper, paper with wax coating, high wet strength papers, telephone books		
			Cardboard	Recyclable Cardboard	Corrugated Cardboard	Corrugated cardboard boxes,
					Packaged Flat Cardboard	packing boxes etc, cereal boxes, business cards, folding cartons
					Liquid Paper Board Foil Lined and Other	UHT / Long life milk, Soy Milk Cartons, some fruit juice cartons, Carbon barriers, Milk Cartons, Cardboard with wax coating, paper/disposable cups including biodegradable cups
	Non-Recyclable Cardboard	Composite cardboard	Composite cardboard items where the weight of the cardboard is estimated to be greater the weight of the other materials, e.g. pringle boxes etc,			
		Contaminated Cardboard	Contaminated Cardboard e.g. pizza boxes			
		Other Cardboard	Non-Recyclable Cardboard			
		Plastics	Recyclable Plastics	PET #1	Soft drink bottles, juice bottles, some food & mouthwash containers (e.g. jam & sauce bottles, peanut butter jars) including coloured PET	
	HDPE#2			Milk and cream bottles, shampoo and cleaner bottles, HDPE bottles, including coloured HDPE		
	PVC#3			Cordial and juice bottles, blister packs, plumbing pipes and fittings, PVC labels		
	LDPE#4			Ice cream container lids, cream bottle lids, squeeze bottles, lids, builder's black plastic, black mulch film, plant nursery bags		
	Polypropylene#5			Ice cream containers, drinking straws, pot plant pots, some bottle caps, plastic garden settings, potato crisp bags, compost bins		
	Polystyrene #6			Yoghurt / sour cream containers, hot drink cups, take away containers, plastic cutlery, video/CD boxes, packaging foam, any foam		
	Plastic#7 Other			Tupperware, Mixed unidentifiable plastics, all other resins and multi-blend plastic materials		
	Non-Recyclable Plastics		Plastic Bags	Plastics Shopping Bags, Plastic Produce/Food Bags, Resealable Plastic Bags, Bin liners, Garbage bin liners, Compostable Plastics Bags		
			Plastic Film	Cling film		
			Composite (Mostly Plastic)	Composite plastic items where the weight of the plastic is estimated to be greater than the other material items		
	Glass	Recyclable Glass (CDS Glass)	Glass Bottles	Beer/Cider Mixed Drinks, Soft drink bottles, not broken glass		
		Recyclable Glass	Glass Other	wine bottles, food and sauce jars,		
		Non-Recyclable Glass	Miscellaneous/Other Glass	Plate glass (window and windscreen), broken light globes glass, glass particles, Black or ceramic lined glass, Including broken glass that is recyclable more than 50mm in size		
	Ferrous (Steel)	Steel	Steel Cans	Food cans, pet food cans, tins, empty paint tins,		
			Steel Aerosols	Aerosol cans		
			Composite Ferrous (Mostly Ferrous)	Composite ferrous items where the weight of the metal is estimated to be greater than the other material items		
			Ferrous Other	Beer bottle tops, 100% ferrous items that are not cans / tins / packaging materials		
Non Ferrous (Aluminium)	Aluminium	Aluminium Cans	Beer and soft drink cans,			
		Aluminium Aerosols	Aluminium aerosol cans			
		Aluminium Foil	clean foil			
		Composite Non-Ferrous (Mostly Non-Ferrous)	Composite non-ferrous metal items where the weight of the metal is estimated to be greater than the other material items			

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		Non-Ferrous Other	Copper / brass / bronze items, other metals (not ferrous / aluminium), Aluminium tamper proof seals	
<b>Contaminants/Non-Recyclable Components</b>				
Organic	Organic	Organic	Food Waste	Vegetable scraps, meat scraps, animal food, leftover food, Food particles, Bones
			Green Waste	Grass clippings, tree trimmings / pruning's, flowers, tree wood
			Packaged Food Waste	(Liquid containers - quarter full or more) and (Food Waste in containers or bags)
			Other Putrescible	Animal excrement, mixed compostable items
			Wood/Timber	Milled wood / timber, wooden skewers
	Other Organics	Other Organics	Textiles	(Natural/Synthetic - Apparel/Bedding etc.), (Leather and Rubber)
	Textiles	Textiles	Other Textiles	Shoes, handbags, millinery etc
	Earth	Earth	Soil/Dust 'n' Dirt and Inert and Broken Glass, Ash/Coal	Vacuum bag contents, soil, rocks, dirt, grit, mud, Broken Glass less than 50mm in size
			Ceramics, Rocks/Stones, Bricks, Concrete	Bricks and stones, Cups, bowls, pottery items, concrete
	Hazardous	Medical	Medical Waste	Pharmaceuticals
Medical Waste				Band aids, Bandages, Used surgical gloves, Surgical Instruments, Medical aids/kits, Medical devices and radioactive materials, any solid waste generated from a diagnosis, treatment of humans or animals, /Medical Other
Hypodermic Syringes				Hypodermic Syringes, Epi Pens
Pathogenic Infectious		Pathogenic Infectious	Sanitary / Hygiene	used tissues (items with any bodily fluids), tampons/pads, cotton buds)
			Nappies	Adult and Child disposable nappies
Hazardous		Hazardous	Chemicals	Bleach, Shampoo, Cleaning Products, (where the weight of the product is estimated to be greater than the weight of the container)
			Paint	Wet/Dry Paint
			Batteries Household	Batteries (Single Use and Rechargeable), Mobile phone battery
			Batteries Other	Vehicle Batteries e.g. Car/Boat, Industrial batteries e.g. Power Supply (UPS)
			Fluorescent Tubes/Light Bulbs	
			Oil Household, Motor & Other	
			Building Material	
Hazardous Other		Uncategorized hazardous waste		
Other	Electronic Waste	Electronic Waste	Toner Cartridges	Toner Cartridges
			Computer Equipment	Computer Components, Peripheral Devices/Computer Printer or Photocopier/Printer
			Mobile Phones	Mobile phones
			Electrical Items	Electrical Products
	Miscellaneous	Miscellaneous	Miscellaneous (Specify)	Any items not applicable to other categories

## GLOSSARY

<b>Avoidance</b>	Avoidance refers to the prevention or reduction of waste generation and is the most preferred option in the waste hierarchy.
<b>Better practice</b>	Better practice refers to practices and approaches that are considered by the Waste Authority to be outcomes-focussed, effective and high performing, which have been identified based on evidence and benchmarking against comparable jurisdictions
<b>Commercial and industrial waste (C&amp;I)</b>	Solid waste generated by the business sector, State and Federal Government entities, schools and tertiary institutions.
<b>Commercial waste services</b>	<ul style="list-style-type: none"> <li>• Refers to drop-off, kerbside, vergeside or other waste services provided by the local government to commercial premises.</li> <li>• Discretionary service, not offered by all local governments</li> </ul>
<b>Construction and demolition waste (C&amp;D)</b>	Solid waste produced by demolition and building activities, including road and rail construction and maintenance, and excavation of land associated with construction activities.
<b>Disposal</b>	<ul style="list-style-type: none"> <li>• Disposal refers to the discharge of waste into the environment, either into landfill or another disposal route.</li> <li>• Disposal is the least preferred option in the waste hierarchy.</li> </ul>
<b>Drop-off facilities and services</b>	<ul style="list-style-type: none"> <li>• Drop-off collections are where reportable waste is delivered to the waste depot (drop-off facility) by the residents of the local government i.e. self-hauled waste.</li> <li>• Services are provided to collect waste or recyclable materials.</li> <li>• May be temporary or permanent standalone drop-off points for one or more materials, or may form part of other waste facilities (such as landfills or transfer stations).</li> <li>• <b>Note:</b> this does not include HHW drop-off points</li> </ul>
<b>Energy recovery</b>	The process of extracting energy from a waste stream through re-use, reprocessing, recycling or recovering energy from waste



<p><b>Household hazardous waste (HHW) facility</b></p>	<ul style="list-style-type: none"> <li>• Refers to facilities for the drop-off and storage of HHW</li> <li>• Includes consideration of the drop-off and storage procedures and infrastructure, staffing and resourcing, layout, operation and management HHW facilities, etc.</li> </ul>	
<p><b>Illegal Dumping</b></p>	<p>Illegal dumping is the unauthorised discharging or abandonment of waste and is an offence under Section 49A of the <i>Environmental Protection Act 1986</i>.</p> <p>Illegally dumped waste is generally considered to have the following attributes:</p>	
	<p>Volume</p>	<p>&gt; 1 cubic metre</p>
	<p>Environmental impact</p>	<p>Contains items/substances that are potentially noxious or hazardous; potential for environmental harm if material leaks, spreads or degrades</p>
	<p>Type of waste</p>	<p>Commercial or industrial waste; larger-scale household waste</p>
	<p>Reason for offence</p>	<p>Premeditated decision; commercial benefit or avoidance of fee</p>
	<p>Mode of deposition</p>	<p>Deposited using a vehicle</p>
<p><b>Kerbside waste services</b></p>	<ul style="list-style-type: none"> <li>• A regular, containerised collection service (often a wheelie bin) where the waste or recycling is collected from outside a resident's dwelling.</li> <li>• Can apply to either recycling or general waste (and in a few instances green waste).</li> </ul>	
<p><b>Landfill</b></p>	<ul style="list-style-type: none"> <li>• Refers to inert or putrescible waste, registered or licenced landfills</li> <li>• Activities related to the layout, operation, management and post closure of a landfill.</li> <li>• Includes consideration of the technology and infrastructure on site, staffing and resourcing, and any other waste facilities or services at the landfill site (e.g. greenwaste or recycling drop off, mulching, tip shop, etc.)</li> </ul>	

<b>Litter</b>	<p>Litter is defined in the <i>Litter Act 1979</i> as including:</p> <ul style="list-style-type: none"> <li>• all kinds of rubbish, refuse, junk, garbage or scrap; and</li> <li>• any articles or material abandoned or unwanted by the owner or the person in possession thereof,</li> </ul> <p>but does not include dust, smoke or other like products emitted or produced during the normal operations of any mining, extractive, primary or manufacturing industry.</p> <p>Litter is generally considered to have the following attributes:</p>	
	Volume	< 1 cubic metre
	Environmental impact	Nil or minor actual or potential environmental impact
	Type of waste	Personal litter
	Reason for offence	Unpremeditated, convenient disposal
	Mode of deposition	Deposited by hand (includes dropping by hand from a vehicle)
<b>Local government waste management</b>	<ul style="list-style-type: none"> <li>• Refers to waste generated by a local government in performing its functions</li> <li>• Includes materials such as construction and demolition waste from road and footpath building and maintenance; greenwaste from parks maintenance; waste generated at local government offices, depots, and facilities</li> </ul>	
<b>Municipal solid waste (MSW)</b>	Solid waste generated from domestic (residential) premises and local government activities	
<b>Peel region</b>	The Peel region is the area defined by the Peel Region Scheme.	

<b>Perth metropolitan region</b>	The Perth metropolitan region or the Perth region is the area defined by the Metropolitan Region Scheme.
<b>Public place services</b>	Public place waste services refers to permanent bins provided by local government in public places to collect waste and/or recycling.
<b>Recovery</b>	The process of extracting materials or energy from a waste stream through re-use, reprocessing, recycling or recovering energy from waste.
<b>Reuse</b>	Reuse refers to using a material or item again.
<b>Reprocessing</b>	Reprocessing refers to using an item or material that might otherwise become waste during the manufacturing or remanufacturing process.
<b>Recycling</b>	The process by which waste is collected, sorted, processed (including through composting), and converted into raw materials to be used in the production of new products.
<b>Residual Waste</b>	<ul style="list-style-type: none"> <li>• Waste that remains after the application of a better practice source separation process and recycling system, consistent with the waste hierarchy as described in section 5 of the WARR Act.</li> <li>• Where better practice guidance is not available, an entity's material recovery performance will need to meet or exceed the relevant stream target (depending on its source - MSW, C&amp;I or C&amp;D) for the remaining non-recovered materials to be considered residual waste under this waste strategy.</li> </ul>
<b>Special event waste services</b>	Special event waste management refers to temporary bins and/or waste collection services provided by local government to manage waste generated at events such as fireworks displays, music festivals, sports events, markets etc.
<b>Sustainable procurement</b>	Sustainable procurement involves meeting a need for goods and services in a way that achieves value for money and generates benefits not only to the organisation, but also to society and the economy, while minimising damage to the environment.
<b>Transfer station</b>	<ul style="list-style-type: none"> <li>• Refers to facilities which undertake large scale consolidation of waste or recyclable materials for transfer to another facility for processing or disposal</li> <li>• Activities related to the layout, operation and management of a transfer station</li> </ul>

	<ul style="list-style-type: none"> <li>• Includes consideration of the technology and infrastructure on site, staffing and resourcing, and any other waste facilities or services available at the site (e.g. greenwaste or recycling drop off, mulching, tip shop, etc.)</li> </ul>
<p><b>Vergeside waste services</b></p>	<ul style="list-style-type: none"> <li>• Vergeside collection services are bulk, infrequent (~every 4-6 month or on demand) services.</li> <li>• Material is collected from residential ‘vergesides’ either non-containerised or in a skip provided by the local government. Vergeside services may relate to green waste or hard waste</li> <li>• Includes waste and/or recyclable materials that may be mixed or separated and the source and can include green waste or hard waste.</li> </ul>
<p><b>Waste services</b></p>	<p>Waste services are defined by the <i>Waste Avoidance and Resource Recovery Act 2007</i> as the:</p> <ul style="list-style-type: none"> <li>• the collection, transport, storage, treatment, processing, sorting, recycling or disposal of waste; or</li> <li>• the provision of receptacles for the temporary deposit of waste; or</li> <li>• the provision and management of waste facilities, machinery for the disposal of waste and processes for dealing with waste.</li> </ul>

**Self-assessment checklists** *(to be completed by ALL local governments)*

Table 1: Self-assessment checklist, Part 1 – Services and Performance

		<b>Table</b>	<b>Reviewed</b> Pre-filled data checked and updated if necessary <b>Y/N/data not available</b>	<b>Completed</b> Data has been provided by local govt <b>Y/N/data not available</b>	<b>Additional comments</b> Local govt has included comments <b>Y/N</b>
<b>Integrated planning and reporting</b>		<i>Table 1: Links between plan for the future and waste management</i>	N/A		N/A
<b>Avoid</b>		<i>Table 2: Population, households and waste generation compared with state averages and targets for 2025 and 2030</i>		N/A	
<b>Recover</b>		<i>Table 3: Population, households and recovery rate compared with state averages and targets for 2020, 2025 and 2030</i>		N/A	
<b>Protect</b>	Better practice	<i>Table 4: Better practice approaches and programs</i>	N/A		
	Litter	<i>Table 5: 2017/18 litter data</i>			
		<i>Table 6: Additional litter information</i>	N/A		
	Illegal dumping	<i>Table 7: 2017/18 illegal dumping data</i>			
		<i>Table 8: Additional illegal dumping information</i>	N/A		
		<i>Table 9: Detailed illegal dumping data collection</i>	N/A		
<b>Waste services</b>		<i>Table 10: Significant sources and generators of waste received in 2017/18</i>		N/A	

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		<i>Table 11: Compositional audit data for kerbside waste services</i>	N/A		
<b>Waste infrastructure</b>		<i>Table 12: Current waste and resource recovery infrastructure operated by the local government (not relevant to all LG)</i>	N/A		
		<i>Table 13: Planned waste and resource recovery infrastructure</i>	N/A		
<b>Policy and procurement</b>	Contracts	<i>Table 14: Existing waste management contracts</i>	N/A		
	Waste local laws & policies	<i>Table 15: Existing waste-related local laws, strategies and policies</i>	N/A		
	Land use planning instruments	<i>Table 16: Existing waste-related land use planning instruments related to waste management</i>	N/A		
	Sustainable procurement	<i>Table 17: Existing sustainable procurement policies and practices</i>	N/A		
<b>Behaviour change programs and initiatives</b>		<i>Table 18: Behaviour change programs and initiatives (including Waste Authority programs and other local government initiatives)</i>	N/A		
<b>Data</b>		<i>Table 19: Assessment of waste data</i>	N/A		N/A
<b>Summary</b>		<i>Table 20: Assessment of waste management performance and prioritisation of future actions (optional to fill out)</i>	N/A		N/A

Table 2: Self-assessment checklist, Part 2 – Implementation Plan (Table 21)

Minimum requirements		Waste plan template completed Y or N or N/A	If N or N/A, please provide additional comments, including challenges to completing the requirement
<b>Avoid</b>	Waste plan describes ongoing and/or new actions which aim to contribute to reducing the local government per capita waste generation rate		
<b>Recover</b>	Waste plan describes ongoing and/or new actions which aim to contribute to increasing the local government material recovery rate		
	Waste plan describes ongoing and/or new actions which aim to provide consistent three-bin kerbside collection systems that include FOGO (Perth and Peel regions only)		
	If the waste plan includes waste to energy, the actions demonstrate that energy is recovered only from residual waste from 2020		
<b>Protect</b>	Waste plan describes ongoing and/or new actions which aim to contribute to state targets to move towards zero illegal dumping by 2030		
	Waste plan describes ongoing and/or new actions which aim to contribute to state targets to move towards zero littering by 2030		
	Waste plan describes ongoing and/or new actions which aim to contribute to state target for no more than 15% of Perth and Peel regions' waste disposed to landfill by 2030 (Perth and Peel regions only)		
<b>General requirements</b>	All new actions in waste plan are consistent with Waste Authority better practice approaches (where a better practice guideline exists)		
	Waste plan contains a minimum of five actions – one action for each of the waste management tools (waste services, waste infrastructure, policy and procurement, behaviour change and data). If not, please provide details on why.		
	The implementation plan has been completed. The description of each action includes: <ul style="list-style-type: none"> <li>• Indication of whether the action is existing/ongoing or a new action</li> </ul>		

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	<ul style="list-style-type: none"> <li>Indicates which Waste Strategy objective the action aligns with</li> <li>Intended outcome or measurement of success</li> <li>Detailed actions <u>OR</u> link to existing plan/document that details the activity</li> <li>Timeline for implementation (completion date)</li> <li>Indication of whether the cost of implementation has been incorporated into annual budget</li> <li>Responsibility for implementation</li> </ul>		
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The waste plan has been approved/adopted by council (please circle): **YES** or **NO** If YES please provide date: \_\_\_\_\_

If NO when will it go to council for adoption/approval? Please provide date: \_\_\_\_\_

City/Town of: \_\_\_\_\_ **CEO**

NAME: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

DATE: \_\_\_\_\_