ATTACHMENTS

Development and Infrastructure Services Committee Meeting

02 December 2020

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City of Albany Council Chambers

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REPORT ITEM DIS241 REFERS

Lot 3348 and 4120 Marbelup North Road, Marbelup WA 6330

Environmental Assessment Report and Operations Plan

Bio Diverse Solutions

Final v. 3

23/10/2020

DOCUMENT CONTROL

TITLE

Lot 3348 and 4120 Marbelup North Road, Marbelup Environmental Assessment Report and Operations Plan
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Reviewer (s): Kathryn Kinnear, Helen O'Neill
Job No.: MSC0282
Client: A.D. Contractors Pty Ltd

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Draft ID v 1 4/05/2020	Internal QA review.	B. Theyer	K. Kinnear	6/05/2020
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1. Introduction

Bio Diverse Solutions (Environmental Consultants) was commissioned by A.D. Contractors ("The Client") as environmental consultants to prepare an Environmental Assessment Report and Extraction Operations Plan for the proposed extraction project at Lots 3348 and 4120 Marbelup Road North, Marbelup within the City of Albany. The purpose of this document is to assess the environmental values for the site, assess the proposed facility and provide supporting documentation for a Development Application with the City of Albany. The document provides and outlines details of emissions associated with the project and associated mitigation measures.

1.1. Alignment to Legislation, Policy and Guidelines

In assessing the proposed gravel extraction facility, Bio Diverse Solutions has prepared this report aligned to the following legislation:

- *Biosecurity and Agriculture Management Act 2007 (BAM Act);*
- *Environmental Protection Act* 1986;
- *Environmental and Protection and Biodiversity Conservation Act 1999 (EPBC Act)*;
- Environmental Protection Authority (EPA) (2005) *Separation Distances between Industrial and Sensitive Land Uses – Guidance Statement No. 3* (current and endorsed guideline);
- Due regard to the *Draft Separation Distances between Industrial and Sensitive Land Uses (2015);*
- Environmental Weeds Strategy for Western Australia 1999;
- *Wildlife Conservation Act 1950*;
- *Biodiversity and Conservation Act 2016*;
- *Conservation and Land Management Act 1980 (CALM Act);*
- Environmental Code of Practise – Extractive Industries (1990) – DEP (now EPA);
- Water Quality Protection Note No.25 (2016), Land use compatibility tables for public drinking water source areas – DoW (now DWER);
- Water Quality Protection Note No.15 (2019) Basic raw materials extraction –DWER; and
- City of Albany Policy Extractive Industries and Mining.

The preparation of this plan is to guide extraction activities by A.D. Contractors as per the City of Albany Policy: Extractive Industries and Mining. Licensing of extraction is the delegated authority of the Local government Authority. Any operations which are subject to regulation under the *Environmental Protection Act* (1986) (EP Act) are delegated to the Department of Water regulation and compliance to administered licensing under the *Environmental Protection Regulation*s (1987). Interpretation of the regulations is defined through guidelines. The current and endorsed guideline pertaining to sensitive land uses and setback requirements in the Environmental Protection Authority (EPA) (2005) *Separation Distances between Industrial and Sensitive Land Uses – Guidance Statement No. 3.*

The activity of crushing and screening is only examined in this document as a component of the noise management plan. Buffers, setbacks and licensing conditions are to be dealt with by DWER as part of a works approval application by the proponent.

2. Background

2.1. Site Details

The “property” is defined as Lots 3348 and 4120 Marbelup North Road and is located 20km north west of the Albany CBD along Marbelup North Road in the municipality of the City of Albany. The property is 155.4 hectares in total and is zoned as “General Agriculture” under the City of Albany Local Planning Scheme No. 1. The “extraction area” is defined as the 34.4ha area in which extraction will occur with 7 stages defined as by the existing fencing within the property. There are multiple pits within each stage. The “crushing and screening extents” are defined as the area in which crushing and screening operations will occur. Please refer to Figure 1 below and Appendix A - Site Facility Mapping.

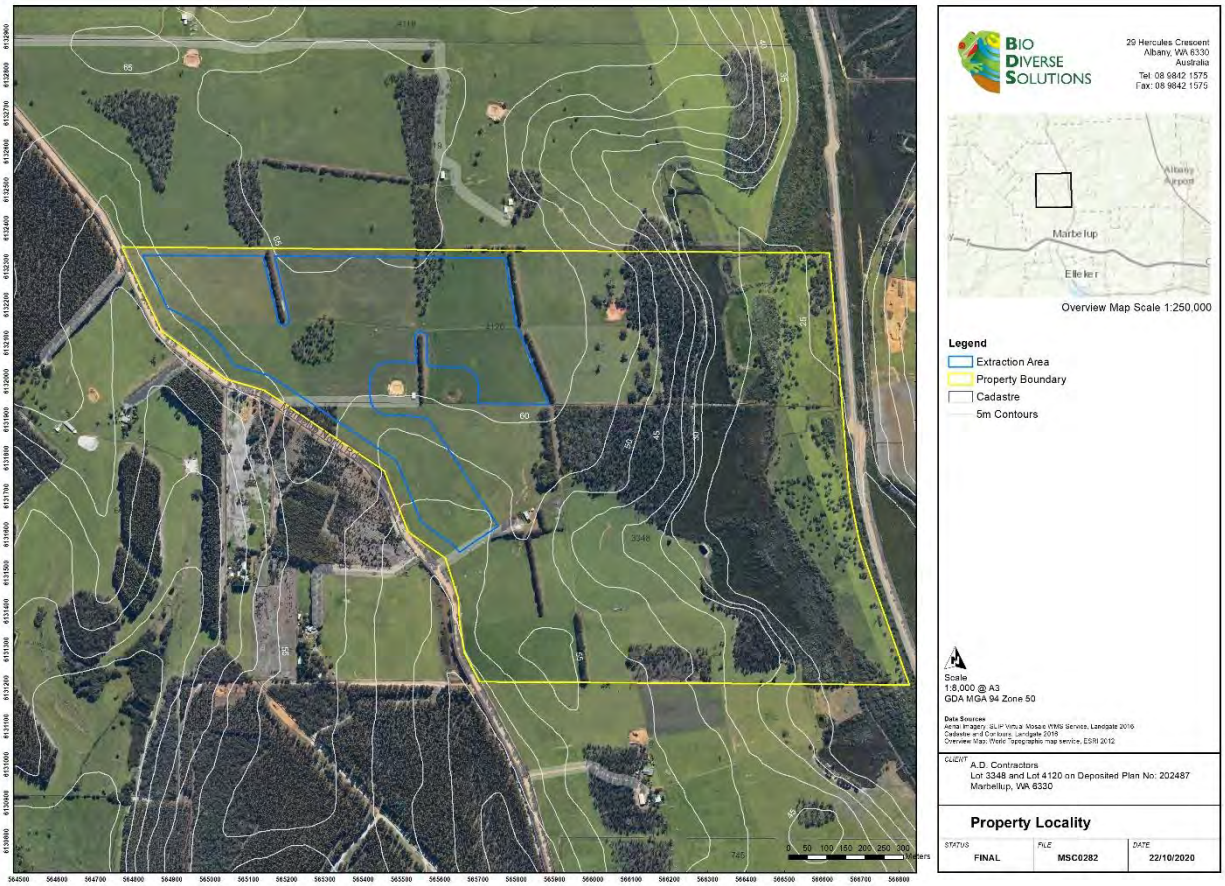

Figure 1: Property Locality

2.2. Existing Land Uses

Currently the property is being utilised for cattle grazing / general agriculture and there are no residential dwellings located within the property. The adjacent surrounding properties are also zoned as “General Agriculture”. After extraction activities are complete (anticipated within 7-8 years) the property will return to agricultural grazing pursuits. The remnant bushland vegetation in the eastern portion of the property is fenced off and is part of the voluntary “Land for Wildlife” (No. 2230).

2.3. Adjacent Land uses and Tenure

The subject site is located within an agricultural area, with residential agricultural properties to the west, east and south. There are also several Blue Gum plantations located along Marbelup North Road. There is another gravel extraction project located to the east of the property (adjacent to the railway tracks). The Down Road Nature Reserve (R20948) is located to the east of the railway line adjacent to the property.

3. Desktop Assessment

Desktop assessment was undertaken of government databases to ascertain environmental aspects both within the property and the surrounding area. This assessment was conducted to various levels, ranging from state-wide to area specific information and includes information on climate, geology and soils, environmentally sensitive areas, acid sulfate soils, public drinking water areas, water bodies and Aboriginal heritage. Desktop inventory of potential Threatened and Priority flora and fauna species likely to occur within 10km of the property was undertaken using the following databases:

- 10km NatureMap Database Search (combined data from DBCA, WA Museum and WA Herbarium);
- Protected matters search tool (DAWE 2020); and
- WA Herbarium records accessed through Flora Base (Western Australian Herbarium, DBCA).

Based on results from the above databases there are 23 conservation significant flora species and 52 conservation significant fauna species potentially present within the 10km property. The full species list compiled from all available data (Appendix E) is based on observations from a 10km study area and is likely to include species that would not occur in the property 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 and fauna 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 Agriculture, Water and Environment (DAWE);
- *Biodiversity Conservation Act 2016* (BC Act). Administered by the Western Australian Department of Biodiversity Conservation and Attractions (DBCA); and
- DBCA Priority Flora list. A non-legislative list maintained by DBCA for management purposes.

3.1. Climate

The nearest Bureau of Meteorology (BoM) operational station is Albany (Site No. 009500). The average maximum temperature is 19.5°C whilst the average minimum temperature is 11.8°C. The average annual rainfall for the station is 925.1mm, with the majority of rainfall occurring between May and September (BoM, 2020).

3.2. Topography

The property is located in an undulating landscape in the Marbelup area. The property has eastern and south western aspects with slopes from the eastern boundary ranging from 25m AHD to 60m AHD. The south western corner of the property slopes from 45m AHD to 60m AHD. The paddocks within the northern portion of the property is relatively flat with the majority of the area located within the 60-65m AHD contour line.

3.3. Geology and Soils

Database searches using the NRInfo Portal (Department of Primary Industries and Regional Development, 2020) shows the property lies within the King System (242Kg). The 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, 2020). 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, 2020).

3.4. Water

The property lies within the Denmark Coast Catchment area and the Albany Sandplain Hydrological Zone (HZ20_AS) which is describes as *"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, 2020b). There is a major tributary that runs through the adjacent private properties to the north of the survey area that extends south across South Western Highway. It does not intersect the "extraction area". No other wetland areas were identified as being present within the extraction area during the desktop assessment.

The property slopes to the east from 60m AHD to 25m AHD, with the steepest section lying within the remnant vegetation in the east. The Marbelup Brook runs along the eastern boundary of the property boundaries, where the Marbelup Flats is located which is a Conservation class category wetland. The property is located in a Priority 2 Public Drinking Water Source Area and within the RIWI Act Proclaimed "Albany Groundwater Area" and the "Marbelup Groundwater Subarea" (WALGA 2020a and b). There is a groundwater bore located in the northern paddock area and is constructed to 35m. The drill log (refer to Appendix B) states the static water level was 27m when constructed in 2010. Refer to Appendix B – Water Features Mapping.

3.5. Acid Sulfate Soils

There are no areas within the property mapped as containing Acid Sulfate Soils.

3.6. Remnant Vegetation

The property lies within the Southern Jarrah Forest JAF02 IBRA subregion. Hearn et al (2002) describes the IBRA region 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 (Beard *et al.* 2013) vegetation classification places the subject site within two System and Vegetation Association (Source Pre-European dataset, DPIRD-006):

- System Association Name: Albany
- Vegetation Association Number: 978.
- Structure Description: Low forest, woodland or low woodland with scattered trees
- Floristic Description: Jarrah, banksia or casuarina *Eucalyptus marginata*, *Banksia spp., Allocasuarina spp*.
- Remnant Vegetation by Beard Association Rarity in LGA: 25.23% remaining (GoWA, 2019).
- Remnant Vegetation by Beard Association Rarity in IBRA Region: 24.85% (GoWA, 2019).

- System Association Name: Albany
- Vegetation Association Number: 51.
- Structure Description: Sedgeland; reed swamps, occasionally with heath.
- Floristic Description: Cyperaceae, Restionaceae, Juncaceae (mainly in the South-West).
- Remnant Vegetation by Beard Association Rarity in LGA: 38.35% remaining (GoWA, 2019).
- Remnant Vegetation by Beard Association Rarity in IBRA Region: 38.35% remaining (GoWA, 2019).

The surrounding native remnant vegetation (within 1km) has previously been mapped during the Albany Regional Vegetation Survey (Sandiford and Barrett 2010). The area is quite diverse with seven different units / complexes described. The most prominent vegetation type is the Jarrah/Marri/Sheoak Laterite Forest. Refer to Appendix C – Native Vegetation Mapping.

- Vegetation Name: Jarrah/Marri/Sheoak Laterite Forest
- Map Code: 12

- Vegetation Name: *Homalospermum firmum/Callistemon glaucus* Peat Thicket
- Map Code: 47

- Vegetation Name: *Taxandria juniperina* Closed Forest
- Map Code: 59

- Vegetation Name: *Melaleuca preissiana* Low Woodland
- Map Code: 49

3.7. Aboriginal Heritage

Database records show the property lies within the Marbelup Brook (ID29673) which is listed as a mythological, natural feature site (DPLH-001 dataset).

4. Site Assessment

Site assessment of the property and extraction area was undertaken on 24th April 2020 by Kathryn Kinnear and Bianca Theyer (Bio Diverse Solutions). This assessment included ground truthing of desktop findings including bushfire risks to 150m. No detailed flora, vegetation and fauna surveys were undertaken as the large areas of intact remnant vegetation within the eastern portion of property will not be cleared during this extraction project. Broad vegetation assessment and general comments on condition of remnant vegetation and stands of paddock trees in the northern area of the property are provided below. Albany Regional Vegetation Survey vegetation units have been used to assist in the mapping of vegetation types within the site. Refer to Appendix B for Native Vegetation Mapping and Site Vegetation Mapping.

4.1. Vegetation Types

Managed Grassland

This vegetation type occurs across the entire subject site as the land is used for grazing/agricultural purposes. All native vegetation has been cleared (except for several stands and individual mature trees to the north and east) and now consists of introduced pasture species such as *Cenchrus clandestinus** (kikuyu), and some other introduce weed species such as *Conyza sp., * Hypochaeris sp., * Phalaris sp., * Phytolacca octandra** (inkweed). The vegetation has been classified as "completely degraded". Please refer to Figure 2 and Table 1 for condition ratings.

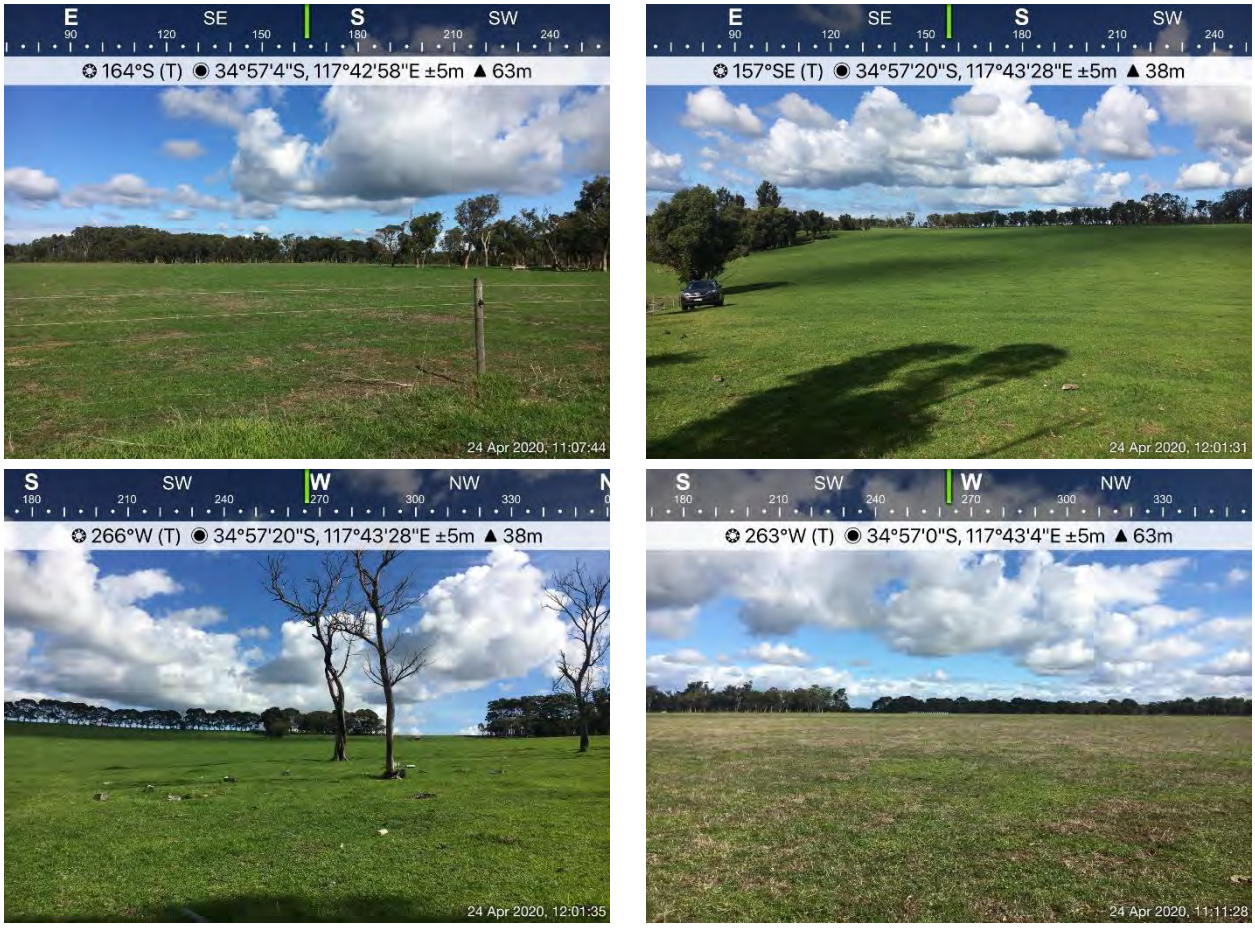

Figure 2: Photographs of the Managed Grassland vegetation type.

Existing Paddock Trees

There are two areas of remnant jarrah and sheoak paddock trees located within the northern area of the property / extraction area. The majority of these trees are in poor health, with dead trees scattered on the ground throughout the areas. The vegetation structure is completely absent with an overstorey of jarrah and occasional sheoak and an understorey of pasture grasses. The areas are classified as "Completely Degraded" (Keighery, 1994). Please refer to Figure 3 and Table 1 for condition ratings. It is proposed these trees will be cleared as part of the extraction project. Refer to Section 6.7 for further information.

Figure 3: Photographs taken in stands of paddock trees within the proposed extraction area.

Melaleuca preissiana and Homalospermum firmum heath

This vegetation type lies within the low-lying wet areas of the subject site and has also been impacted by bushfire. The vegetation type consists of an overstorey of *Melaleuca preissiana* with a midstorey of regenerating *Homalospermum firmum, Callistemon glaucus, Taxandria parviceps, Astartea sp.* and *Psoralea pinnata** (taylorina). The understorey consists of regenerating native shrubs and sedges, as well as a variety of pasture related weed species such *Cenchrus clandestinus** (kikuyu), *Conyza sp., * Hypochaeris sp., * Phalaris sp., * Phytolacca octandra** (inkweed), and bracken fern. Although impacts of fire and weed species are evident within the vegetation, this vegetation type has been classified as being in "Very Good" condition. Please refer to Figure 4 and Table 1 for condition ratings.

Figure 4: Photographs of the *Melaleuca preissiana* and *Homalospermum firmum* heath vegetation type.

Jarrah/Marri/Sheoak Laterite Forest

This vegetation type is located within the remnant vegetation within the eastern portion of the property and within the remnant roadside vegetation. Vegetation in the east of the property has been burnt in recent years and regeneration of the midstorey is still occurring. During the site assessment overstorey species identified were *Eucalyptus marginata, Allocasuarina fraseriana* and *Corymbia calophylla.* Regenerating midstorey species include *Banksia grandis,* juvenile *E. marginata* and *C. calophylla, Acacia sp., Taxandria parviceps, Leucopogon verticillatus, Beaufortia decussata* and *Melaleuca sp.* Understorey species consisted of *Leucopogon sp*., *Xanthosia rotundifolia, Patersonia sp., Anigozanthos flavidus, Lepidosperma sp., Conyza sp.,* Hypochaeris sp.,* Phalaris sp.,* Phytolacca octandra** (inkweed) and other pasture weed species. Due to the obvious signs of disturbance (weeds species and fire) the vegetation has been classified as "Very Good". Please refer to Figure 5 and Table 1 for condition ratings.

Figure 5: Photographs of the Jarrah/Marri/Sheaok Laterite Forest vegetation type.

Table 1: Condition Rating Scale

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.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate to it.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.
Completely Degraded	Vegetation structure not intact; the area completely or almost completely without native species.

5. Proposed Development

5.1. Extraction process, staging and haulage routes

The location and extent of the proposed gravel extraction area is shown in Appendix A – Location and Site Facility Mapping covering an area of 34.4 hectares in total of cleared agricultural land. It is assumed that the average amount of 30,000 tonnes per year will be extracted over the life of the extraction project. In times of high demand, it is expected a maximum of 50,000 tonnes per year will be extracted (*Pers. Comms.* H. O'Neill 2020). Ultimately the amount of extracted materials will be reliant upon industry demand. It is proposed that the entire life of the project will be approximately 7-8 years. A.D. Contractors expect that in high demand periods, one stage within the proposed project will be exhausted every 12 months. Extraction is planned to commence as soon as possible after all required approvals are obtained. The extraction facility will be gated and locked, with no unauthorised persons able to enter. Refer to Implementation Plan Section 8.

The extraction of gravel including crushing and screening will take place on site by A.D. Contractors Pty Ltd. Extracted products will then be transported to various construction sites within the City of Albany and adjoining areas. Mobile plant is utilised to push up and stockpile topsoil as well as to extract, push up and stockpile gravel. Unprocessed gravel is fed into the crushing and screening plant, and then stockpiled prior to being loaded onto trucks. No blasting will be required, whilst portable crushing and screening equipment will be utilised, the crushing of large gravel "boulders" will only occur when required and it is therefore expected that most of the extracted resource will not require crushing.

It is proposed that extraction will be staged with the stages depicted on the Site Plan Mapping. Within these paddocks one of the pits (no greater than 1.2ha in size) will be exposed/operated at any given time. This area will then be rehabilitated / closed up (covered with topsoil) and a remaining area of the stage will be opened. Gravel will be stockpiled within the stage / pit area adjacent to the next pit, for use as demand requires. It is estimated that the maximum amount of time gravel will be stockpiled is 6-12months. Stockpiles will be no higher than 4 metres. Trucks will access the property via the existing site entry along Marbelup North Road. This access route allows for trucks to head south to South Coast Highway or north to Redmond West Road.

5.2. Vegetation and Topsoil Removal

This proposal requires no clearing of native vegetation as the subject site consists of approximately 61.3 ha of agricultural land. Topsoil will be removed to a depth of 150 – 200mm with the maximum depth of excavations to 1500mm below ground level. All topsoil removed will be stockpiled in windrows 5-8m wide and stored parallel to the borders of the extraction area. Topsoil will be stockpiled in piles no higher than 4m which will then be respread over the pit area once excavation activities have ceased, the ground has been ripped and all stockpiled materials removed. This will be done as the client wishes to continue agricultural practices once the extractive proposal has ceased.

5.3. Operation Times

Extraction and plant operation times will be restricted to the hours between 7:00am and 5:00pm Monday to Friday and 8:30am to 1:00pm on Saturday (in times of high demand / peak periods), not including Public Holidays. Actual operation times will vary as a result of product demand, if demand is low due to no construction projects being carried out then the facility will not be operational.

5.4. Vehicles and Machinery

No hydrocarbons, chemicals, fuels, coolants etc. will be stored onsite. These will be transported onsite as required by a contained mobile service vehicle which will be appropriately equipped with spill kits in the unlikely event there is a spillage. Furthermore, no trucks will be stored on site outside of operation hours, only screening and crushing equipment will be stored on site. If major servicing of these machines is required, they will be removed from site. In the unlikely event of a major breakdown on site all necessary precautions to ensure no hydrocarbons or other liquids enter the environment, and any contaminated soil will be removed and disposed of at an appropriate location.

6. Environmental Considerations

6.1. Noise

A.D. Contractors will ensure all extraction, crushing and screening operations are to be carried out only between 7:00am and 5:00pm Monday to Friday and 8:30am to 1:00pm on Saturday (in times of high demand / peak periods), not including Public Holidays. The surrounding properties are also zoned as "General Agriculture" and it is expected that operational noise will not be louder than the surrounding agricultural and forestry operations within the immediate vicinity.

Noise considerations are subject from 3 key areas:

- Extraction processes (excavation, pushing and moving material on site;
- Crushing and screening; and
- Truck and vehicle movements to and from site.

Extraction processes

The extraction processes involve the stripping of topsoil and mounding, ripping and pushing of ripped material for export off site or for crushing (if required). The estimated times for this process for 1 ha (i.e. a stage) is:

- 1 day - Strip/ push up topsoil;
- 1 day - Rip entire area;
- 1-2 days - Push up ripped material for export/crushing; and
- Crushing material depending on size and requirement of resource by client:
    - Low demand: 0 - 3 days.
    - High demand / peak periods: 7 days.

The volume and amount required is purely dependant on demand. Location of extraction and staging is defined in Appendix A.

The extraction areas shall be located a minimum of 300m from neighbouring residential areas consistent with the City of Albany Guidelines to Sensitive Land Uses as shown on Site Buffers Mapping in Appendix A. Extraction areas are situated 40m from Marbelup North Road, 20m off the adjacent property boundaries and internal native vegetation, and 50m from dams.

There are four residential properties within the vicinity of the extraction project. The dwelling to the south is located 734m to the nearest stage / pit. The dwelling to the south west is located 385m from the nearest stage / pit. The dwelling to the west south-west is located 444m to the nearest stage / pit. The dwelling to the west is 305m from the nearest stage / pit. Refer to Site Buffers Mapping in Appendix A. The buildings to the north of the property in Lot 4119 are agricultural storage sheds.

A bund will be constructed along the western boundary of the extraction area to reduce noise to neighbouring residential areas. The bund will be between 2 and 4m high. This noise bund will be the stockpiled topsoil from each stage and at 2-4m high will ensure the operations are visually obscured and noise is contained within the site.

To create noise (and visual) buffers, the client will utilise the topsoil mounds around the perimeters of the extraction stages / pits as they are established. Traffic routes internal to the site will be planned out in such a way as to minimise vehicle reversing requirements and thus minimise reversing alarm noise (particularly for the nearest residences). Replacing standard "beeping" reversing alarms with a mixed frequency alarm (which does not carry as far) should also be considered to further reduce noise issues.

In conjunction with these activities, regular maintenance of onsite plant and machinery will help to reduce unnecessary noise pollution. Any equipment identified as noisy will either be removed from site or its use terminated until repairs are made.

All employees and contractors will be educated through site inductions raising awareness and outlining company practices to be employed to help mitigate noise pollution whilst on site and when entering and exiting the property. It will be the site manager's responsibility to ensure all personnel adhere to noise reduction measures.

A noise complaint system/register should be implemented to ensure any complaints are dealt with appropriately. A notice should be placed at the front gate providing the contact details of the site manager. Any noise related complaints will be recorded by

the site manager and acted on immediately and resolved within 24 hours. Any complaints made should be kept in a register. Refer to Section 7.2 for Noise Management to be implemented during all operations.

Crushing and screening

Noise from crushing and screening operations will be the largest consideration to the project. Crushing and screening operations will be only undertaken in the designated crushing and screening extents within the pits to create further buffers to neighbouring residents and sensitive receptors. The current endorsed EPA Separation Distances between Industrial and Sensitive Land Uses is Guidance No. 3 (2005) whereby noise (and dust) is assessed on a "case by case" basis. The draft 2015 document outlines that a 500m to 1000m buffer is considered appropriate and has been *given due regard* in the preparation of this document.

The crushing and screening areas shall be located at least 500m from the neighbouring residential properties where able to be achieved, with areas of crushing and screening between 500m and 1000m from the residential properties. Where this cannot be achieved due to fencing or logistics in the pits, the area is to be classified as "Sensitive Operations" areas. All proposed crushing and screening areas are to be licensed via DWER and a Works Approval application to be submitted for the operations. The "Sensitive Operations" area ensures the maximum time taken for any one pit to push up ripped material for crushing is 3 days per week. This will ensure that noise is limited reducing the risk to adjacent properties, see further information in section 7.2.

Truck movements

Truck movements and noise is deemed to be low along North Marbelup Road adjacent to the subject site as trucks will be at low speed and low gearing to enter and exit the property. Road and truck noise is more probable along the road length to the south to South Coast Highway (haulage route to the south of the subject site) and to the north of North Marbelup road from other agricultural and industrial land uses existing to the north.

The extraction and subsequent carting of the gravel material is subject to demand and truck movements, noting on some days will be nil to minimal, whilst other days may be subject to a higher demand.

6.2. Dust and Erosion

Dust emissions are anticipated during topsoil removal, resource excavation, crushing and screening, loading, haulage and wind erosion of exposed surfaces in adverse weather conditions. However, dust management will be implemented in order to mitigate dust emissions, ensuring dust levels cannot reach levels that adversely impact health, welfare, surrounding amenities and the environment.

All topsoil stockpiles and stockpiled gravel will be no greater than 4 metres in height. Long-term stockpiling should be avoided where possible and will be dependent on demand, it is expected stockpiling will range between 6-12months. Stockpiles will not be located in areas subject to adverse environmental conditions (e.g. prevailing winds) such as prominent ridges, and will be located within the stage or extraction pit currently in operation. Operations temporarily cease during times of high winds, and water trucks and water shall be available to supress dust. At the sign of any erosion, measures shall be put in place to mitigate any erosion. All post development runoff is contained onsite with drain basins, table drains and well-draining soils.

6.3. Light

Extraction activities will not be conducted outside of daylight hours, therefore there will be no light emissions.

6.4. Discharges to land

There will be no discharges to land.

6.5. Wetlands and Public Drinking Water Source Areas (PDWSA)

The extraction areas are over 384-440m from the conservation category wetland located in the eastern portion of the property. There will be no impacts to this wetland. As the extraction and crushing and screening areas are located in a P2 PDWSA the below are to apply as per the Water Quality Protection Notice (WQPN) 25. Furthermore, it is recommended that a minimum of 2 metres of undisturbed soil profile is required as a buffer between the base of the excavated area and the maximum water table level.

Table 2: Mineral Processing compatibility and conditions within Public Drinking Water Source Areas.

Land use or activity	P2 areas	Conditions
Mineral processing – crushing and screening	Compatible with conditions (9, 13)	*Condition 9* A licence under the Rights in Water and Irrigation Act 1914 may be required to abstract groundwater or surface water. Please contact the nearest Department of Water regional office for more information www.water.wa.gov.au. *Condition 13* These facilities/land uses should be located outside of WHPZs and RPZs unless the operator demonstrates that the risk of water contamination is effectively controlled under all circumstances. Under the Metropolitan Water Supply, Sewerage and Drainage By-laws 1981, ground level or underground chemical storage tanks (equal to or greater than 250 L) are prohibited in P1 and P2 areas of an UWPCA; and elevated chemical storage tanks (equal to or greater than 250 L capacity) are prohibited in P1 and P2 WHPZs of an UWPCA. Hydrocarbons, chemicals and other toxic or hazardous substances should be stored so there is no discernible contamination of groundwater or surface water. This should include effective secondary barriers to contain the system. Refer to WQPN no. 56: *Tanks for elevated chemical storage*, WQPN no. 58: *Tanks for temporary elevated chemical storage*, WQPN no. 60: *Tanks for mobile fuel storage in PDWSAs*, WQPN no. 61: *Tanks for ground level chemical storage*, WQPN no. 62: *Tanks for underground chemical storage and WQPN no. 65: Toxic and hazardous substances for further information. A contingency plan should be in place to ensure adequate response to contamination incidents (refer to WQPN no. 10: Contaminant spills – emergency response).*

6.6. Discharges to water

There will be no discharge to surface or ground water. Surface water will be managed according to Section 7.3.

6.7. Flora and Vegetation

Areas of remnant vegetation within the eastern portion of the property have been excluded from extraction stages. The stand of paddocks trees that are in completely degraded condition are proposed to be cleared. No other native vegetation is proposed to be cleared as part of this project. There will be no discharges to land or water and this further reduces any risk to surrounding flora and vegetation. Weed management will be undertaken to ensure no invasive weeds identified will not spread into the surrounding remnant vegetation. A native vegetation clearing permit may be required to remove the degraded paddock trees, no clearing of these two areas will occur until the relevant approvals are obtained. Recommend condition of DA.

6.8. Fauna

As the subject site is located in an area that has already been cleared and highly modified for agricultural practices, there will be no further impacts to fauna than are already present.

7. Management Plans

7.1. Dust management

Dust has potential to impact on the surrounding social and natural environment through decreases in visibility, air quality, vegetation health and general amenity.

Crushing and screening operations have the potential to generate dust through:

- Land clearing, vegetation and topsoil removal;
- Excavation, crushing and screening, transfer and loading of product for haulage;
- Wind erosion from topsoil stockpiles and other exposed surfaces;
- Use of access tracks; and
- Topsoil spreading during rehabilitation.

Dust emissions are anticipated during topsoil removal, resource excavation, crushing and screening, loading, haulage and wind erosion of exposed surfaces in adverse weather conditions. However, dust management can be implemented in order to mitigate dust emissions, ensuring dust levels cannot reach levels that adversely impact health, welfare, surrounding amenities and the environment.

All topsoil stockpiles and stockpiled gravel will be no greater than 4 metres in height. Long-term stockpiling will be avoided but will be dependent on demand. Stockpiles will not be located in areas subject to adverse environmental conditions (e.g. prevailing winds) such as prominent ridges, and will be located within the stage or extraction pit currently in operation. Operations will cease during times of high winds (i.e. if visible dust seen leaving the property), and during times when a north easterly wind is present. Water trucks and water will be used to supress dust via a tanker on site. At the sign of any wind erosion, measures shall be put in place to mitigate any erosion. Measures to mitigate erosion include (but are not limited to) contouring of soils, surface water management (i.e. directing surface water away from the area if necessary) and bunding.

The aims of the dust management plan are to:

- Ensure dust is not prevailing over adjacent residences and properties;
- Maintain a dust free working environment for all employees on site;
- Ensure all employees and sub-contractors are educated to minimise dust from all operations; and
- Ensure dust is controlled and minimised at all times.

The following is to be implemented by A.D. Contractors during operations:

- Construction of a 2-4m bund along the western boundary of the extraction area and parallel to any excavation areas;
- Land clearing will be kept to the minimum required for the project, and clearing and topsoil stripping will be avoided on high wind days;
- Clearing will be carried out in stages as the project progresses to minimise dust generation from cleared areas;
- All crushing and screening to occur within the designated boundary of the crushing and screening extents;
- Topsoil mounds to be no greater than 4 metres in height;
- Stockpiles to be located in pit areas and along the edge of pits to assist in noise and dust reduction to the properties and will be no greater than a height of 4m;
- Gradual rehabilitation will be undertaken to minimise the area of exposed surfaces;
- Stockpiles to be configured to accommodate easy access for watering/dust minimisation;
- The access road, immediate extraction area and fixed plant (screen) to be watered as required to minimise dust emissions;
- Manage operations to minimise work in windy conditions to minimise dust emissions. Works only to occur in low velocity winds (i.e. operations to cease if visible dust seen leaving the property);
- Visually monitor emissions of dust from the works, if dust is visible water trucks are to be utilised to supress dust and / or operations are to cease temporarily;
- Works to cease temporarily if visible dust is seen leaving the site when there is a north easterly wind and dust suppression measures (i.e. water application to area) implemented;
- Trucks to be fully covered by tarpaulins when fully loaded, prior to leaving extraction area;
- Vehicle travel speeds will be restricted to 40 km/hour on unsealed surfaces on site;

- Education to employees and sub-contractors to raise awareness of dust management issues; and
- Dust complaint register in place to record any issues from neighbours. A contractor sign at the front gate to be erected clearly showing A.D. Contractors contact details.

7.2. Noise Management

The noise management plan is to be implemented by A.D. contractors at all times of operation.

The aims of the Noise Management measures are to:

- Ensure compliance with *Environmental Protection (Noise) Regulations 1997;*
- Ensure noise does not significantly impact adjacent residences and properties by ensuring crushing and screening plant remains more than 500m from the closest adjacent residence (sensitive receptor). Where this cannot be achieved, Sensitive Operations" occurs, see below for further information;
- Define "Sensitive Operations" to occur for crushing and screening operations close to sensitive receptors;
- Ensure all A.D. Contractors employees and sub-contractors are educated to minimise noise from all operations; and
- Ensure noise is controlled and minimised at all times.

The following actions are to implemented by the contractor during excavation operations:

- Construction of a 2-4m bund along the western boundary of the extraction area for noise attenuation. The bund is the stripped topsoil and mounded parallel to the pit to reduce noise to offsite receptors;
- All plant movements, extraction, crushing and screening operations are to be carried out between 7:00am and 5:00pm Mondays to Fridays, and 8:30am to 1:00pm on Saturday (in times of high demand / peak periods), not including Public Holidays;
- Mounding of topsoil along the edge of pits to act as noise bunds to further reduce noise at nearby properties, mounding is to be parallel to the excavated pit and maintained regularly for any defects, stabilised for dust management;
- Regular inspections of all plant and machines on site to ensure all are working and functioning correctly, without excess noise;
- Regular inspections of bunds to ensure noise is contained within the site and bunds are to required specified heights;
- Turning off equipment when not in use;
- Regular inspections of road trains and trucks used for carting to ensure all muffler and exhaust systems are functional, specific to noise attenuation;
- Vehicle travel speeds will be restricted to 40 km/hour on unsealed surfaces on site;
- Education to A.D. Contractors employees and sub-contractors to raise awareness of noise management issues;
- Noise complaint register in place to record any issues from neighbours. A contractor sign at the front gate to be erected clearly showing A.D. Contractors contact details; and
- Any noise related complaints will be recorded by the site manager and acted on immediately and resolved within 24 hours.

<u>Excavation processes</u>

Excavation processes operations generate noise through the operation of machinery – dozers, excavators, light vehicles and trucks. These can be considered commensurate with general farm vehicle agricultural operations. Adhering to the plan above will ensure there is no adverse impact from excavation processes on the site.

<u>Crushing and screening</u>

Crushing and screening operations generate noise through the operation of machinery, crushing and screening plant. This noise has potential to impact on nearby sensitive receptors and is required to comply with the *Environmental Protection (Noise) Regulations 1997*. All crushing and screening operations is to be licensed by the Department of Water and Environmental Regulation (DWER) as per the *EP Act* "prescribed premises". The regulation and compliance of the crushing and screening operations are via the DWER License for the premises as issued under the *EP Act.*

No blasting will be required, whilst portable crushing and screening equipment will be utilised, the crushing of large gravel "boulders" will only occur when required and it is therefore expected that most of the extracted resource will not require crushing.

"Sensitive Operations"

Noise emitted from crushing and screening is subject to regulation and compliance under the *EP Act*. Crushing and screening operations are likely to be limited to the amount and volume required for the product and subject to demand. It is estimated the majority of the resource will not require crushing and screening however is not confirmed until each pit is exposed and demand requirements. Where any crushing and screening occurs within 500m of a sensitive receptor this will be limited to 3 days per week and from 8.30-5pm weekdays only. This will reduce the frequency of exposure to adjacent residents and therefore reduce the impact/risk of this emitting source to health and wellbeing. A detailed risk assessment of the crushing and screening processes proposed on site will be performed to accompany the works approval to DWER.

As mentioned in Section 1.1 of this document, the activity of crushing and screening is only examined in this document as a component of the noise management plan. Buffers, setbacks and licensing conditions are to be dealt with by DWER as part of a works approval application by the proponent.

Truck and vehicle noise

Truck movements and noise is deemed to be low along North Marbelup Road adjacent to the subject site as trucks will be at low speed and gearing to enter and exit the property. Road and truck noise are more probable along the highway to the south of the subject site and to the north of North Marbelup road from other agricultural and industrial land uses exist to the north.

The extraction and subsequent carting of the gravel material is subject to demand and truck movements on some days will be nil to minimal, whilst other days may be subject to a higher demand.

7.3. Road Condition and Ongoing Maintenance

A.D. Contractors use two types of truck, the capacities are approximately 15 tonnes for the 6-wheeler trucks and 24 tonnes for a semi-trailer. Truck movements (2 movements = 1 truck would enter and exit the site per day) will be dependent on demand of materials. On average it is expected there will be 4 truckloads per day, which equates to 8 truck movements per day. During peak periods / times of high demand it is expected there will be an increase in truck movements and truckloads per day (i.e. 4 trucks, 7 truckloads each). This equates to 28 truckloads and 56 truck movements per day (approx. 6 truck movements per hour). When demand is low it is expected 0-2 movements per day will occur. Truck signs are to be installed prior to operations commencing before the access point along Marbelup North Road and South Coast Highway, warning of truck movements.

A detailed traffic management plan may be required by AD contractors but is not supplied within the scope of this document, and can be conditioned by CoA at Development Approval stages.

The CoA are going to require a contribution for the road to be sealed due to the potential number of trucks, plus they will also require additional grading until the road is constructed. This will be conditioned via the CoA at Development Approval. It is noted that the CoA license is for 8 years and is subject to renewal at the end of that period. It is noted that this period is "renewal license period" only not a life of project.

7.4. Stormwater Management

The overall extraction area will be designed, constructed and operated to avoid disruption to surface water flows, minimise erosion and ensure that potential contaminants are not released into the environment. Stormwater management measures are:

- The site will be graded along contours to ensure that all stormwater, wash-down and spillage water run-off is either directed to a low point within the prescribed premises, or a collection and settling basin from where it can be recycled for dust suppression purposes;
- Perimeter bunding will be installed if required to minimize stormwater entering the site;
- Runoff from stockpiles diverted to low point within the prescribed premises;
- Contouring of pit edges to contain surface water;
- Encourage point source infiltration across the existing rural areas (future stages) and in rehabilitated areas; and
- Ensure all surface water is contained and treated on site.

Also refer to Section 7.13 for daily and weekly stormwater monitoring and controls of structures.

7.5. Weed Management

Weed management is to be used in conjunction with dieback hygiene management (See Section 7.6). The following Weed Management Plan is to apply to all aspects of site operations. All operations shall conform to this Weed Management Plan, and monitoring to occur post construction for any infestations. Weed management will primarily be undertaken through avoiding introducing new weeds to the site, whilst also controlling weeds already present.

7.5.1. Aims of Weed Management Plan

The aims of the weed management program will be:

- Eradicate Declared plants (*BAM Act*) from the property;
- Maintain a weed free environment;
- Ensure all vehicles are clean on entry prior to any soil or vegetation movement;
- Site is to be secured to prevent trespassers illegally accessing, dumping rubbish and green waste;
- All weeds on site removed promptly on discovery;
- Remove weeds from least affected areas to the most affected areas (Bradley Method);
- Do not use weed affected soils for rehabilitation, but remove infected soils to waste disposal; and
- Regularly monitor the site for invasive species.

If weeds are discovered on site, they will be treated using the following methodology:

- Large woody weeds will be burned, poisoned or removed from site and disposed to approved green waste;
- Small weeds will be sprayed by a licensed contractor or landholder; and
- Initial follow up spraying will be undertaken at 6 months and 18 months and repeated as necessary.

7.5.2. Program for weed control

The following program for weed management will be implemented prior to commencement of extractive activities, during extractive activities, and post extraction monitoring activities. Table 3 (over the page) is a guide for aggressive common species (adapted from Department of Agriculture and Food and Department of Biodiversity Conservation and Attractions (FloraBase) recommended technique) and should be used as a guide to treat relevant species within the proposal area. Further information for any species and recommended treatment not listed in Table 3 should be gained from the Department of Primary Industry and Regional Development.

Table 3: Generalised Weed Management Program for Common Species

Species	Treatment
Grasses	
Kikuyu *Cenchrus clandestinus*	Control with herbicides whilst growing.
African Love Grass *Eragrostis curvula*	Removal of small plants/infestations Annual Spray during winter, small infestations all year round as required.
Flat weed *Hypochaeris sp.*	Annual Spray during winter, small infestations all year round as required.
Hare's-tail Grass *Lagurus ovatus*	Prevent seed set for 2-3 years by the removal of the topsoil through civil works. Hand removal of small infestations. Annual spray during winter
Perennial Grasses *Phalaris sp.*	Selective control can be achieved with 800mL/ha Verdict®520 plus 1% spray oil. Or use 10mL Verdict®520 plus 100mL of spray oil per 10L water for hand sprays.
Woody Weeds	
Golden wattle *Acacia longifolia*	Hand pull seedlings. Fell mature plants, apply herbicides and diesel to trunk, or cut and paste or inject with Glyphosate
Tayloriana *Psoralea pinnata*	Treat seedlings early summer with Glyphosate, juveniles can be hand pulled. Fire not recommended. Slash or doze large trees.
Blackberry *Rubus ulmifolius*	Mechanical control difficult. Annual summer applications of Grazon, 3 applications required, use Glyphosate in sensitive areas (i.e. creek lines).
Ink weed *Phytolacca octandra*	Uproot heavy infestations and cut remaining plants 5cm below ground. Spraying is effective.
Kangaroo Apple *Solanum laciniatum*	Herbicide treatment of 150mL Access® in 10L diesel to the lower 50cm of the trunk of the plant. Young growing seedlings can be sprayed with 1L/ha Starane® or hand pulled. Control spread for a radius of 5km. Plant perennial species to provide a good mulch on the soil.
Herbs	
Spear thistle *Cirsium vulgare*	Spray control effective for seedlings and adults. Manual control by eliminating seed production by close mowing/cutting twice per season
## Arum Lily *Zantedeschia aethiopica* P1 and P4	Mechanical control only effective if all root fragments removed. Multiple rotary hoeing over a few years provides control. Herbicides are most effective use 1g chlorsulfuron(750g/kg) plus 10mL 2,4-D amine(500g/L) plus 25mL Pulse® per 10L of water. Or use 1g metsulfuron(600g/L) plus 25mL Pulse® per 10L of water.
Curled Dock *Rumex crispus*	Remove isolated plants by cutting their roots at least 20cm below ground level. Small infestations 0.5g chlorsulfuron(600g/kg) plus 100mL Tordon®75-D in 10L of water in winter will control existing plants and seedlings for about a year.
Cape Weed *Arctotheca calendula*	Manual removal before flowering effective. For large infestations apply Lontrel® 6 ml/10 L (300 ml/ha) in early growth stages. Glyphosate at 0.2% will provide some selective control if the plants are young or at the budding stage, otherwise spot spraying glyphosate at 10 ml/L. Introduction of native species which provide shade.
## Paterson's Curse *Echium plantagineum* P1 and P4	Isolated plants can be manually removed and burnt if flowering or seeding. Graze heavily with wethers (castrated ram) over spring to reduce seed production. Spray graze pasture with 500mL/ha Tigrex® in early winter before the weed has reached the 6-leaf stage and repeat if necessary.
Penny Royal *Mentha pulegium*	Improve drainage, spray with 40 g/ha metsulfuron before flowering, establish a vigorous perennial pasture such as kikuyu then spray graze annually in early winter with 750 mL/ha 2,4-D amine.
Smooth Cats-ear *Hypochaeris glabra*	Mowing and grazing ineffective. Hand remove small infestations and/or isolated plants, ensuring the taproot is removed. For dense infestations, apply Lontrel® and wetting agent. Introduction of native species which provide shade.

Western Australian Herbarium (1998-); Wheeler (2002), **HerbiGuide (2014).

Denotes Declared weeds

7.6. Dieback and General Hygiene Management

The aims of the dieback and hygiene management are to:

- To ensure there is zero spread of *Phytophthora* and other diseases into and out of the area; and
- Implement measures for successful completion of the project in terms of education to personnel, decontaminating equipment, and defining access measures.

The following will apply to all aspects of operations and will form part of the hygiene management briefing to all site workers:

- Visual inspections on vehicles, plant, equipment and footwear are clean when entering the site;
- Earth moving vehicles and equipment are to be cleaned prior to entering site with attention to:
    - Tyres: tread, trim, hub, wheel arches wheels;
    - Body: external areas, crevices, chassis, bumpers, side steps etc.
    - Internal: footwells of vehicles, engine bay, grill, radiator etc.
- Access to the site during excavation will be controlled (fenced and gated and locked when unattended);
- Completed areas will be rehabilitated as soon as practicable;
- The rehabilitated surface will be free draining and not contain wet or waterlogged soils;
- Materials used in rehabilitation will be from on-site stockpiled material; and
- Road and transport vehicles are to be restricted to defined road reserve, loading and turn around areas.

Clean down specification:

A visual inspection is necessary of in-coming and out-going vehicles to determine whether or not vehicles, machinery or equipment is free of a build-up of:

- Clods of soil and plant material and / or slurry consisting of a mixture of soil, plant and water;
- Dust and grime adhering to the sides of vehicles need not be removed before entering the site; and
- Records of inspections and clean downs are to be maintained.

7.7. Bushfire Risks and Management

Vegetation Classification to AS3959-2018 was undertaken by Kathryn Kinnear (level 2 BPAD Practitioner, BPAD 30794). Refer to the Vegetation Classes Map in Appendix D. As per the requirements of State Planning Policy (SPP) 3.7 (WAPC, 2015) a Bushfire Hazard Level (BHL) map was produced as per the defined methodology of the Guideline for Planning in Bushfire Prone Areas Version 1.3 (WAPC, 2017).

Areas of moderate BHLs occur on and adjacent to the site, generated off Forest Type A, Woodland Type B and Grassland Type G (AS3959). 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 (e.g. low fuel areas).

Bushfire Management Statement

Planning in Bushfire Prone Areas Version 1.3 (WAPC, 2017) requires assessment to the bushfire protection criteria – a process where land is assessed for compliance to the criteria. The bushfire protection criteria (Appendix 4, WAPC, 2017) are performance-based criteria in assessing bushfire risk management.

The bushfire protection criteria (Appendix 4, WAPC, 2017) outline four elements, being:

- Element A1: Location;
- Element A2: Siting and Design of Development;
- Element A3: Vehicle Access; and
- Element A4: Water.

The Subject site is located in a Bushfire Prone Area (OBRM, 2019), refer to Figure 6 over the page.

The proposal is required to meet the “Acceptable Solutions” of each Element of the bushfire mitigation measures (WAPC, 2017). The proposal will be assessed against the bushfire protection criteria Acceptable Solutions for Elements A1, A2, A3 and A4. A summary of the assessment is provided below in Table 4. Please refer to the summary table over the page, Table 4.

Figure 6: State Bushfire Prone Mapping (OBRM, 2019). https://maps.slip.wa.gov.au/landgate/bushfireprone/

Table 4: 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. As per SPP.3.7 and the Guidelines for Panning in Bushfire Prone Areas, the development will not be subject to a higher BHL than moderate. There are no proposed habitable buildings for this development (site office or dwellings) on the extraction site. Proposal deemed to meet Acceptable Solution A.1.1
Element 2 – Siting and Design	A2.1 Asset Protection Zone	Yes	Compliant. The Crushing and screening equipment will be in low fuel areas as defined by AS3959 Exc 2.2.3.2 whereby bare areas will exist. No habitable buildings are proposed for this development. Proposal deemed to meet Acceptable Solution 2.1
Element 3 – Vehicular Access	A3.1 Two Access Routes	Yes	Compliant. Site personnel will have access in alternative directions north and south along Marbelup North Road. Marbelup North Road connects to Redmond West Road to the north and to South Coast Highway to the south. Proposal deemed to meet Acceptable Solution A3.1.
	A3.2 Public Road	No	No public roads are proposed for this proposal. Not assessed to Acceptable Solution A3.2.
	A3.3 Cul-de-sacs	No	No cul-de-sacs are proposed. Not assessed to Acceptable Solutions A3.3.
	A3.4 Battle axes	No	No battle axes are proposed. Not assessed to Acceptable Solution A3.4.
	A3.5 Private driveways	Yes	Compliant. Internal access driveways and pen pit areas will have adequate turn around areas as per the minimum requirements as per Figure 7 below. Proposal deemed to meet Acceptable Solution A3.5.
	A3.6 Emergency Access Ways	No	No EAWs proposed as the public road network will be utilised. Not assessed to Acceptable Solution A3.6.
	A3.7 Fire Service Access Ways	No	No FSA's proposed as the public road network will be utilised. Not assessed to Acceptable Solution A3.7.
	A3.8 Firebreaks	Yes	Compliant. Firebreaks are currently in place around the subject site and should remain in perpetuity as per the CoA Fire Management Notice. Low fuel loads as per the CoA Fire Management Notice. Development deemed to meet Acceptable Solution 3.8.
Element 4 – Water	A4.1 Reticulated areas	No	Not assessed to A4.1.
	A4.2 Non-reticulated areas	Yes	Water will be required for bushfire safety and dust control. Reticulated water will not be available. A minimum 10,000L standalone tank will be required solely dedicated for firefighting supply. Appropriate storz fittings are to be installed for fire services to access supply. The proposal will meet Acceptable Solutions A4.3.
	A4.3 Individual lots in non-reticulated areas	No	Not assessed to A4.3.

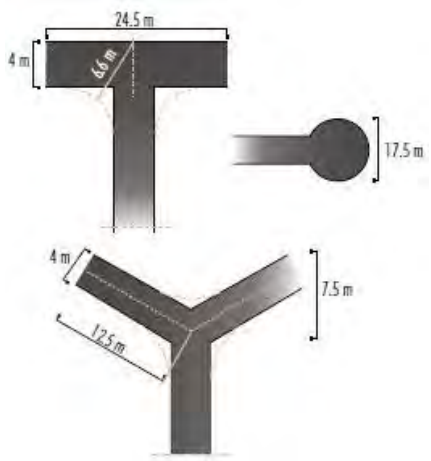

Figure 7: Private driveway design requirements (WAPC, 2017)

Table 5: Vehicular Access Technical Requirements (WAPC, 2017)

Technical requirements	Private Driveways & Battle Axes
Minimum trafficable surface (m)	4
Horizontal clearance (m)	6
Vertical clearance (m)	4.5
Maximum grades	1 in 10
Minimum weight capacity (t)	15
Maximum crossfall	1 in 33
Curves minimum inner radius (m)	8.5
Maximum Length	50m

Other bushfire mitigation measures

There is a potential bushfire risk from operations on "Extreme" "Fire Danger Index" (FDI) rated days. The predominant bushfire risk associated with the site is the adjacent native vegetation (east and west) where heavily vegetated areas (Extreme Risks) under hot conditions can give rise to hot and intense fires. The following fire control methods should be enforced at all times during summer periods.

Summary of bushfire control methods to apply to this development:

- Driveway construction standards as outlined in this document (responsibility of the contractor);
- Fire service access to be a minimum of 8m between excavation areas and boundary fences to ensure fire appliances can access external areas of the paddocks. See Site buffers Mapping Appendix A indicating the fire access in the west;
- Abide by CoA imposed Vehicle Movement and/or Harvest ban due to dangerous fire weather conditions or if there are bush fires already burning during the Restricted and Prohibited Burning Times (i.e. High-Very High Fire Danger days) (responsibility of the contractor);
- 10,000L dedicated water supply on site; and
- A mobile firefighting appliance dedicated to firefighting operations is located on the property at all times during bushfire season operations (November - April) (responsibility of the contractor).

7.8. Rehabilitation Management

Rehabilitation will be to constructed soils and a return to pasture paddocks. The following aims will apply to all rehabilitation works:

- To re-instate pastures for ongoing agricultural pursuits;
- To establish pasture vegetation through seeding and compaction through use of preserved topsoil; and
- To reduce weed invasions and competition of weeds with native species.

Rehabilitation methods

- Ripping of ground once extraction processes have occurred (prior to replacing topsoil);
- The method of revegetation is to use the seed from existing topsoil and seeding pasture paddocks (if required);
- Any weeds likely to significantly impact on the rehabilitation will be sprayed with Roundup or similar herbicide, or grubbed out, depending on the species involved. Refer to Weed Management Plan Section 7.4; and
- Rehabilitation will be carried out promptly after soil disturbance (within two weeks of exhaustion of pit and stockpiles removed).

Seed Stock

Species shall be sourced from stockpiled topsoil from clearing operations. If regeneration is slow then pasture seed shall be collected at the first spring period and spread at the first Autumn rains (usually after three continuous rain days is recommended). It is anticipated that most species will regenerate from site topsoil.

Methodology

The rehabilitation methodology is proposed to be undertaken using the following steps:

1. Remove topsoil and place on regeneration area or store adjacent to the site (no more than 10m from removal area).
2. Store topsoil in piles no higher than 4m.
3. Spread topsoil over batters and regeneration areas of the pits.
4. Ensure batters do not exceed 1:5m slopes.
5. Seeding of paddocks / closed stage pits and compaction of soil.
6. Inspect site after first large rainfall event, ensure erosion has not occurred over any slopes and remediate as necessary.
7. Inspect site after 6 months to determine success rate of seeding and any weed establishment. Remove weeds either through selective spraying or hand removal.
8. Instigate any seeding to assist regenerating areas.

Topsoil Management

Where topsoil removal is required, topsoil and overburden will be directly transferred from an area being cleared to an area to be rehabilitated. Where this is not possible the topsoil and overburden will be stored in low dumps (overburden and 4m for topsoil) for future use in rehabilitation. No topsoil soil rehabilitation/movement is to occur during high winds to avoid erosion and slumping.

Bank stability works / erosion control

The predominant soil type is deep sands and gravels over clay. Loose sands during revegetation works can be subject to prevailing winds and water erosion. Mounding of the rehabilitation areas will assist with any runoff and brushing will reduce the effects of wind erosion. The mounding and contouring of soil will also assist in trapping water for seedling germination and growth and will be employed where applicable. Mounding should occur along contours or in flat areas perpendicular to surface flow direction. Stabilisation techniques may need to be applied during and post construction activities (i.e. use of sediment traps). Mulching of pit faces or use of geo-fabrics should be used wherever possible to ensure there is minimal erosion to the site.

It is recommended as the site is predominantly sandy (topsoil) in nature, best practise is carried out when site is developed and sediment traps are installed during development activities with any bare ground areas stabilised (i.e. mulching).

7.9. Control of Environmental Incidents

An important aspect in the environmental program is management of non-conformance or incidents. An environmental incident is an event which could result in pollution to the local environment. The planning of site works and methodology as outlined within this management plan limits the risk and harm of construction works impacting on-site or off-site.

If an incident or event occurs during operations and excavation, it should be emphasised to all personnel working on site that all incidents are documented. Investigations should be conducted and action plans established in order to ensure the event does not happen again. The Site Operations Manager will be responsible for maintaining records of environmental incidents and reporting.

Examples of an “incident” for this project may include:

- Hygiene protocols not adhered to;
- Topsoil has not been appropriately placed;
- Unplanned vegetation clearing has occurred;
- Mechanical breakdown occurring along a waterway and hydraulic oil spill occurs;
- Refuelling occurs within the creek area;
- Complaints from “stakeholders” or neighbours; and
- Any event which causes non-compliance with the Operations Management Plan.

Should an incident occur which leads to a non-conformance, the Site Manager shall inform the owner of the property of any non-compliance or potential non-compliance within seven days of that non-compliance being known, and if further action is required then the CoA will be informed.

7.10. Corrective and Preventative actions

An environmental investigation should include the following basic elements:

- Identify the cause of the incident;
- Identifying and implementing the necessary corrective action;
- Identifying the personnel responsible for carrying out corrective action;
- Implementing or modifying controls necessary to avoid repetition;
- Recording changes in written procedures required; and
- Reporting to the appropriate government agencies if required.

7.11. Contingency Procedures

Contingency measures are included within this management plan. These protocols are designed to reduce adverse environmental impacts and provide an early detection of non-conformance and subsequent corrective action. Any modifications to the outlined strategies and methodologies to meet unexpected conditions shall be agreed to by the Site Manager. Monitoring shall be used to confirm the effectiveness of any changes.

Should it be identified by any personnel involved in the project there is a non-conformance to the acceptable methodology or there is reason to cause environmental harm, in consultation with the Site Manager and owner of the property, activities should cease during resolution of the required change in methodology.

The Site Manager should be notified of any environmental non-conformances and undertake site investigation. It will be the responsibility of the Site Manager to report any environmental incidents to the appropriate government agencies (e.g. Department of Water and Environmental Regulation – contamination, spills etc., Parks and Wildlife Service (PAWS/DBCA) - impacts to flora or fauna).

7.12. Spill Management Procedures

The following information is from the PaWS Spill Management Brochure (DEC 2011). This should be the methodology employed should a spill from fuel or chemical occur.

Dealing with minor spills

A small spill is considered to be a spill of 5 litres or less providing the product is not concentrated. For concentrated products of any quantity the spill must be treated as a large spill.

1. Assess safety. Make sure that people are kept clear, and that you have the right training and equipment to deal with the spill.

2. Stop the source. Providing it is safe to do so, stop the spill at its source. This may involve righting an overturned container or sealing holes or cracks in containers.

3. Contain and clean up the spill. The spill should be mopped up immediately.

4. Record the spill. Record when, what, how and where the spill occurred, clean up measures undertaken and the names of any witnesses. Also, make note of what changes can be made when handling, transporting or storing chemicals to ensure a similar incident does not happen again.

Dealing with large spills

A large spill is considered to be anything over 5 litres or concentrated chemicals of any volume.

1. Assess safety. Make sure that people are kept clear, and that you have the right training and equipment to deal with the spill.

2. Consult the Material Safety Data Sheet (MSDS). The MSDS will have instructions on how to deal with specific chemical spills.

3. Put on protective clothing. If necessary, put on gloves and goggles, a mask and an apron.

4. Stop the source. Providing it is safe to do so, stop the spill at its source. This may involve righting an overturned container or sealing holes or cracks in containers.

5. Contain and control the flow. The spill should be prevented from filtrating into the ground or entering the stormwater system. The outer edge of the spill should be dammed with rags, blankets, sand, sands bags, mops and/or absorbent booms.

6. Clean up the spill. Promptly cover the spill using absorbent materials such as the correct absorbent granules for the product (Note that some strong acids will react with some types of granules and sawdust), sand and rags, being mindful not to splash the spill. Using a dustpan or spade, the absorbent granules or sand must then be scooped up and placed into a container. This waste material is not to be buried or thrown into the environment. The method of disposing this waste will depend on the amount and the type of chemical that was spilt. The Department of Environment Controlled Waste Section will advise on the appropriate disposal of hazardous substances. There are several contractors that will dispose of contaminated substances and soils. All contact phone numbers can be found below

7. Notify the appropriate authority. If the spill does enter a stormwater drain or open ground, the Department of Environment and your local council must be notified. Please refer to the phone numbers listed below. If there is a hazard to health or property, call Fire and Rescue on 000 immediately.

8. Record the incident. Record what, how and where the spill occurred and the names of any witnesses. Also, make note of what changes can be made when handling, transporting or storing chemicals to ensure a similar incident does not happen again.

Who to call in an emergency

All hours' phone numbers

Life / property emergencies: Ambulance, Fire or Police	000
Pollution emergencies - Department of Water and Environment Regulation	1300 784 782
Poisons Information Centre	13 11 26
Water Corporation – Emergencies and water service difficulties	13 13 75

7.13. Monitoring and contingency planning

Environmental controls during construction will be checked at frequent intervals as outlined in Table 6 below. This will be the responsibility of the Site Supervisor and the Environmental Officer to ensure all the below activities are carried out.

Table 6: Environmental Monitoring Activities During Construction

Frequency & Compliance Number	*Activity*
Daily	Check all sediment controls
	Check waste materials collected from site are correctly sorted and stored (i.e. green waste, refuelling in designated areas only).
	Check personal safety equipment before each use.
	Check dust filters on equipment.
	Visually check vehicles and equipment for leaks or potential oil spills.
	Check signage, gates and demarcation tapes (trees and dieback) in place
	Check noise suppression devices on equipment prior to working.
	Check no disturbance to Soils in wetlands/creek areas for disturbance of ASS.
	Check vehicle/hygiene requirements have been met.
	Check topsoil has been appropriately placed.
	Check no unplanned vegetation clearing has occurred.
	Incident reports have been completed if required.
	Check containers of hazardous materials are properly stored and not damaged (away from site)
Twice weekly	Ensure dust suppression controls in place
	Visually check vehicles and equipment for leaks or potential oil spills
Weekly	Inspect all sediment control structures
After rain (i.e. >10mm)	Check all drains are free from debris or chemicals (i.e. hydrocarbons)
	Stormwater structures are checked and/or are cleaned out
	Check for erosion after wet periods and winter months
	Ensure drainage structures are working as required
	Ensure sediment controls are working appropriately
Monthly	Ensure rehabilitation areas are healthy and free of weeds
	Apply stabilisation on any bare regenerating areas
	Remove weeds as per Weed Management Plan
	Ensure public access is restricted and signage in place

8. Consultation process

To ensure that all aspects of the project encompass current best practise, legislative requirements and guidelines, the following consultation plan shall be implemented.

Consultation shall occur with government agencies:

- At approval of the CoA Planning Approval and prior to implementation, for CoA feedback and comment regarding the document;
- A site meeting/walk over with government agency representatives (if requested) prior to commencement of any site works to confirm refuelling area, demarcation, turnarounds, areas of concern etc.; and
- Post construction periods.

Recommended government agencies to consult are:

- Department of Water and Environmental Regulation – regarding all storm water and water quality issues;
- Department Biodiversity, Conservation and Attraction (Parks and Wildlife Service) – vegetation and flora, fauna, wetlands weeds, disease, flora and fauna issues;
- City of Albany – regarding site construction activities, areas of environmental concern, pit and track design, control measures implemented and ongoing management.

Regular consultation can occur during operations with other stakeholders as required and may include but not be limited to:

- Neighbours;
- Community groups;
- City of Albany representatives;
- Parks and Wildlife Service (DBCA); and
- Interest groups as identified.

The client and site supervisor shall have overall responsibility of conveying information to relevant government agencies regarding any environmental or operational issue or concern.

9. Implementation Process

A generalised implementation program for the proposal is shown below in Table 7. Carting of gravel products will occur during times of high demand such as through the construction period of November to May. Each stage / pit is to be rehabilitated prior to the next stage being opened, which should take no more than 1 week to complete. The implementation program outlined below is a generalised plan and may be subject to change depending on demand for resource and gravel availability at the site. It is noted that the CoA license is for 8 years and is subject to renewal at the end of that period. It is noted that this period is "renewal license period" only not a life of project.

Table 7: Implementation Program

Year / Stage	2020	2021	2022	2023	2024	2025	2026	2027
Stage 1 extraction								
Rehabilitation								
Stage 2 extraction								
Rehabilitation								
Stage 3 extraction								
Rehabilitation								
Stage 4 extraction								
Rehabilitation								
Stage 5 extraction								
Rehabilitation								
Stage 6 extraction								
Rehabilitation								
Stage 7 extraction								
Rehabilitation								

It is recommended that this management plan is reviewed post initial excavation stages to ensure site management is occurring to the plan and any modifications are undertaken to the document consistent with operational duties and environmental requirements. Any factors which need to be considered for long term management should be documented into an updated post completion report or long-term maintenance schedule. At each stage/activity the management goals/objectives should be met prior to commencement of the next stage of works.

10. References

AS 3959-2018 Australian Standard, Construction of buildings in bushfire-prone areas, Building Code of Australia, Primary Referenced Standard, Australian Building Codes Board and Standards Australia.

Beard's Vegetation Classification dataset, 1:3,000,000 digital representation of Beard's vegetation map of the state of Western Australia (DPIRD-006).

Beard, J. S., Beeston, G.R., Harvey, J.M., Hopkins, A. J. M. and Shepherd, D. P. (2013). The vegetation of Western Australia at the 1:3,000,000 scale. Explanatory memoir. Second edition. *Conservation Science Western Australia* 9: 1-152.

BoM, Bureau of Meteorology Australia (2020) Climate Statistics for Australian Locations – Albany (Station # 009500). Accessed: March 2020 www.bom.gov.au

City of Albany Fire Management Notice 2019/2020, accessed from: www.albany.wa.gov.au

DBCA (2007 –) *NatureMap: Mapping Western Australia's Biodiversity*. Department of Parks and Wildlife. URL: https://naturemap.dbca.wa.gov.au/

Department of Environment and Conservation (DEC) (2005) digital dataset "*Pre-European Vegetation – Western Australia (NVIS Compliant Version)".*

Department of Fire and Emergency Services Website accessed from: www.dfes.wa.gov.au

Department of Primary Industries and Regional Development (2020a). *Shared Land Information Portal – Natural Resource Management: Soil – Landscape Mapping dataset.* Accessed April 2020. https://maps.agric.wa.gov.au/nrm-info

Department of Primary Industries and Regional Development (2020b). *Shared Land Information Portal – Natural Resource Management: Hydrological Zones dataset.* Accessed April 2020. https://maps.agric.wa.gov.au/nrm-info

Department of Water Public Drinking Water Supply Act (2001) Mapping dataset, Government of Western Australia.

Department of Agriculture, Water and Environment (DAWE) (2020). EPBC Act Protected Matters Search Tool. URL: http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf#

Department of Water (2016). *Land use compatibility tables for public drinking water source areas*. Water Quality Protection Note No. 25. Government of Western Australia.

Environmental Protection Authority Western Australia (2005) *Environmental Assessment Guideline for Separation Distances between Industrial and Sensitive Land Uses – Guidance Statement No. 3.* Government of western Australia.

Environmental Protection Authority Western Australia (2015) *Draft Environmental Assessment Guideline for Separation Distances between Industrial and Sensitive Land Uses.* Government of western Australia.

GoWA (2019). 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions, Perth.

Hearn, R., Williams, K., S. Comer and B. Beecham (2002). *Jarrah Forest 2 (JF2 – Southern Jarrah Forest subregion).* Department of Conservation and Land Management.

Keighery, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA.

Moore, J, and Wheeler, J. *Southern Weeds and Their Control*, Department of Agriculture.

Personal Communication from Helen O'Neill to Bio Diverse Solutions during site assessment and review period.

Sandiford, E.M. and Barrett, S. (2010) *Albany Regional Vegetation Survey, Extent Type and Status, A project funded by the Western Australian Planning Commission (EnviroPlanning "Integrating NRM into Land Use Planning" and State NRM Program), South Coast Natural Resource Management Inc. and City of Albany for the Department of Environment and Conservation.* Unpublished report. Department of Environment and Conservation, Western Australia.

Office of Bushfire Management (OBRM) (2019) Map of Bushfire Prone Areas. Data retrieved from State Information Land Portal (SLIP): *https://maps.slip.wa.gov.au/landgate/bushfireprone/*

Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2002) *Native Vegetation in Western Australia, extent Type and Status, Technical Report 249*, Department of Agriculture WA.

WALGA, (20204), *Environmental Planning Tool – Public Drinking water Source Areas*, viewed April 2020.

WALGA, (2020b), *Environmental Planning Tool – RIWI Groundwater Areas*, viewed April 2020.

WALGA (2020). *Environmental Planning Tool – Department of Aboriginal Affairs Aboriginal Site and other Heritage Places Dataset,* viewed April 2020. http://lbp.asn.au/index_public.html

Western Australian Planning Commission (WAPC) (2017) Guidelines for Planning in Bushfire Prone Areas v1.3. 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.

11. Appendices

Appendix A –Site Facility Mapping

Appendix B – Water Features Mapping

Appendix C – Native Vegetation Mapping

Appendix D – Bushfire Mapping

Appendix E – Database Searches

Appendix A

Site Facility Mapping

REPORT ITEM DIS241 REFERS

BIO DIVERSE SOLUTIONS
29 Hercules Crescent
Albany, WA 6330
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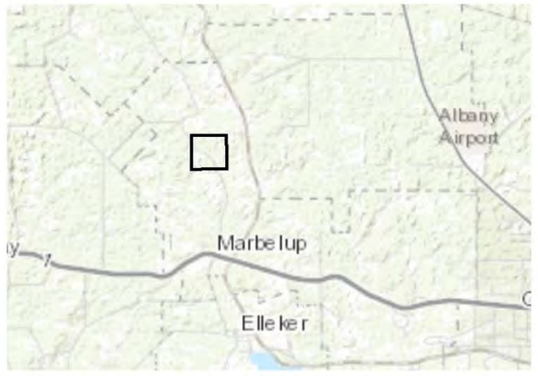
Tel: 08 9842 1575
Fax: 08 9842 1575



Overview Map Scale 1:250,000

Legend

- Property Boundary (Lots 3348 & 4120)
- Cadastre
- Extraction Area
- Pits
- GPS Points
- Access Routes

Staging Areas

1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7

Scale
1:4,000 @ 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
A.D. Contractors
Lot 3348 and Lot 4120 on Deposited Plan No: 202487
Marbellup, WA 6330

Staging Plan

STATUS	*FILE*	*DATE*
FINAL	**MSC0282**	**22/10/2020**

REPORT ITEM DIS241 REFERS

BIO DIVERSE SOLUTIONS
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Albany, WA 6330
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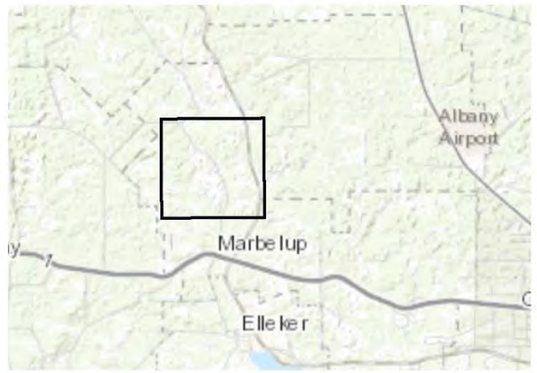

Overview Map Scale 1:250,000

Legend

- Property Boundary (Lots 3348 & 4120)
- Extraction Area
- Cadastre
- Existing Dwelling
- Separation Distance
- Pits
- 2-4m Bunding for Noise and Dust Reduction
- Fire Service Access
- Windbreaks

Buffers

- 10m Windbreak Buffer
- 50m Dam Buffer (CoA)
- 200m Adjacent Residences Buffer (CoA)
- 300m Noise & Dust Buffer to Extraction Areas (CoA)
- 500m Noise and Dust Buffer (EPA)
- 1000m Noise and Dust Buffer (EPA)

South Coast Significant Wetlands (DBCA)

- Conservation Class

Scale
1:11,750@ 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
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Marbellup, WA 6330

Site Buffers Mapping

STATUS	*FILE*	*DATE*
FINAL	**MSC0282**	**22/10/2020**

Appendix B

Water Features Mapping

REPORT ITEM DIS241 REFERS

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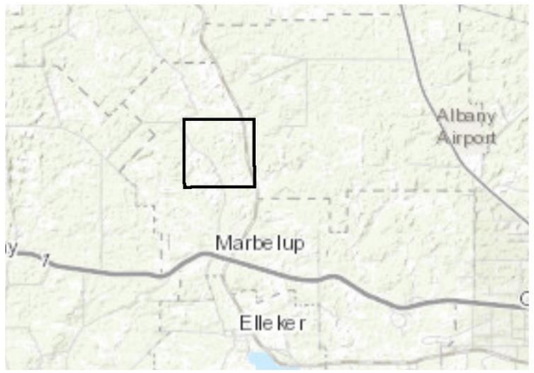
Fax: 08 9842 1575



Overview Map Scale 1:250,000

Legend

- Property Boundary
- Extraction Area
- Cadastre
- 5m Contours
- W Bore Location

South Coast Significant Wetlands (DBCA_018)

- Conservation Class

Public Drinking Water Source Area

- P2

RIWI Act, Groundwater Areas (DWER-034)

Scale
1:8,000 @ 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
A.D. Contractors
Lot 3348 and Lot 4120 on Deposited Plan No: 202487
Marbellup, WA 6330

Water Features Mapping

STATUS	FILE	DATE
FINAL	MSC0282	22/10/2020

DRILL LOG!

DATE: 14/5/10

Customer Name: Graham Smith

Address: 314 Nth. Marbellup road

Phone No: 9845 3223

BORE DEPTH:	35m
STATIC WATER LEVEL:	27m
SALT CONTENT:	90mspm
DISCHARGE:	80lpm
DRAWDOWN:	2m

0-1m ironstone

1-6 sticky clays

6-9 pasty clays

9-18 sands

18-27 red sandstone and pasty clays

27-36 medium sands into greeny clays. 1 screen.

Appendix C

Vegetation Mapping

REPORT ITEM DIS241 REFERS

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Albany, WA 6330
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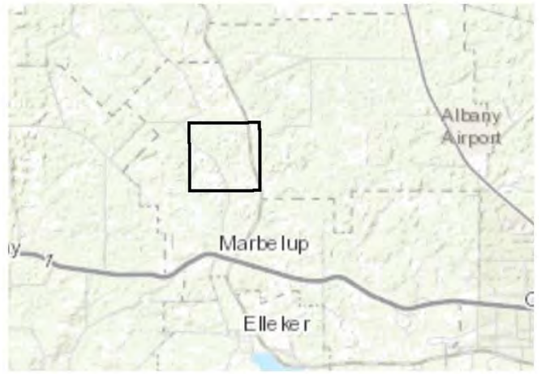

Overview Map Scale 1:250,000

Legend

- Property Boundary
- Extraction Area
- Cadastre
- 5m Contours
- Native Vegetation Extent (DPIRD_005)

ARVS Vegetation Units

- Homalospermum firmum/Callistemon glaucus Peat Thicket, 47
- Jarrah/Marri/Sheoak Laterite Forest, 12
- Melaleuca preissiana Low Woodland, 49
- Taxandria juniperina Closed Forest, 59

Scale
1:8,000 @ 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
A.D. Contractors
Lot 3348 and Lot 4120 on Deposited Plan No: 202487
Marbellup, WA 6330

Native Vegetation Mapping

STATUS	*FILE*	*DATE*
FINAL	**MSC0282**	**22/10/2020**

REPORT ITEM DIS241 REFERS

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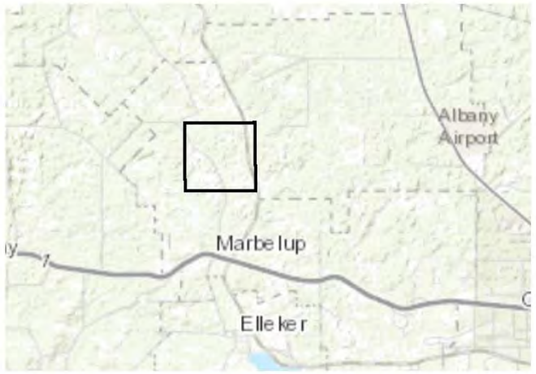

Overview Map Scale 1:250,000

Legend

- Property Boundary
- Extraction Area
- Cadastre
- 5m Contours

Vegetation Types

- Managed Grassland
- Jarrah/Marri/Sheoak Laterite Forest
- Melaleuca preissiana and Homalospermum firmum heath
- Existing Paddock Trees

Scale
1:8,000 @ 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
A.D. Contractors
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Marbellup, WA 6330

Site Vegetation Mapping

STATUS	*FILE*	*DATE*
FINAL	**MSC0282**	**22/10/2020**

Appendix D

Bushfire Mapping

This BAL Plan was prepared by:
Kathryn Kinnear, Bio Diverse Solutions
Accreditation No: BPAD30794
Jurisdiction: Level 2 - WA

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

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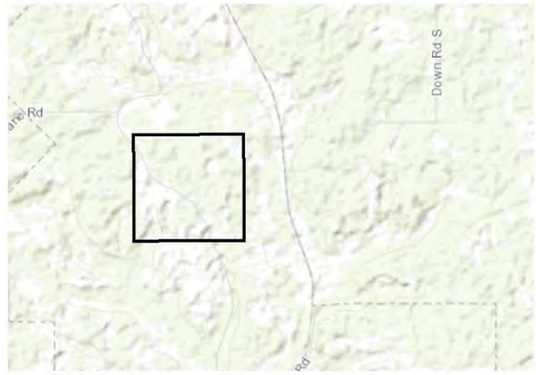


Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Separation Distance
- Slopes Degrees
- Future Low Fuel
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Woodland Type B
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:5,000 @ 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

Plot No.	Vegetation Type	Slope Category
1	Low fuel or non-vegetated 2.2.3.2 (e)	N/A
2	Low fuel or non-vegetated 2.2.3.2 (f)	N/A
3	Forest Type A	Downslope >0 to 5 degrees
4	Forest Type A	Downslope >5 to 10 degrees
5	Forest Type A	Upslope/Flat
6	Woodland Type B	Upslope/Flat
7	Grassland Type G	Downslope >0 to 5 degrees
8	Grassland Type G	Upslope/Flat

0 25 50 100 150 200 250 300 Meters

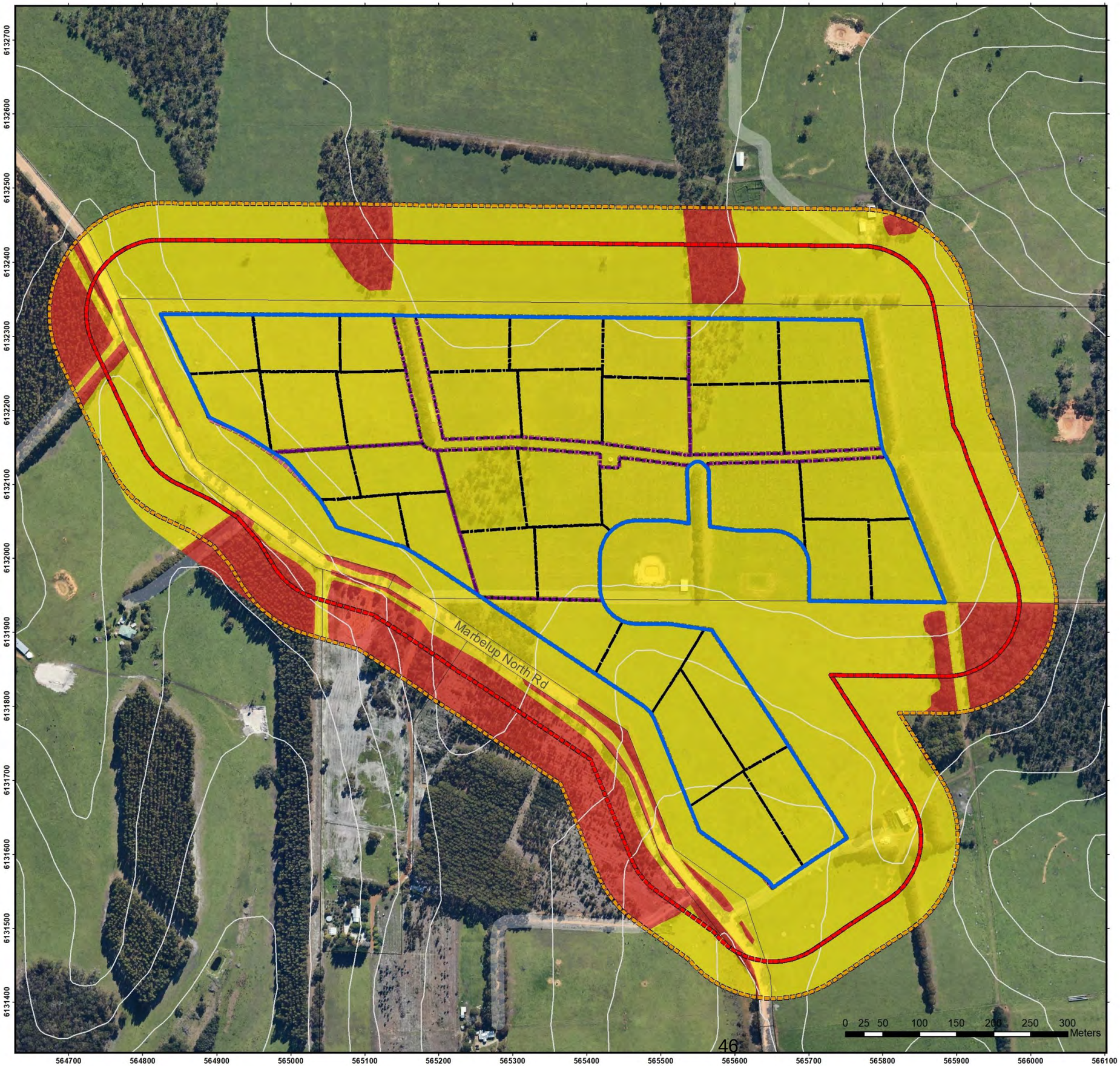
6132600 6132500 6132400 6132300 6132200 6132100 6132000 6131900 6131800 6131700 6131600 6131500 6131400 6131300

564700 564800 564900 565000 565100 565200 565300 565400 565500 565600 565700 565800 565900 566000 566100

CLIENT
A.D. Contractors Pty Ltd
Lots 3348 and 4120 Marbellup Road North
Marbellup, WA 6330

Vegetation Classes

BAL Assessor	QA Check	Drawn by
KK	BT	BT
STATUS	**FILE**	**DATE**
FINAL	MSC0282	22/10/2020



This BAL Plan was prepared by:
Kathryn Kinnear, Bio Diverse Solutions
Accreditation No: BPAD30794
Jurisdiction: Level 2 - WA

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

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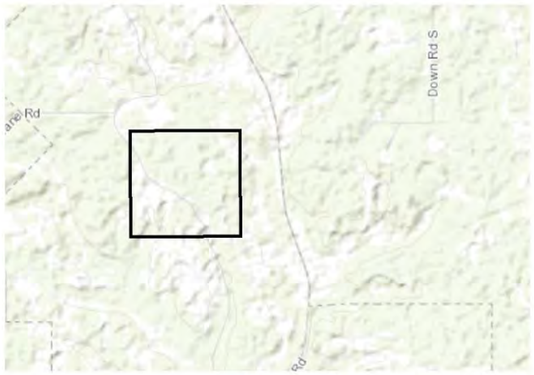

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Staging Areas
- Pits

Bushfire Hazard Level

- Extreme
- Moderate
- Low

Scale
1:5,000 @ 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
A.D. Contractors Pty Ltd
Lots 3348 and 4120 Marbellup Road North
Marbellup, WA 6330

BHL Mapping

BAL Assessor	*QA Check*	*Drawn by*
KK	**BT**	**BT**
STATUS	*FILE*	*DATE*
FINAL	**MSC0282**	**22/10/2020**

Appendix E

Database Searches

NatureMap 10km Flora Species Report

Created By Guest user on 21/04/2020

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 117° 43' 22" E,34° 57' 19" S
Buffer 10km
Group By Family

Family	Species	Records
Acrobolbaceae	1	1
Agapanthaceae	1	1
Anarthriaceae	5	12
Apiaceae	5	13
Apocynaceae	1	1
Araliaceae	3	3
Asparagaceae	10	15
Aspleniaceae	1	1
Asteraceae	7	8
Boraginaceae	1	1
Brassicaceae	1	1
Bryaceae	2	2
Campanulaceae	2	5
Caryophyllaceae	1	1
Casuarinaceae	2	2
Centrolepidaceae	6	9
Cephalotaceae	1	4
Cephaloziellaceae	1	1
Cupressaceae	1	1
Cyperaceae	28	56
Dasypogonaceae	4	6
Dicranaceae	2	4
Dilleniaceae	6	6
Droseraceae	11	21
Elaeocarpaceae	3	5
Ericaceae	27	86
Euphorbiaceae	3	4
Fabaceae	61	141
Funariaceae	1	1
Geraniaceae	2	2
Goodeniaceae	10	18
Haemodoraceae	8	12
Haloragaceae	1	3
Hemerocallidaceae	5	7
Hydatellaceae	1	7
Iridaceae	5	7
Juncaceae	5	10
Lamiaceae	1	1
Lauraceae	5	12
Lentibulariaceae	2	4
Lepidoziaceae	1	2
Linaceae	1	1
Lindsaeaceae	1	2
Loganiaceae	4	8
Lophocoleaceae	1	3
Lycopodiaceae	1	1
Malvaceae	4	4
Menyanthaceae	2	7
Myrtaceae	44	131
Olacaceae	1	1
Onagraceae	1	4
Orchidaceae	39	56
Orobanchaceae	2	2
Orthotrichaceae	1	1
Phyllanthaceae	1	2
Phytolaccaceae	1	1
Pittosporaceae	4	14
Plantaginaceae	1	1
Poaceae	12	16
Polygalaceae	4	6
Polygonaceae	1	1
Pottiaceae	3	4
Primulaceae	1	2
Proteaceae	61	162
Racopilaceae	1	1
Restionaceae	14	55
Rhamnaceae	2	3
Rosaceae	1	2
Rubiaceae	1	2
Rutaceae	10	19
Santalaceae	4	15
Sapindaceae	1	4
Selaginellaceae	1	1
Sematophyllaceae	1	1
Solanaceae	2	2

Stylidiaceae	24	58
Thuidiaceae	2	3
Thymelaeaceae	6	14
Xyridaceae	3	10
TOTAL	**508**	**1117**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acrobolbaceae					
1.		*Lethocolea pansa*			
Agapanthaceae					
2.	18380	*Agapanthus praecox subsp. orientalis*	Y		
Anarthriaceae					
3.	1058	*Anarthria gracilis*			
4.	1060	*Anarthria laevis*			
5.	1062	*Anarthria prolifera*			
6.	1063	*Anarthria scabra*			
7.	18049	*Lyginia imberbis*			
Apiaceae					
8.	6203	*Actinotus glomeratus*			
9.	6206	*Actinotus omnifertilis*			
10.	6253	*Platysace filiformis*			
11.	6263	*Schoenolaena juncea*			
12.	6292	*Xanthosia rotundifolia (Southern Cross)*			
Apocynaceae					
13.	6565	*Alyxia buxifolia (Dysentery Bush)*			
Araliaceae					
14.	18297	*Hedera helix*	Y		
15.	6223	*Hydrocotyle alata*			
16.	6226	*Hydrocotyle callicarpa (Small Pennywort)*			
Asparagaceae					
17.	1302	*Laxmannia jamesii (James' Paperlily)*			
18.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
19.	1225	*Lomandra drummondii*			
20.	1234	*Lomandra nigricans*			
21.	1238	*Lomandra pauciflora*			
22.	1244	*Lomandra sonderi*			
23.	1246	*Lomandra suaveolens*			
24.	1328	*Thysanotus dichotomus (Branching Fringe Lily)*			
25.	1339	*Thysanotus multiflorus (Many-flowered Fringe Lily)*			
26.	1354	*Thysanotus tenellus*			
Aspleniaceae					
27.	61	*Asplenium aethiopicum (Forked Spleenwort)*			
Asteraceae					
28.	7909	*Carduus pycnocephalus (Slender Thistle)*	Y		
29.	7962	*Dittrichia viscosa*	Y		
30.	8099	*Leontodon saxatilis (Hairy Hawkbit)*	Y		
31.	8133	*Olearia elaeophila*			
32.	20663	*Senecio multicaulis subsp. multicaulis*			
33.	9367	*Sonchus hydrophilus (Native Sowthistle)*			
34.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
Boraginaceae					
35.	6681	*Echium plantagineum (Paterson's Curse)*	Y		
Brassicaceae					
36.	3027	*Lepidium foliosum (Leafy Peppercress)*			
Bryaceae					
37.	32417	*Ptychostomum angustifolium*			
38.	32424	*Rosulabryum albolimbatum*			
Campanulaceae					
39.	9289	*Lobelia anceps (Angled Lobelia)*			
40.	7405	*Lobelia rarifolia*			
Caryophyllaceae					
41.	2912	*Spergula arvensis (Corn Spurry)*	Y		
Casuarinaceae					
42.	1728	*Allocasuarina fraseriana (Sheoak, Kondil)*			
43.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
Centrolepidaceae					
44.	1116	*Aphelia brizula*			

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45.	1117	*Aphelia cyperoides*			
46.	1123	*Centrolepis caespitosa*			
47.	1129	*Centrolepis glabra (Smooth Centrolepis)*			
48.	1132	*Centrolepis mutica*			
49.	13125	*Centrolepis strigosa subsp. strigosa*			
Cephalotaceae					
50.	3148	*Cephalotus follicularis (Albany Pitcher Plant)*			
Cephaloziellaceae					
51.		*Cephaloziella exiliflora*			
Cupressaceae					
52.	97	*Callitris roei (Roe's Cypress Pine)*			
Cyperaceae					
53.	743	*Baumea juncea (Bare Twigrush)*			
54.	17618	*Cyathochaeta equitans*			
55.	815	*Cyperus tenellus (Tiny Flatsedge)*	Y		
56.	834	*Evandra aristata*			
57.	835	*Evandra pauciflora*			
58.	902	*Gahnia decomposita*			
59.	907	*Gahnia trifida (Coast Saw-sedge)*			
60.	912	*Isolepis cyperoides*			
61.	931	*Lepidosperma drummondii*			
62.	934	*Lepidosperma gracile (Slender Sword Sedge)*			
63.		*Lepidosperma sp.*			
64.	945	*Lepidosperma squamatum*			
65.	946	*Lepidosperma striatum*			
66.	953	*Mesomelaena graciliceps*			
67.	957	*Mesomelaena tetragona (Semaphore Sedge)*			
68.	970	*Schoenus acuminatus*			
69.	978	*Schoenus brevisetis*			
70.	979	*Schoenus caespititius*			
71.	983	*Schoenus cruentus*			
72.	985	*Schoenus discifer*			
73.	986	*Schoenus efoliatus*			
74.	17614	*Schoenus plumosus*			
75.	1018	*Schoenus subfascicularis*			
76.	1021	*Schoenus sublaxus*			
77.	1022	*Schoenus submicrostachyus*			
78.	1023	*Schoenus tenellus*			
79.	1038	*Tricostularia neesii*			
80.	20428	*Tricostularia sp. south coast (R.T. Wills 1423)*			
Dasypogonaceae					
81.	1212	*Baxteria australis*			
82.	1213	*Calectasia cyanea (Blue Tinsel Lily)*		T	
83.	1218	*Dasypogon bromeliifolius (Pineapple Bush)*			
84.	1221	*Kingia australis (Kingia, Pulonok)*			
Dicranaceae					
85.	32335	*Campylopus bicolor*			
86.	32338	*Campylopus introflexus*	Y		
Dilleniaceae					
87.	5117	*Hibbertia cuneiformis (Cutleaf Hibbertia)*			
88.	5118	*Hibbertia cunninghamii*			
89.	5119	*Hibbertia depressa*			
90.	5131	*Hibbertia gracilipes*			
91.	5137	*Hibbertia inconspicua*			
92.	5144	*Hibbertia microphylla*			
Droseraceae					
93.	48751	*Drosera drummondii*			
94.	13218	*Drosera erythrogyne*			
95.	19256	*Drosera intricata*			
96.	13099	*Drosera microscapa*			
97.	3112	*Drosera myriantha (Star Rainbow)*			
98.	3118	*Drosera pallida (Pale Rainbow)*			
99.	3122	*Drosera platypoda (Fan-leaved Sundew)*			
100.	3124	*Drosera pulchella (Pretty Sundew)*			
101.	13186	*Drosera roseana*			
102.	3130	*Drosera scorpioides (Shaggy Sundew)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
103.	48783	*Drosera verrucata*			
Elaeocarpaceae					
104.	4526	*Tetratheca affinis*			
105.	4544	*Tetratheca setigera*			
106.	4547	*Tremandra diffusa*			
Ericaceae					
107.	6306	*Andersonia caerulea (Foxtails)*			
108.	25844	*Andersonia caerulea subsp. caerulea*			
109.	19623	*Andersonia depressa*			
110.	6320	*Andersonia simplex (Spiked Andersonia)*			
111.	41737	*Andersonia sp. Jamesii (J. Liddelow 84)*		P4	
112.	16997	*Andersonia sp. Mitchell River (B.G. Hammersley 925)*		P3	
113.	6355	*Leucopogon alternifolius*		P3	
114.	6360	*Leucopogon australis (Spiked Beard-heath)*			
115.	6387	*Leucopogon distans*			
116.	6396	*Leucopogon glabellus*			
117.	40940	*Leucopogon obovatus subsp. obovatus*			
118.	6428	*Leucopogon pendulus*			
119.	6435	*Leucopogon polystachyus*			
120.	6440	*Leucopogon racemulosus*			
121.	6441	*Leucopogon reflexus (Heart-leaf Beard-heath)*			
122.	10755	*Leucopogon rubricaulis*			
123.	6454	*Leucopogon verticillatus (Tassel Flower)*			
124.	6456	*Lysinema ciliatum (Curry Flower)*			
125.	6457	*Lysinema conspicuum*			
126.	6460	*Lysinema lasianthum*		P4	
127.	34736	*Lysinema pentapetalum*			
128.	6464	*Needhamiella pumilio*			
129.	31931	*Sphenotoma capitata*			
130.	31952	*Sphenotoma gracilis (Swamp Paper-heath)*			
131.	31951	*Sphenotoma parviflora*			
132.	48617	*Styphelia sp. Albany (M. Hislop 2218)*			
133.	6476	*Styphelia tenuiflora (Common Pinheath)*			
Euphorbiaceae					
134.	4585	*Amperea ericoides*			
135.	4588	*Amperea volubilis*			
136.	4666	*Monotaxis occidentalis*			
Fabaceae					
137.	15429	*Acacia alata var. alata*			
138.	11731	*Acacia browniana var. browniana*			
139.	16975	*Acacia decurrens*	Y		
140.	3363	*Acacia hastulata*			
141.	3383	*Acacia incurva*			
142.	3428	*Acacia luteola*			
143.	10955	*Acacia melanoxylon*	Y		
144.	3453	*Acacia myrtifolia*			
145.	3502	*Acacia pulchella (Prickly Moses)*			
146.	15482	*Acacia pulchella var. goadbyi*			
147.	3504	*Acacia pycnantha (Golden Wattle)*	Y		
148.	3523	*Acacia robiniae*			
149.	3576	*Acacia tetragonocarpa*			
150.	3588	*Acacia uliginosa*			
151.	3689	*Aotus intermedia*			
152.	3713	*Bossiaea linophylla*			
153.	3714	*Bossiaea ornata (Broad Leaved Brown Pea)*			
154.	10861	*Callistachys lanceolata (Wonnich)*			
155.	3757	*Chorizema glycinifolium*			
156.	3760	*Chorizema reticulatum (Showy Flame Pea)*			
157.	3811	*Daviesia flexuosa*			
158.	3817	*Daviesia inflata*			
159.	3876	*Eutaxia epacridoides*			
160.	3879	*Eutaxia parvifolia*			
161.	3880	*Eutaxia virgata*			
162.	19190	*Gastrolobium cuneatum*			
163.	20511	*Gastrolobium minus*			
164.	20500	*Gastrolobium sericeum*			
165.	3948	*Gompholobium capitatum*			
166.	10909	*Gompholobium confertum*			

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167.	3950	*Gompholobium knightianum*			
168.	3953	*Gompholobium ovatum*			
169.	3954	*Gompholobium polymorphum*			
170.	3955	*Gompholobium preissii*			
171.	11083	*Gompholobium scabrum*			
172.	3958	*Gompholobium venustum (Handsome Wedge-pea)*			
173.	11115	*Gompholobium villosum*			
174.	3964	*Hovea chorizemifolia (Holly-leaved Hovea)*			
175.	4028	*Jacksonia spinosa*			
176.	4037	*Kennedia coccinea (Coral Vine)*			
177.	4048	*Latrobea brunonis*			
178.	4049	*Latrobea diosmifolia*			
179.	4063	*Lotus uliginosus (Greater Lotus)*	Y		
180.	4076	*Medicago lupulina (Black Medic)*	Y		
181.	4114	*Ornithopus pinnatus (Slender Serradella)*	Y		
182.	4140	*Phyllota barbata*			
183.	4164	*Pultenaea aspalathoides*			
184.	4181	*Pultenaea reticulata*			
185.	4200	*Sphaerolobium alatum*			
186.	17551	*Sphaerolobium drummondii*			
187.	4202	*Sphaerolobium fornicatum*			
188.	4204	*Sphaerolobium grandiflorum*			
189.	20302	*Sphaerolobium hygrophilum*			
190.	4207	*Sphaerolobium medium*			
191.	4208	*Sphaerolobium nudiflorum*			
192.	17547	*Sphaerolobium pubescens*			
193.	17548	*Sphaerolobium rostratum*			
194.	4211	*Sphaerolobium vimineum (Leafless Globe Pea)*			
195.	4295	*Trifolium dubium (Suckling Clover)*	Y		
196.	11474	*Vicia sativa subsp. nigra*	Y		
197.	4325	*Viminaria juncea (Swishbush, Koweda)*			
Funariaceae					
198.	32370	*Funaria hygrometrica*			
Geraniaceae					
199.	4339	*Geranium molle (Dove's Foot Cranesbill)*	Y		
200.	4343	*Pelargonium capitatum (Rose Pelargonium)*	Y		
Goodeniaceae					
201.	7411	*Anthotium humile (Dwarf Anthotium)*			
202.	7439	*Dampiera fasciculata (Bundled-leaf Dampiera)*			
203.	7452	*Dampiera leptoclada (Slender-shooted Dampiera)*			
204.	7462	*Dampiera pedunculata*			
205.	7487	*Diaspasis filifolia (Thread-leaved Diaspasis)*			
206.	7508	*Goodenia filiformis (Thread-leaved Goodenia)*			
207.	7523	*Goodenia leptoclada (Thin-stemmed Goodenia)*			
208.	7572	*Lechenaultia expansa*			
209.	7646	*Scaevola striata (Royal Robe)*			
210.	7665	*Velleia trinervis*			
Haemodoraceae					
211.	1407	*Anigozanthos flavidus (Tall Kangaroo Paw)*			
212.	1413	*Anigozanthos preissii (Albany Catspaw)*			
213.	11597	*Conostylis setigera subsp. setigera*			
214.	1474	*Haemodorum sparsiflorum*			
215.	1478	*Phlebocarya ciliata*			
216.	1481	*Tribonanthes australis (Southern Tiurndin)*			
217.	8798	*Tribonanthes uniflora (Woolly Tiurndin)*			
218.	1485	*Tribonanthes violacea (Violet Tiurndin)*			
Haloragaceae					
219.	6166	*Gonocarpus simplex*		P4	
Hemerocallidaceae					
220.	23474	*Agrostocrinum hirsutum*			
221.	1285	*Corynotheca micrantha (Sand Lily)*			
222.	1297	*Johnsonia lupulina (Hooded Lily)*			
223.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
224.	29478	*Tricoryne sp. South Coast (T.E.H. Aplin 2653)*			
Hydatellaceae					
225.	1139	*Trithuria bibracteata*			

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Iridaceae					
226.	11445	*Ferraria crispa subsp. crispa*	Y		
227.	1524	*Gladiolus undulatus (Wild Gladiolus)*	Y		
228.	29193	*Iris laevigata*	Y		Y
229.	1533	*Ixia paniculata*	Y		
230.	1558	*Sparaxis bulbifera*	Y		
Juncaceae					
231.	1180	*Juncus capitatus (Capitate Rush)*	Y		
232.	1185	*Juncus kraussii (Sea Rush)*			
233.	1186	*Juncus microcephalus*	Y		
234.	1187	*Juncus oxycarpus*	Y		
235.	1188	*Juncus pallidus (Pale Rush)*			
Lamiaceae					
236.	6939	*Westringia dampieri*			
Lauraceae					
237.	2951	*Cassytha flava (Dodder Laurel)*			
238.	2952	*Cassytha glabella (Tangled Dodder Laurel)*			
239.	11857	*Cassytha glabella forma glabella*			
240.	2957	*Cassytha racemosa (Dodder Laurel)*			
241.	11242	*Cassytha racemosa forma pilosa*			
Lentibulariaceae					
242.	7148	*Utricularia multifida*			
243.	7153	*Utricularia tenella*			
Lepidoziaceae					
244.		*Kurzia compacta*			
Linaceae					
245.	4363	*Linum trigynum (French Flax)*	Y		
Lindsaeaceae					
246.	59	*Lindsaea linearis (Screw Fern)*			
Loganiaceae					
247.	6504	*Logania buxifolia*			
248.	46255	*Orianthera campanulata*			
249.	46315	*Orianthera serpyllifolia subsp. serpyllifolia*			
250.	16177	*Phyllangium paradoxum*			
Lophocoleaceae					
251.		*Chiloscyphus semiteres*			
Lycopodiaceae					
252.	12783	*Lycopodiella serpentina*			
Malvaceae					
253.	48634	*Commersonia corniculata*			
254.	40863	*Commersonia corylifolia (Hazel-leaved Rulingia)*			
255.	5092	*Thomasia pauciflora (Few Flowered Thomasia)*			
256.	5094	*Thomasia purpurea*			
Menyanthaceae					
257.	36178	*Liparophyllum lasiospermum*			
258.	36181	*Ornduffia parnassifolia*			
Myrtaceae					
259.	5315	*Actinodium cunninghamii (Albany Daisy)*			
260.	19789	*Agonis theiformis*			
261.	20361	*Astartea arbuscula (Minute Astartea)*			
262.	20125	*Astartea corniculata*			
263.	20127	*Astartea glomerulosa (Early Astartea)*			
264.	45213	*Astartea pulchella*			
265.	20283	*Astartea scoparia (Common Astartea)*			
266.	42820	*Astartea transversa*		P2	
267.	5376	*Beaufortia anisandra (Dark Beaufortia)*			
268.	5381	*Beaufortia decussata (Gravel Bottlebrush)*			
269.	5392	*Beaufortia sparsa (Swamp Bottlebrush)*			
270.	5394	*Callistemon glaucus*			
271.	5415	*Calothamnus lateralis*			
272.	5430	*Calothamnus schaueri*			
273.	5440	*Calytrix asperula (Brush Starflower)*			
274.	5458	*Calytrix flavescens (Summer Starflower)*			
275.	48451	*Calytrix hirta*			

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276.	17104	*Corymbia calophylla (Marri)*			
277.	5519	*Darwinia oederoides*			
278.	5625	*Eucalyptus diversicolor (Karri)*			
279.	13547	*Eucalyptus marginata subsp. marginata (Jarrah)*			
280.	5709	*Eucalyptus megacarpa (Bullich, Pulidj)*			
281.	5776	*Eucalyptus staeri (Albany Blackbutt)*			
282.	5816	*Homalospermum firmum*			
283.	5818	*Hypocalymma cordifolium*			
284.	13106	*Hypocalymma scariosum*			
285.	5827	*Hypocalymma strictum*			
286.	17512	*Kunzea clavata*			
287.	17508	*Kunzea micrantha subsp. oligandra*			
288.	5841	*Kunzea recurva*			
289.	5853	*Leptospermum oligandrum*			
290.	5902	*Melaleuca densa*			
291.	5946	*Melaleuca pauciflora*			
292.	5952	*Melaleuca preissiana (Moonah)*			
293.	13277	*Melaleuca ringens*			
294.	5971	*Melaleuca striata*			
295.	5980	*Melaleuca thymoides*			
296.	11109	*Pericalymma crassipes*			
297.	15501	*Pericalymma spongiocaule*			
298.	6027	*Rinzia schollerifolia (Cranberry Rinzia)*			
299.	20114	*Taxandria fragrans*			
300.	20115	*Taxandria juniperina*			
301.	20135	*Taxandria linearifolia*			
302.	20133	*Taxandria parviceps*			
Olacaceae					
303.	2366	*Olax phyllanthi*			
Onagraceae					
304.	6133	*Epilobium hirtigerum (Hairy Willow Herb)*			
Orchidaceae					
305.	10776	*Caladenia ensata*			
306.	15350	*Caladenia flava subsp. sylvestris*			
307.	1603	*Caladenia longiclavata (Clubbed Spider Orchid)*			
308.	15371	*Caladenia nana subsp. nana*			
309.	15372	*Caladenia nana subsp. unita*			
310.	15375	*Caladenia pholcoidea*			
311.	1610	*Caladenia plicata (Crab-lipped Spider Orchid)*			
312.	15379	*Caladenia serotina*			
313.	1589	*Caladenia x ericksoniae*			
314.	15114	*Cyanicula gemmata*			
315.	10942	*Cyrtostylis tenuissima*			
316.	19649	*Disa bracteata*	Y		
317.	1640	*Drakaea glyptodon (King-in-his-carriage)*			
318.	11156	*Drakaea livida*			
319.	1643	*Elythranthera brunonis (Purple Enamel Orchid)*			
320.	1646	*Eriochilus dilatatus (White Bunny Orchid)*			
321.	15412	*Eriochilus dilatatus subsp. multiflorus*			
322.	15415	*Eriochilus scaber subsp. scaber*			
323.	15416	*Eriochilus valens*			
324.	12932	*Gastrodia lacista*			
325.	15418	*Leptoceras menziesii*			
326.	1656	*Lyperanthus serratus (Rattle Beak Orchid)*			
327.	12199	*Microtis familiaris*			
328.	15424	*Praecoxanthus aphyllus*			
329.	1672	*Prasophyllum fimbria (Fringed Leek Orchid)*			
330.	1676	*Prasophyllum hians (Yawning Leek Orchid)*			
331.	1677	*Prasophyllum macrostachyum (Laughing Leek Orchid)*			
332.	44084	*Prasophyllum sp. early (G. Brockman GBB 1626)*			
333.	1683	*Prasophyllum triangulare (Dark Leek Orchid)*			
334.	18655	*Pterostylis sp. crinkled leaf (G.J. Keighery 13426)*			
335.	1698	*Pterostylis vittata (Banded Greenhood)*			
336.	16367	*Pyrorchis nigricans (Red beaks, Elephants ears)*			
337.	10856	*Thelymitra benthamiana (Leopard Orchid)*			
338.	1705	*Thelymitra crinita (Blue Lady Orchid)*			
339.	1706	*Thelymitra cucullata (Swamp Sun Orchid)*			
340.	1707	*Thelymitra flexuosa (Twisted Sun Orchid)*			
341.	11053	*Thelymitra macrophylla*			

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342.	1716	*Thelymitra tigrina (Tiger Orchid)*			
343.	20737	*X Cyanthera glossodioides*			
Orobanchaceae					
344.	48868	*Bellardia viscosa*	Y		
345.	7122	*Orobanche minor (Lesser Broomrape)*	Y		
Orthotrichaceae					
346.	36218	*Zygodon menziesii*			
Phyllanthaceae					
347.	4690	*Poranthera huegelii*			
Phytolaccaceae					
348.	2793	*Phytolacca octandra (Red Ink Plant)*	Y		
Pittosporaceae					
349.	25798	*Billardiera fusiformis (Australian Bluebell)*			
350.	3159	*Billardiera laxiflora*			
351.	3165	*Billardiera variifolia*			
352.	16322	*Pittosporum undulatum*	Y		
Plantaginaceae					
353.	7108	*Veronica arvensis (Wall Speedwell)*	Y		
Poaceae					
354.	197	*Amphipogon debilis*			
355.	20184	*Amphipogon laguroides subsp. laguroides*			
356.	20196	*Amphipogon setaceus*			
357.	244	*Briza maxima (Blowfly Grass)*	Y		
358.	249	*Bromus diandrus (Great Brome)*	Y		
359.	287	*Dactylis glomerata (Cocksfoot)*	Y		
360.	299	*Deyeuxia quadriseta (Reed Bentgrass)*			
361.	353	*Eleusine indica (Crowsfoot Grass)*	Y		
362.	20019	*Lachnagrostis filiformis*			
363.	10957	*Lolium perenne x rigidum*	Y		
364.	485	*Microlaena stipoides (Weeping Grass)*			
365.	613	*Setaria verticillata (Whorled Pigeon Grass)*	Y		
Polygalaceae					
366.	4550	*Comesperma calymega (Blue-spike Milkwort)*			
367.	4552	*Comesperma confertum*			
368.	4554	*Comesperma flavum*			
369.	4578	*Polygala virgata*	Y		
Polygonaceae					
370.	2429	*Rumex acetosella (Sorrel)*	Y		
Pottiaceae					
371.	32315	*Barbula calycina*			
372.	36137	*Pseudocrossidium crinitum*			
373.	32451	*Triquetrella papillata*			
Primulaceae					
374.	6483	*Samolus junceus*			
Proteaceae					
375.	10824	*Acidonia microcarpa*			
376.	1791	*Adenanthos obovatus (Basket Flower)*			
377.	1800	*Banksia attenuata (Slender Banksia, Piara)*			
378.	32676	*Banksia biterax*			
379.	1806	*Banksia brownii (Feather-leaved Banksia)*		T	
380.	32525	*Banksia formosa (Showy Dryandra)*			
381.	11764	*Banksia gardneri var. brevidentata*			
382.	11532	*Banksia gardneri var. gardneri*			
383.	1819	*Banksia grandis (Bull Banksia, Pulgarla)*			
384.	1822	*Banksia ilicifolia (Holly-leaved Banksia)*			
385.	1830	*Banksia littoralis (Swamp Banksia, Pungura)*			
386.	1837	*Banksia occidentalis (Red Swamp Banksia)*			
387.	1841	*Banksia praemorsa (Cut-leaf Banksia)*			
388.	1844	*Banksia quercifolia (Oak-leaved Banksia)*			
389.	32085	*Banksia seneciifolia*		P4	
390.	32084	*Banksia serra (Serrate-leaved Dryandra)*		P4	
391.	12111	*Banksia sphaerocarpa var. sphaerocarpa (Fox Banksia)*			
392.	15610	*Conospermum caeruleum subsp. caeruleum*			
393.	1863	*Conospermum capitatum*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
394.	1872	*Conospermum flexuosum (Tangled Smokebush)*			
395.	17109	*Conospermum flexuosum subsp. flexuosum*			
396.	2005	*Grevillea fasciculata*			
397.	2052	*Grevillea occidentalis*			
398.	15991	*Grevillea pulchella subsp. pulchella*			
399.	2112	*Grevillea trifida*			
400.	2128	*Hakea amplexicaulis (Prickly Hakea)*			
401.	2137	*Hakea ceratophylla (Horned Leaf Hakea)*			
402.	2150	*Hakea cucullata (Hood Leaved Hakea)*			
403.	2160	*Hakea ferruginea*			
404.	2162	*Hakea florida*			
405.	2169	*Hakea lasiantha (Woolly Flowered Hakea)*			
406.	2174	*Hakea linearis*			
407.	2191	*Hakea oleifolia (Dungyn)*			
408.	2197	*Hakea prostrata (Harsh Hakea)*			
409.	2203	*Hakea ruscifolia (Candle Hakea)*			
410.	2212	*Hakea sulcata (Furrowed Hakea)*			
411.	16640	*Hakea tuberculata*			
412.	2216	*Hakea varia (Variable-leaved Hakea)*			
413.	2223	*Isopogon axillaris*			
414.	12908	*Isopogon buxifolius var. buxifolius*		P2	
415.	2226	*Isopogon cuneatus (Coneflower)*			
416.	16880	*Isopogon formosus subsp. formosus*			
417.	2233	*Isopogon longifolius*			
418.	2253	*Lambertia uniflora*			
419.	2262	*Persoonia elliptica (Spreading Snottygobble)*			
420.	2264	*Persoonia graminea*			
421.	2267	*Persoonia longifolia (Snottygobble)*			
422.	2282	*Petrophile acicularis*			
423.	2292	*Petrophile divaricata*			
424.	2293	*Petrophile diversifolia*			
425.	2306	*Petrophile rigida*			
426.	17765	*Petrophile squamata subsp. squamata*			
427.	12910	*Stirlingia seselifolia*			
428.	2318	*Stirlingia tenuifolia*			
429.	2322	*Synaphea favosa*			
430.	16859	*Synaphea incurva*		P3	
431.	16866	*Synaphea intricata*		P3	
432.	12911	*Synaphea obtusata*			
433.	2324	*Synaphea petiolaris (Synaphea)*			
434.	2326	*Synaphea polymorpha (Albany Synaphea, Pinda)*			
435.	2327	*Synaphea preissii*		P3	
Racopilaceae					
436.	32480	*Racopilum cuspidigerum var. convolutaceum*			
Restionaceae					
437.	17685	*Chaetanthus aristatus*			
438.	1065	*Chaetanthus leptocarpoides*			
439.	17687	*Chaetanthus tenellus*			
440.	17828	*Chordifex isomorphus*			
441.	17689	*Chordifex laxus*			
442.	17691	*Desmocladus fasciculatus*			
443.	19918	*Hypolaena grandiuscula*			
444.	46375	*Leptocarpus decipiens*			
445.	1080	*Leptocarpus scariosus*			
446.	46377	*Leptocarpus scoparius*			
447.	1082	*Leptocarpus tenax (Slender Twine Rush)*			
448.	46379	*Leptocarpus thysananthus*			
449.	14915	*Sporadanthus strictus*			
450.	17684	*Tremulina tremula*			
Rhamnaceae					
451.	4828	*Spyridium globulosum (Basket Bush)*			
452.	14355	*Spyridium majoranifolium*			
Rosaceae					
453.	20506	*Rubus anglocandicans*	Y		
Rubiaceae					
454.	7348	*Opercularia hispidula (Hispid Stinkweed)*			
Rutaceae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
455.	4403	*Boronia alata (Winged Boronia)*			
456.	4412	*Boronia crassipes*		P3	
457.	4413	*Boronia crenulata (Aniseed Boronia)*			
458.	11503	*Boronia crenulata subsp. crenulata var. crenulata*			
459.	4416	*Boronia denticulata*			
460.	16630	*Boronia juncea subsp. laniflora*			
461.	16631	*Boronia juncea subsp. micrantha*			
462.	4441	*Boronia spathulata (Boronia)*			
463.	4442	*Boronia stricta*			
464.	18547	*Rhadinothamnus anceps*			
Santalaceae					
465.	2335	*Choretrum lateriflorum (Dwarf Sour Bush)*			
466.	2350	*Leptomeria pauciflora (Sparse-flowered Currant Bush)*			
467.	2353	*Leptomeria scrobiculata*			
468.	2355	*Leptomeria squarrulosa*			
Sapindaceae					
469.	4757	*Dodonaea ceratocarpa*			
Selaginellaceae					
470.	6	*Selaginella gracillima (Tiny Clubmoss)*			
Sematophyllaceae					
471.	32483	*Sematophyllum subhumile var. contiguum*			
Solanaceae					
472.	11505	*Anthocercis viscosa subsp. viscosa*			
473.	7017	*Solanum laciniatum (Kangaroo Apple)*	Y		
Stylidiaceae					
474.	7676	*Levenhookia pusilla (Midget Stylewort)*			
475.	39881	*Stylidium acuminatum subsp. meridionale*			
476.	7684	*Stylidium amoenum (Lovely Triggerplant)*			
477.	7687	*Stylidium assimile (Bronze-leaved Triggerplant)*			
478.	7689	*Stylidium beaugleholei*			
479.	7695	*Stylidium caespitosum (Fly-away Triggerplant)*			
480.	7696	*Stylidium calcaratum (Book Triggerplant)*			
481.	7712	*Stylidium despectum (Dwarf Triggerplant)*			
482.	7718	*Stylidium diversifolium (Touch-me-not)*			
483.	20691	*Stylidium gloeophyllum*		P4	
484.	7735	*Stylidium hirsutum (Hairy Triggerplant)*			
485.	7742	*Stylidium inundatum (Hundreds and Thousands)*			
486.	7757	*Stylidium luteum (Yellow Triggerplant)*			
487.	25851	*Stylidium nymphaeum*			
488.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
489.	7776	*Stylidium plantagineum (Plantagenet Triggerplant)*			
490.	7784	*Stylidium pygmaeum (Pygmy Triggerplant)*			
491.	7785	*Stylidium repens (Matted Triggerplant)*			
492.	7796	*Stylidium scandens (Climbing Triggerplant)*			
493.		*Stylidium sp.*			
494.	7799	*Stylidium spathulatum (Creamy Triggerplant)*			
495.	7800	*Stylidium spinulosum (Topsy-turvy Triggerplant)*			
496.	7802	*Stylidium squamosotuberosum (Fleshy-rhizomed Trigger Plant)*			
497.	7808	*Stylidium violaceum (Violet Triggerplant)*			
Thuidiaceae					
498.	32442	*Thuidium sparsum*			
499.	32486	*Thuidium sparsum var. hastatum*			
Thymelaeaceae					
500.	5231	*Pimelea angustifolia (Narrow-leaved Pimelea)*			
501.	5239	*Pimelea clavata*			
502.	5249	*Pimelea hispida (Bristly Pimelea)*			
503.	5255	*Pimelea longiflora*			
504.	18115	*Pimelea rosea subsp. annelsii*		P3	
505.	5270	*Pimelea tinctoria*			
Xyridaceae					
506.	1144	*Xyris flexifolia*			
507.	1149	*Xyris lacera*			
508.	1150	*Xyris lanata*			

Conservation Codes

Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area

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

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely 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 10km Fauna Species Report

Created By Guest user on 21/04/2020

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 117° 43' 22" E,34° 57' 19" S
Buffer 10km
Group By Family

Family	Species	Records
Acanthizidae	6	665
Accipitridae	11	252
Actinopodidae	2	2
Aegothelidae	1	8
Amphisopodidae	1	1
Anatidae	12	547
Ancylidae	1	2
Anhingidae	1	12
Apodidae	1	2
Aracanidae	1	1
Araneidae	2	32
Ardeidae	6	169
Argiolestidae	1	2
Artamidae	2	34
Atherinidae	1	1
Baetidae	1	2
Cacatuidae	1	55
Caenidae	1	5
Campephagidae	1	85
Caprimulgidae	1	1
Carangidae	1	1
Casuariidae	1	1
Ceinidae	1	2
Ceratopogonidae	1	5
Charadriidae	5	28
Cheluidae	1	1
Chironomidae	3	43
Coenagrionidae	1	5
Columbidae	4	200
Corduliidae	1	1
Corixidae	1	3
Corvidae	2	234
Cracticidae	3	291
Cuculidae	2	73
Culicidae	1	3
Cyprididae	2	5
Cypridopsidae	1	4
Dasyuridae	2	2
Desidae	1	1
Dicruridae	4	575
Dugesiidae	1	1
Dytiscidae	1	13
Ecnomidae	1	4
Elapidae	3	5
Empididae	1	1
Estrilidae	1	166
Falconidae	4	35
Galaxiidae	2	9
Gelastocoridae	1	2
Glossiphoniidae	1	3
Gobiidae	1	3
Gomphidae	1	3
Gordiidae	1	1
Gripopterygidae	1	3
Gyrinidae	1	1
Haematopodidae	1	7
Halcyonidae	2	208
Hebridae	1	1
Hemicorduliidae	1	4
Hirundinidae	2	236
Hydrobiosidae	1	1
Hydrometridae	1	2
Hydrophilidae	1	9
Hydropsychidae	1	1
Hydroptilidae	1	2
Hylidae	2	4
Hyriidae	1	1
Iulomorphidae	1	7
Ixodidae	1	1
Lamponidae	2	2
Laridae	4	58
Lepidogalaxiidae	1	1
Leptoceridae	1	12
Leptophlebiidae	1	3
Libellulidae	1	1

Limnodynastidae	2	13
Lycosidae	1	2
Macropodidae	1	2
Maluridae	4	429
Meliphagidae	11	764
Miturgidae	1	1
Muridae	1	6
Myobatrachidae	6	32
Nannopercidae	2	16
Nemesiidae	1	1
Neosittidae	1	10
Notonectidae	1	2
Oligochaeta	1	15
Otididae	1	3
Pachycephalidae	3	200
Palaemonidae	1	7
Paradoxosomatidae	1	2
Parastacidae	1	9
Pardalotidae	3	72
Pelecanidae	1	110
Peramelidae	1	18
Percichthyidae	3	15
Perthidae	1	6
Petroicidae	3	177
Phalacrocoracidae	5	125
Phasianidae	2	22
Phreatoicidae	1	1
Physidae	1	2
Planorbidae	1	2
Podargidae	1	13
Podicipedidae	2	48
Poeciliidae	1	1
Polycentropodidae	1	1
Potoroidae	1	2
Procellariidae	1	1
Pseudocheiridae	1	106
Psittacidae	12	752
Pyralidae	1	1
Rallidae	9	178
Recurvirostridae	3	27
Scincidae	3	16
Sciomyzidae	1	1
Scolopacidae	4	15
Scolopendridae	1	1
Simuliidae	1	8
Sphaeriidae	1	1
Stratiomyidae	1	2
Sulidae	1	1
Sylviidae	2	43
Syngnathidae	1	1
Synthemistidae	1	2
Talitridae	1	1
Tarsipedidae	1	2
Telephlebiidae	1	4
Tetragnathidae	1	1
Threskiornithidae	3	167
Tipulidae	1	6
Trombidiformes	1	9
Turnicidae	2	3
Tytonidae	1	2
Veliidae	1	9
Vespertilionidae	1	1
Zoridae	1	1
Zosteropidae	1	216
TOTAL	**268**	**7874**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthizidae					
1.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
2.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
3.	24262	*Acanthiza inornata (Western Thornbill)*			
4.	25530	*Gerygone fusca (Western Gerygone)*			
5.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
6.	30948	*Smicrornis brevirostris (Weebill)*			
Accipitridae					
7.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
8.	25536	*Accipiter fasciatus (Brown Goshawk)*			
9.	24285	*Aquila audax (Wedge-tailed Eagle)*			
10.	24288	*Circus approximans (Swamp Harrier)*			
11.	24289	*Circus assimilis (Spotted Harrier)*			
12.		*Elanus axillaris*			
13.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
14.	24295	*Haliastur sphenurus (Whistling Kite)*			
15.	47965	*Hieraaetus morphnoides (Little Eagle)*			
16.		*Lophoictinia isura*			
17.	48591	*Pandion cristatus (Osprey, Eastern Osprey)*		IA	
Actinopodidae					
18.		*Missulena granulosa*			
19.		*Missulena torbayensis*			
Aegothelidae					
20.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
Amphisopodidae					
21.		*Amphisopodidae sp.*			
Anatidae					
22.	24310	*Anas castanea (Chestnut Teal)*			
23.	24312	*Anas gracilis (Grey Teal)*			
24.	24313	*Anas platyrhynchos (Mallard)*			
25.	24315	*Anas rhynchotis (Australasian Shoveler)*			
26.	24316	*Anas superciliosa (Pacific Black Duck)*			
27.	24318	*Aythya australis (Hardhead)*			
28.	24319	*Biziura lobata (Musk Duck)*			
29.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
30.	24322	*Cygnus atratus (Black Swan)*			
31.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
32.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
33.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
Ancylidae					
34.		*Ancylidae sp.*			
Anhingidae					
35.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
Apodidae					
36.	25554	*Apus pacificus (Fork-tailed Swift, Pacific Swift)*		IA	
Aracanidae					
37.		*Caprichthys gymnura*			
Araneidae					
38.		*Arachnura higginsi*			
39.		*Austracantha minax*			
Ardeidae					
40.	25558	*Ardea ibis (Cattle Egret)*			
41.	41324	*Ardea modesta (great egret, white egret)*			
42.	24341	*Ardea pacifica (White-necked Heron)*			
43.	24345	*Botaurus poiciloptilus (Australasian Bittern)*		T	
44.		*Egretta novaehollandiae*			
45.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
Argiolestidae					
46.		*Megapodagrionidae sp.*			
Artamidae					
47.	25566	*Artamus cinereus (Black-faced Woodswallow)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
48.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
Atherinidae					
49.		*Atherinosoma wallacei*			
Baetidae					
50.		*Baetidae sp.*			
Cacatuidae					
51.		*Eolophus roseicapillus*			
Caenidae					
52.		*Caenidae sp.*			
Campephagidae					
53.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
Caprimulgidae					
54.	24368	*Eurostopodus argus (Spotted Nightjar)*			
Carangidae					
55.		*Seriola lalandi*			
Casuariidae					
56.	24470	*Dromaius novaehollandiae (Emu)*			
Ceinidae					
57.		*Ceinidae sp.*			
Ceratopogonidae					
58.		*Ceratopogonidae sp.*			
Charadriidae					
59.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
60.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
61.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
62.	48135	*Thinornis rubricollis (Hooded Plover, Hooded Dotterel)*		P4	
63.	24386	*Vanellus tricolor (Banded Lapwing)*			
Cheluidae					
64.	43380	*Chelodina colliei (South-western Snake-necked Turtle)*			
Chironomidae					
65.		*Chironominae sp.*			
66.		*Orthocladiinae sp.*			
67.		*Tanypodinae sp.*			
Coenagrionidae					
68.		*Coenagrionidae sp.*			
Columbidae					
69.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
70.	24409	*Phaps chalcoptera (Common Bronzewing)*			
71.	25587	*Phaps elegans (Brush Bronzewing)*			
72.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
Corduliidae					
73.		*Corduliidae sp.*			
Corixidae					
74.		*Corixidae sp.*			
Corvidae					
75.	25592	*Corvus coronoides (Australian Raven)*			
76.	24417	*Corvus coronoides subsp. perplexus (Australian Raven)*			
Cracticidae					
77.	25595	*Cracticus tibicen (Australian Magpie)*			
78.	25596	*Cracticus torquatus (Grey Butcherbird)*			
79.	25597	*Strepera versicolor (Grey Currawong)*			
Cuculidae					
80.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
81.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
Culicidae					
82.		*Culicidae sp.*			
Cyprididae					
83.		*Candonocypris novaezelandiae*			
84.		*Ilyodromus ellipticus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Cypridopsidae					
85.		*Sarscypridopsis aculeata*			
Dasyuridae					
86.	24088	*Antechinus flavipes subsp. leucogaster (Yellow-footed Antechinus, Mardo)*			
87.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
Desidae					
88.		*Baiami torbayensis*			
Dicruridae					
89.	24443	*Grallina cyanoleuca (Magpie-lark)*			
90.	25610	*Myiagra inquieta (Restless Flycatcher)*			
91.	48096	*Rhipidura albiscapa (Grey Fantail)*			
92.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
Dugesiidae					
93.		*Dugesiidae sp.*			
Dytiscidae					
94.		*Dytiscidae sp.*			
Ecnomidae					
95.		*Ecnomidae sp.*			
Elapidae					
96.	25250	*Elapognathus coronatus (Crowned Snake)*			
97.	25252	*Notechis scutatus (Tiger Snake)*			
98.	25255	*Parasuta nigriceps*			
Empididae					
99.		*Empididae sp.*			
Estrilidae					
100.	24645	*Stagonopleura oculata (Red-eared Firetail)*			
Falconidae					
101.	25621	*Falco berigora (Brown Falcon)*			
102.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
103.	25623	*Falco longipennis (Australian Hobby)*			
104.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
Galaxiidae					
105.	34026	*Galaxiella munda (mud minnow, western dwarf galaxias)*		T	
106.	34027	*Galaxiella nigrostriata (Black-stripe Minnow, black-striped dwarf galaxias)*		T	
Gelastocoridae					
107.		*Gelastocoridae sp.*			
Glossiphoniidae					
108.		*Glossiphoniidae sp.*			
Gobiidae					
109.		*Pseudogobius olorum*			
Gomphidae					
110.		*Gomphidae sp.*			
Gordiidae					
111.		*Gordiidae sp.*			
Gripopterygidae					
112.		*Gripopterygidae sp.*			
Gyrinidae					
113.		*Gyrinidae sp.*			
Haematopodidae					
114.	25627	*Haematopus fuliginosus (Sooty Oystercatcher)*			
Halcyonidae					
115.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
116.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
Hebridae					
117.		*Hebridae sp.*			
Hemicorduliidae					
118.		*Hemicorduliidae sp.*			
Hirundinidae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
119.	24491	*Hirundo neoxena (Welcome Swallow)*			
120.	48061	*Petrochelidon nigricans (Tree Martin)*			
Hydrobiosidae					
121.		*Hydrobiosidae sp.*			
Hydrometridae					
122.		*Hydrometridae sp.*			
Hydrophilidae					
123.		*Hydrophilidae sp.*			
Hydropsychidae					
124.		*Hydropsychidae sp.*			
Hydroptilidae					
125.		*Hydroptilidae sp.*			
Hylidae					
126.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
127.	25388	*Litoria moorei (Motorbike Frog)*			
Hyriidae					
128.		*Hyriidae sp.*			
Iulomorphidae					
129.		*Atelomastix mainae*			
Ixodidae					
130.		*Ixodes australiensis*			
Lamponidae					
131.		*Lampona cylindrata*			
132.		*Lampona torbay*			Y
Laridae					
133.		*Chroicocephalus novaehollandiae*			
134.	48587	*Hydroprogne caspia (Caspian Tern)*		IA	
135.	25638	*Larus pacificus (Pacific Gull)*			
136.	48597	*Thalasseus bergii (Crested Tern)*		IA	
Lepidogalaxiidae					
137.	47983	*Lepidogalaxias salamandroides (Salamanderfish)*		T	
Leptoceridae					
138.		*Leptoceridae sp.*			
Leptophlebiidae					
139.		*Leptophlebiidae sp.*			
Libellulidae					
140.		*Libellulidae sp.*			
Limnodynastidae					
141.	25410	*Heleioporus eyrei (Moaning Frog)*			
142.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
Lycosidae					
143.		*Venatrix pullastra*			
Macropodidae					
144.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
Maluridae					
145.	25650	*Malurus elegans (Red-winged Fairy-wren)*			
146.	25654	*Malurus splendens (Splendid Fairy-wren)*			
147.	25655	*Stipiturus malachurus (Southern Emu-wren)*			
148.	24554	*Stipiturus malachurus subsp. westernensis (Southern Emu-wren)*			
Meliphagidae					
149.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
150.	24561	*Anthochaera carunculata (Red Wattlebird)*			
151.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
152.	24567	*Epthianura albifrons (White-fronted Chat)*			
153.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			
154.	25661	*Lichmera indistincta (Brown Honeyeater)*			
155.	24583	*Manorina flavigula (Yellow-throated Miner)*			
156.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
157.	24587	*Melithreptus chloropsis (Western White-naped Honeyeater)*			
158.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
159.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
Miturgidae					
160.		*Mituliodon tarantulinus*			
Muridae					
161.	24215	*Hydromys chrysogaster (Water-rat, Rakali)*		P4	
Myobatrachidae					
162.	25398	*Crinia georgiana (Quacking Frog)*			
163.	25399	*Crinia glauerti (Clicking Frog)*			
164.	25401	*Crinia pseudinsignifera (Bleating Froglet)*			
165.	25402	*Crinia subinsignifera (South Coast Froglet)*			
166.	25404	*Geocrinia leai (Ticking Frog)*			
167.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
Nannopercidae					
168.		*Edelia vittata*			
169.	34033	*Nannatherina balstoni (Balston's Pygmy Perch)*		T	
Nemesiidae					
170.		*Aname tepperi*			
Neosittidae					
171.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
Notonectidae					
172.		*Notonectidae sp.*			
Oligochaeta					
173.		*Oligochaeta sp.*			
Otididae					
174.	24610	*Ardeotis australis (Australian Bustard)*			
Pachycephalidae					
175.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
176.	25677	*Falcunculus frontatus (Crested Shrike-tit)*			
177.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
Palaemonidae					
178.		*Palaemonidae sp.*			
Paradoxosomatidae					
179.		*Akamptogonus novarae*			
Parastacidae					
180.		*Parastacidae sp.*			
Pardalotidae					
181.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
182.	24626	*Pardalotus punctatus subsp. xanthopyge (Yellow-rumped Pardalote)*			
183.	25682	*Pardalotus striatus (Striated Pardalote)*			
Pelecanidae					
184.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
Peramelidae					
185.	48588	*Isoodon fusciventer (Quenda, southwestern brown bandicoot)*		P4	
Percichthyidae					
186.		*Bostockia porosa*			
187.		*Maccullochella peelii*			Y
188.		*Nannoperca vittata*			
Perthidae					
189.		*Perthiidae sp.*			
Petroicidae					
190.	24651	*Eopsaltria australis subsp. griseogularis (Western Yellow Robin)*			
191.	24652	*Eopsaltria georgiana (White-breasted Robin)*			
192.	48066	*Petroica boodang (Scarlet Robin)*			
Phalacrocoracidae					
193.		*Microcarbo melanoleucos*			
194.	25697	*Phalacrocorax carbo (Great Cormorant)*			
195.	24666	*Phalacrocorax melanoleucos subsp. melanoleucos (Little Pied Cormorant)*			
196.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
197.	25699	*Phalacrocorax varius (Pied Cormorant)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Phasianidae					
198.	24671	*Coturnix pectoralis (Stubble Quail)*			
199.	25701	*Coturnix ypsilophora (Brown Quail)*			
Phreatoicidae					
200.		*Phreatoicidae sp.*			
Physidae					
201.		*Physidae sp.*			
Planorbidae					
202.		*Planorbidae sp.*			
Podargidae					
203.	25703	*Podargus strigoides (Tawny Frogmouth)*			
Podicipedidae					
204.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
205.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
Poeciliidae					
206.		*Gambusia affinis*			
Polycentropodidae					
207.		*Polycentropodidae sp.*			
Potoroidae					
208.	24162	*Bettongia penicillata subsp. ogilbyi (Woylie, Brush-tailed Bettong)*		T	
Procellariidae					
209.	24690	*Macronectes giganteus (Southern Giant Petrel)*		IA	
Pseudocheiridae					
210.	24166	*Pseudocheirus occidentalis (Western Ringtail Possum, ngwayir)*		T	
Psittacidae					
211.		*Barnardius zonarius*			
212.	25713	*Cacatua galerita (Sulphur-crested Cockatoo)*			
213.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
214.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black Cockatoo)*		T	
215.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)*		T	
216.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
217.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
218.	24738	*Neophema elegans (Elegant Parrot)*			
219.	24739	*Neophema petrophila (Rock Parrot)*			
220.	25720	*Platycercus icterotis (Western Rosella)*			
221.	25722	*Polytelis anthopeplus (Regent Parrot)*			
222.		*Purpureicephalus spurius*			
Pyralidae					
223.		*Pyralidae sp.*			
Rallidae					
224.	25727	*Fulica atra (Eurasian Coot)*			
225.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
226.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
227.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
228.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
229.	24769	*Porzana fluminea (Australian Spotted Crake)*			
230.	25732	*Porzana pusilla (Baillon's Crake)*			
231.	24771	*Porzana tabuensis (Spotless Crake)*			
232.	48141	*Tribonyx ventralis (Black-tailed Native-hen)*			
Recurvirostridae					
233.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
234.	25734	*Himantopus himantopus (Black-winged Stilt)*			
235.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
Scincidae					
236.	25100	*Egernia napoleonis*			
237.	25117	*Hemiergis peronii subsp. peronii*			
238.	25207	*Tiliqua rugosa subsp. rugosa*			
Sciomyzidae					
239.		*Sciomyzidae sp.*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Scolopacidae					
240.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
241.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
242.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
243.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
Scolopendridae					
244.		*Cormocephalus michaelseni*			
Simuliidae					
245.		*Simuliidae sp.*			
Sphaeriidae					
246.		*Sphaeriidae sp.*			
Stratiomyidae					
247.		*Stratiomyidae sp.*			
Sulidae					
248.	48008	*Morus serrator (Australasian Gannet)*			
Sylviidae					
249.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
250.	25758	*Megalurus gramineus (Little Grassbird)*			
Syngnathidae					
251.		*Phyllopteryx taeniolatus*			
Synthemistidae					
252.		*Synthemistidae sp.*			
Talitridae					
253.		*Talitridae sp.*			
Tarsipedidae					
254.	24167	*Tarsipes rostratus (Honey Possum, Noolbenger)*			
Telephlebiidae					
255.		*Telephlebiidae sp.*			
Tetragnathidae					
256.		*Tetragnatha caudifera*			Y
Threskiornithidae					
257.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
258.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
259.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
Tipulidae					
260.		*Tipulidae sp.*			
Trombidiformes					
261.		*Acariformes sp.*			
Turnicidae					
262.	48147	*Turnix varius (Painted Button-quail)*			
263.	24851	*Turnix velox (Little Button-quail)*			
Tytonidae					
264.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
Veliidae					
265.		*Veliidae sp.*			
Vespertilionidae					
266.	24206	*Vespadelus regulus (Southern Forest Bat)*			
Zoridae					
267.		*Argoctenus bidentatus*			
Zosteropidae					
268.	25765	*Zosterops lateralis (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

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the

Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area

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.

Australian Government
Department of the Environment and Energy

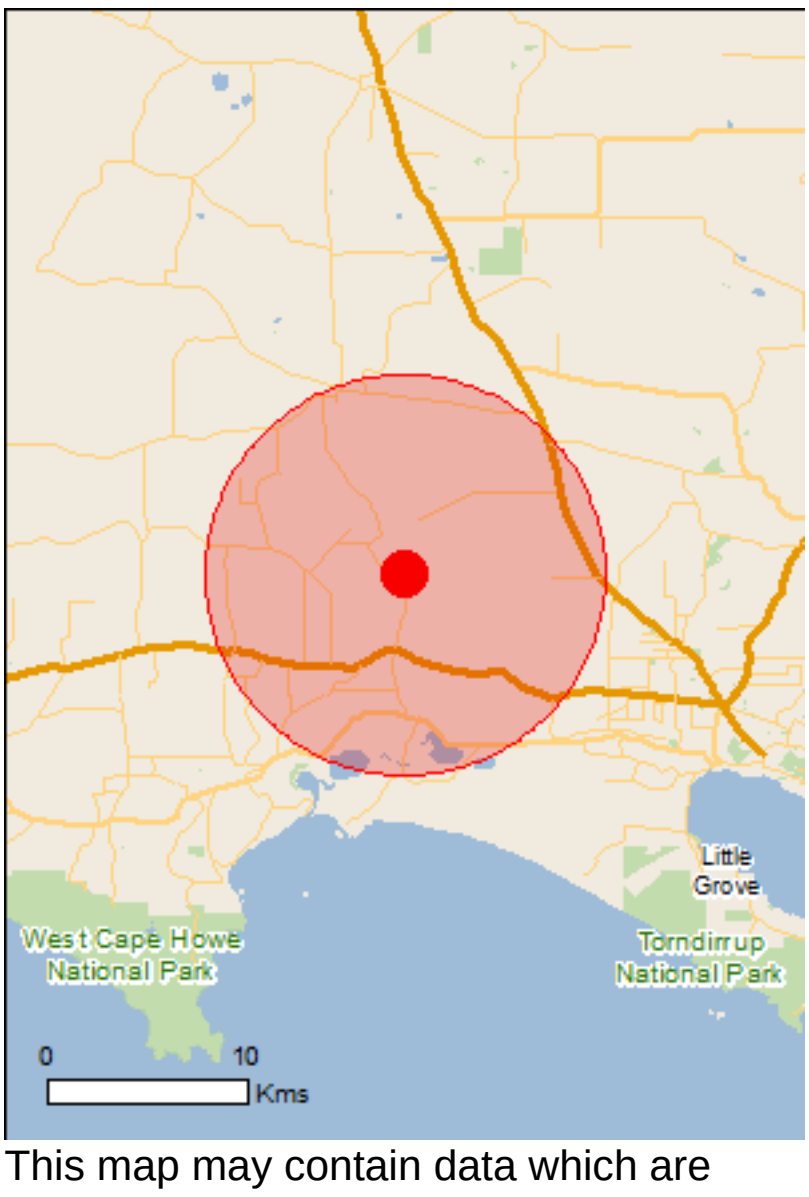
EPBC Act Protected Matters Report

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: 22/04/20 15:19:05



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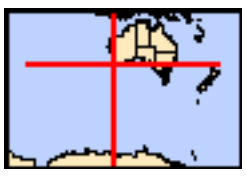

Summary

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.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	51
Listed Migratory Species:	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.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	60
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	5
Regional Forest Agreements:	1
Invasive Species:	25
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	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
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat may occur within area
Dasyornis longirostris Western Bristlebird [515]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Diomedea exulans		
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica baueri		
Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri		
Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus		
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		
Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica		
Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Phoebetria fusca		
Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Sternula nereis nereis		
Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta cauta		
Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi		
White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Fish		
Nannatherina balstoni		
Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat likely to occur within area
Insects		
Trioza barrettae		
Banksia brownii plant louse [87805]	Endangered	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Breeding known to occur within area
[Megaptera novaeangliae](#) Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat may occur within area
[Parantechinus apicalis](#) Dibbler [313]	Endangered	Species or species habitat likely to occur within area
[Pseudocheirus occidentalis](#) Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat known to occur within area
Other		
[Westralunio carteri](#) Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat likely to occur within area
Plants		
[Banksia brownii](#) Brown's Banksia, Feather-leaved Banksia [8277]	Endangered	Species or species habitat known to occur within area
[Banksia goodii](#) Good's Banksia [16727]	Vulnerable	Species or species habitat likely to occur within area
[Caladenia harringtoniae](#) Harrington's Spider-orchid, Pink Spider-orchid [56786]	Vulnerable	Species or species habitat may occur within area
[Calectasia cyanea](#) Blue Tinsel Lily [7669]	Critically Endangered	Species or species habitat likely to occur within area
[Chordifex abortivus](#) Manypeaks Rush [64868]	Endangered	Species or species habitat may occur within area
[Conostylis misera](#) Grass Conostylis [21320]	Endangered	Species or species habitat likely to occur within area
[Drakaea micrantha](#) Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
[Isopogon uncinatus](#) Albany Cone Bush, Hook-leaf Isopogon [20871]	Endangered	Species or species habitat likely to occur within area
[Kennedia glabrata](#) Northcliffe Kennedia [16452]	Vulnerable	Species or species habitat likely to occur within area
[Sphenotoma drummondii](#) Mountain Paper-heath [21160]	Endangered	Species or species habitat may occur within area
Reptiles		
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Breeding likely to occur

Name	Status	Type of Presence within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Sharks		
[Carcharias taurus (west coast population)](#) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Rhincodon typus](#) 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
Migratory Marine Birds		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardenna carneipes](#) Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
[Ardenna grisea](#) Sooty Shearwater [82651]		Species or species habitat may occur within area
[Diomedea antipodensis](#) Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Diomedea dabbenena](#) Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
[Diomedea epomophora](#) Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Diomedea exulans](#) Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Diomedea sanfordi](#) Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Hydroprogne caspia](#) Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area
[Macronectes giganteus](#) Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
[Macronectes halli](#) Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
[Phoebetria fusca](#) Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
[Thalassarche cauta](#) Shy Albatross [89224]	Vulnerable*	Foraging, feeding or

Name	Threatened	Type of Presence
		related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta alfredi 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
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		

Name	Threatened	Type of Presence
[Motacilla cinerea](#)		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#)		
Common Sandpiper [59309]		Species or species habitat known to occur within area
[Calidris acuminata](#)		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
[Calidris canutus](#)		
Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
[Calidris ferruginea](#)		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#)		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Limosa lapponica](#)		
Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
[Numenius madagascariensis](#)		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#)		
Osprey [952]		Species or species habitat known to occur within area
[Tringa nebularia](#)		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

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
Birds		
[Actitis hypoleucos](#)		
Common Sandpiper [59309]		Species or species habitat known to occur within area
[Apus pacificus](#)		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba](#)		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat may occur within area
Sterna caspia Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Thalassarche cauta Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat likely to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

REPORT ITEM DIS241 REFERS

Whales and other Cetaceans

[Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata		
Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis		
Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Breeding known to occur within area
Grampus griseus		
Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus		
Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Tursiops aduncus		
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str.		
Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Down Road	WA
Lake Powell	WA
Marbelup	WA
Phillips Brook	WA
Unnamed WA01998	WA

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	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 Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
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
Mammals		
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

Name	Status	Type of Presence within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		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, Common Broom, French Broom, Soft Broom [20126]		Species or species 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

-34.95513 117.72229

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
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-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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REPORT ITEM DIS241 REFERS

BIO DIVERSE SOLUTIONS
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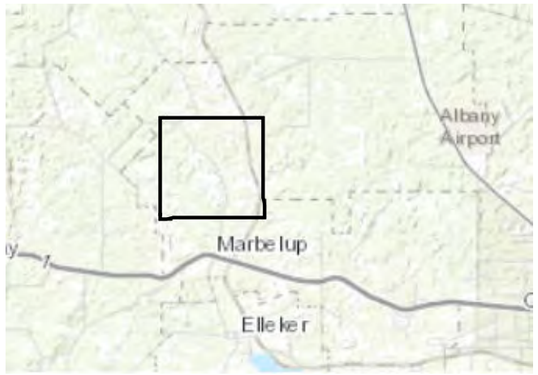

Overview Map Scale 1:250,000

Legend

- Property Boundary (Lots 3348 & 4120)
- Extraction Area
- Cadastre
- Existing Dwelling
- Separation Distance
- Pits
- 2-4m Bunding for Noise and Dust Reduction
- Fire Service Access
- Windbreaks

Buffers

- 10m Windbreak Buffer
- 50m Dam Buffer (CoA)
- 200m Adjacent Residences Buffer (CoA)
- 300m Noise & Dust Buffer to Extraction Areas (CoA)
- 500m Noise and Dust Buffer (EPA)
- 1000m Noise and Dust Buffer (EPA)

South Coast Significant Wetlands (DBCA)

- Conservation Class

Scale
1:11,750@ 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
A.D. Contractors
Lot 3348 and Lot 4120 on Deposited Plan No: 202487
Marbellup, WA 6330

Site Buffers Mapping

STATUS	*FILE*	*DATE*
FINAL	**MSC0282**	**22/10/2020**

REPORT ITEM DIS241 REFERS

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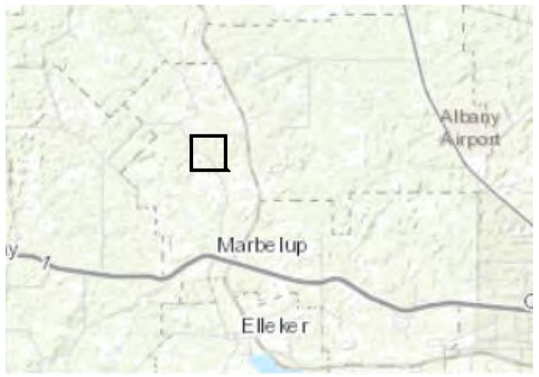

Overview Map Scale 1:250,000

Legend

- Property Boundary (Lots 3348 & 4120)
- Cadastre
- Extraction Area
- Pits
- GPS Points
- Access Routes

Staging Areas

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Scale
1:4,000 @ 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
A.D. Contractors
Lot 3348 and Lot 4120 on Deposited Plan No: 202487
Marbellup, WA 6330

Staging Plan

STATUS	*FILE*	*DATE*
FINAL	**MSC0282**	**22/10/2020**

CITY OF ALBANY LOCAL PLANNING SCHEME No. 1

Extractive Industry (Gravel) – Lots 3348 and 4120 (314) Marbelup North Road, Marbelup, P2200207

SCHEDULE OF SUBMISSIONS AND MODIFICATIONS

Note: This is a broad summary of the submissions only.

Summary of submission.	Officer Comment
Road Safety and maintenance Condition of Road, ongoing Maintenance and safety– inadequate for current volume of traffic • Marbelup North Road is a high use gravel road (used as a thoroughfare between Redmond and South Coast Hwy) • This road is one of the 5 most problematic roads within Albany • Poor drainage and inadequate camber of the road is a constant source of complaints • Road corrugates badly in summer and slippery with potholes in winter • Sometimes is only suitable for 4wd • A management plan was put in place in 2018 given the wear and tear as a result of being a thoroughfare between Redmond and South Coast Hwy • How will the City manage the degradation that truck movements will cause? • Constant maintenance - Unfair on ratepayers and other users of this road • Ongoing maintenance is a big cost to the COA. Applicant should be made to upgrade and seal the road from site to South Coast Hwy prior to the commencement of the project • Road graded twice within the last two weeks but potholes return within a day • Marbelup North Road is winding and has a series of sharp bends. • No traffic management has been attached to the proposal • No mention how operations will take into account the poor visibility and sight lines when operating fully laden 24 tonne trucks on a gravel road • Dust from road makes visibility on the road so bad you have to pull over when trucks pass	• In consultation with the City of Albany Engineers, it was determined that the proponent shall be required to contribute to the upgrade of Marbelup North Road to a sealed standard from South Coast Highway to the entrance of the site. • In addition to this the applicant will be required to arrange up to 4 additional re-gradings of Marbelup North Rd per year at the request of the City of Albany until the road is sealed. The City of Albany currently re-grades Marbelup North Rd every 2 months, and will monitor the condition of Marbelup North Rd on a monthly basis. • The operator shall liaise with the school bus operator to establish a traffic schedule to avoid potential conflict with school bus operations. • The proposal was referred to Main Roads WA who have no objection to the proposal.

CITY OF ALBANY LOCAL PLANNING SCHEME No. 1

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SCHEDULE OF SUBMISSIONS AND MODIFICATIONS
Note: This is a broad summary of the submissions only.

Summary of submission.	**Officer Comment**
How will 24 tonne trucks, 56 times per day compete with: • School buses • Through traffic on the only north south connection in the area • Agricultural enterprises • Residential traffic • Cyclists, runners and horse riders **Appropriate consideration should be given to likely risks such as:** • *Children (bus stop)* • *Stray animals (cattle)* • *Road use (speed and times)* **South Coast Hwy instersection –** Dangerous intersection – Main Roads should be consulted	
Noise, dust, proximity to dwellings resulting in health issues: **Dust** • Inadequate dust management plan and lack of detail • Located on side of ridge, bunds won't help with dust	In response to the concerns raised in relation to dust and noise, the proponent has provided updated dust and noise managements plan. These plans incorporate a number of appropriate and acceptable measures to mitigate impacts on nearby landowners.

CITY OF ALBANY LOCAL PLANNING SCHEME No. 1

Extractive Industry (Gravel) – Lots 3348 and 4120 (314) Marbelup North Road, Marbelup, P2200207

SCHEDULE OF SUBMISSIONS AND MODIFICATIONS
Note: This is a broad summary of the submissions only.

Summary of submission.	**Officer Comment**
• Dust from operation and road • Dust will impact health of nearby residents, some with lung conditions and asthma. • Dust will affect rainwater quality • Prevailing winds will constantly send dust directly to dwellings (strong north/easterly) • No detail or guarantee how dust management will be effectively implemented and monitored • Dust from gravel contains high iron oxide reacts with metal surfaces causing rust • States "*dust management <u>can be</u> implemented"…."Operation <u>generally</u> cease during times of high wind"….these terms should be changed to provide certainty'* • Operation should be ceased during high N/E winds or heavy suppression of water **<u>Noise</u>** • States operation will be undertaken Monday to Fridays only, <u>unless required.</u> • Operation on weekends and public holidays is not acceptable. • Impact on nearby landowners. • Noise will be exacerbated in a gully. • There is no natural or artificial screening to reduce noise impacts *States that "Noise will be the largest consideration of the project from crushing and screening operations". Further "it is expected that operations noise will not be louder than the surrounding agricultural and forestry operations".* This statement is refuted in regards to the impact to houses less than 280m – requests evidence of this or retract statement. Noise management plan insufficient for the following reasons:	The EPA Separation Distances between Industrial and Sensitive Land Uses (draft) 2015, is not the current and endorsed document so the standing provision within the 2005 endorsed guidelines apply. The current and endorsed guidelines pertaining to sensitive land uses and setback requirements are the Environmental Protection Authority's Separation Distances between Industrial and Sensitive Land Uses Guidelines 2005, which do not set out a specific buffer for this type of extraction, and it is assessed case by case. The Extractive Industries and Mining Policy requires that buffer distances are to be in accordance with the setbacks outlined within the Environmental Protection Authority requirements. Although the Environmental Protection Authority's Separation Distances between Industrial and Sensitive Land Uses guidelines (2005) do not set out a specific buffer for this type of extraction, and it is assessed case by case, the City of Albany Extractive Industries and Mining policy and Local Planning Scheme No. 1 state 200 metres should be achieved between dwellings not on the subject property and excavation areas. Although the proposed setbacks exceeded the required 200 metre setback within the City of Albany Extractive Industries and Mining Policy, in response to the concerns raised during the

CITY OF ALBANY LOCAL PLANNING SCHEME No. 1

Extractive Industry (Gravel) – Lots 3348 and 4120 (314) Marbelup North Road, Marbelup, P2200207

SCHEDULE OF SUBMISSIONS AND MODIFICATIONS
Note: This is a broad summary of the submissions only.

Summary of submission.	**Officer Comment**
Inconsistent with CoA Policy- Class 2 pits require a description of measures to be taken to comply with the EPA Noise Regulations 1997 and is applicable where a residence is within 300m of an extraction site Inconsistent with EPA Separation Distances between Industrial and Sensitive Land Uses (draft) 2015: Guideline requires buffers of 500m to 1000m. Does not comply or follow measures within this guideline. State Planning Policy 2.4 – Basic Raw Materials Policy and EPA Guidelines (draft) are over-arching policy to guide the planning framework in WA. This has not been referenced within the application. The following have not been addressed: • "*The proposed activity will not cause disturbance to the amenity of the area"* • *"The site has safe access to major roads, and existing roads are in good condition.* • *The access roads proposed are suitable for the volume of traffic and type of heavy "The site is not in a visually significant location, such as on a ridge, or visible from major roads and will not have a negative visual impact on major roads, scenic areas or adjoining properties"* • *"The site provides adequate separation distance… separation distances should be 300m to 1,000m"* *How will noise be monitored and always kept to the safe level?* *Residents shouldn't have to complain and believe better noise management should be put in place*	submission period, the applicant has since revised the plan and increased the closest setback to 305 metres; The *State Planning Policy 2.4 – Basic Raw Materials Guidelines (2018)* incorporates a site selection checklist intended on guiding the applicant during the site selection process. Within this checklist it recommends that adequate setbacks for Extractive Industries from sensitive lands uses should be between 300 metres and 1000 metres. The guidelines however state that local government assessment and approval should be based on relevant local planning scheme provisions, polies or strategies where applicable. In this instance, the City of Albany Extractive Industries and Mining Policy and Local Planning Scheme No. 1 both require a setback of 200 metres from a residence not located on the subject lot. The closest dwelling not on the subject lot is 305 metres, therefore it is considered to comply with the applicable provisions. The proposed operation times would generally be between 7.00am to 5.00pm on weekdays (Monday to Friday). The applicant has clarified that in times of high demand, there may be operations on Saturdays between 8.30am to 1.00pm. There would be no operations of Sundays or public holidays. The

CITY OF ALBANY LOCAL PLANNING SCHEME No. 1

Extractive Industry (Gravel) – Lots 3348 and 4120 (314) Marbelup North Road, Marbelup, P2200207

SCHEDULE OF SUBMISSIONS AND MODIFICATIONS
Note: This is a broad summary of the submissions only.

Summary of submission.	Officer Comment
Proximity to dwellings. Does not meet the EPA buffer CoA Policy requires EPA buffers to be accommodated within the boundaries of the subject property Buffer not contained within the site boundaries. One property/dwelling?? Is 279m, one 440m, and another 385m. All homes within the EPA 500m buffer Seeks clarification how this will be addressed	proposed hours are consistent with the hours generally permitted. Extractive industries are subject to an annual inspection prior to the licence renewal. This process ensures work is being undertaken in accordance with the approved plan and planning conditions, and that rehabilitation work is correctly carried out. If a breach is found, the licence is not renewed until such a time as the breach has been rectified. It should be noted that the lack of compliance, if any, is not a relevant planning matter for consideration, each application must be considered on its own merit in good faith. The Department of Health state that unless adequately treated, rainwater is not reliably safe to drink and it is almost impossible to completely impossible to completely protect rainwater from contamination. However, our advice is that installing screens, filters and first flush devices will reduce contamination if people are using rainwater for this purpose.
Impact on the character and visual amenity of the area • CoA Policy states that an extractive industry should not be located within visually obtrusive locations (locations obvious from major roads, townsites and tourist nodes). • Residents contend Marbelup North Road is a major road.	The subject site is zoned General Agriculture. Local Planning Scheme No. 1 classifies an extractive industry as a use which can be considered within this zone. An extractive industry is a common use on Priority and General Agriculture zoned land. Furthermore, in terms of compliance, the proposal meets the

CITY OF ALBANY LOCAL PLANNING SCHEME No. 1

Extractive Industry (Gravel) – Lots 3348 and 4120 (314) Marbelup North Road, Marbelup, P2200207

SCHEDULE OF SUBMISSIONS AND MODIFICATIONS
Note: This is a broad summary of the submissions only.

Summary of submission.	Officer Comment
• Located on the side of a ridge • Will have a high visual impact on residents overlooking the valley	requirements of the Extractive Industry and Mining Local Planning Policy. Marbelup North Road is not considered a major road or visually sensitive area. In terms visual amenity, the staging and rehabilitation of areas will serve to reduce the overall visual impact of the proposed works. Extractive industries are subject to an annual licence renewal inspection to ensure that rehabilitation work is correctly carried out.
Environmental concerns **Waterways:** Located within South West Significant Wetlands defined by the Dept of Biodiversity Conservation and Attractions (DBCA) and sites within the Marbelup Brook Catchment area Priority water catchment area **Weeds:** The roadside vegetation was in good condition and dieback free has now been compromised and damaged due to grading spreading weeds including watsonias and golden wattles	The proposal was referred to the Department of Water and Environmental Regulation who are the body responsible for assessing the risk to the waterway. They have no objections to the proposal as the separation distance to the Brook and the stormwater management measures of the Environmental Assessment report were sufficient, however recommended the following advice; • *It is recommended that a minimum of 2 metres of undisturbed soil profile is required as a buffer between the base of the excavated area and the maximum water table level.* • *DWER supports the proposal that no fuels, oils and chemicals will be stored on the site. Refuelling to be undertaken in a designated area with spill kits available Furthermore, routine servicing and washdown of*

CITY OF ALBANY LOCAL PLANNING SCHEME No. 1

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SCHEDULE OF SUBMISSIONS AND MODIFICATIONS
Note: This is a broad summary of the submissions only.

Summary of submission.	Officer Comment
	operating equipment is unacceptable in a P2 area. Running repairs may be conducted if effective measures are in place to prevent fuel, lubricants, coolant and hydraulic fluid losses to the environment. • *The applicant may require a works approval to construct/install the equipment (mobile or otherwise) and a licence or registration to operate. It should be noted that DWERs determination of production or design capacity may be influenced by a planning approval that restricts capacity (such as constraining hours of operation).* The applicant has provided a satisfactory on-site Weed Management plan.
<u>Life of pit</u> Requests clarification given the calculations	The applicant has stated that it is estimated that an average amount of 30,000 tonnes per year will be extracted over a period of 7-8 years. In times of high demand, it is anticipated a maximum of 50,000 tonnes per year would be extracted, however this is dependent upon industry demand; During periods of high demand, the applicant has estimated that one stage will be exhausted every 12 months, therefore it is anticipated that the life of the pit will be 7-8 years; The applicant is applying for an 8 year approval. All extraction must be contained within the approved area indicated on the

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SCHEDULE OF SUBMISSIONS AND MODIFICATIONS
Note: This is a broad summary of the submissions only.

Summary of submission.	Officer Comment
	site plan. New areas outside of the approved area, or an extension beyond the 8 year period will be subject to a new approval.
Value of property	Property value is not a matter to be considered under the Planning Regulations 2015;
Inconsistencies within the report Report states: *"3 to 4 trucks per day (6-7 trips per day) Unlikely to occur more than 3-4 times per year". This equals 1 truck every 10.7 minutes for 10 hours per day.* Based on the operational plan, there will be average of 40,000 tonnes extracted per year Project life = 8 years Annual extraction max = 50,000 tonnes Using 24 tonne trucks (14m3) = 2083 loads per year 251 operational days per year (excluding weekends and public holidays) = 16.6 movements per day (8.3 trucks per day) Note: Using 15 tonne trucks (9m3) further increases traffic movements Why has the report:	The proposed types of trucks used during the operation are 6-wheeler trucks with an approximate capacity of 15 tonnes and semi-trailers with an approximate capacity of 24 tonnes, however volumes vary depending on moisture and density of the gravel extracted; The number of truck movements will vary dependent on demand, however on average it is expected that there will be four truckloads per day, which equates to eight truck movements per day. During times of high demand, it is estimated that four trucks would make up to seven trips per day (this equates to 56 movements). During low demand times, it is likely that 0 – 2 movements per day will occur;

CITY OF ALBANY LOCAL PLANNING SCHEME No. 1

Extractive Industry (Gravel) – Lots 3348 and 4120 (314) Marbelup North Road, Marbelup, P2200207

SCHEDULE OF SUBMISSIONS AND MODIFICATIONS
Note: This is a broad summary of the submissions only.

Summary of submission.	**Officer Comment**
• Used m3 not tonnes? • Indicated 3-4 trucks, 6-7 per day, not 56 movements per day? • Stated that when demand is low only one truck will enter and exit the site per day when this is not correct?	
Consultation process: Lack of consultation by applicant prior to submitting to the City 1500m radius insufficient consultation by the City	Concerns were raised in relation to the lack of consultation by the applicant prior to the proposal being submitted, and that the 1500 metre consultation radius undertaken by the City was considered insufficient. Under clause 64 of the Planning and Development (Local Planning Schemes) Regulations 2015, the proposal was required to be advertised for a period of 14 days. The proposal was advertised for a period of 19 days. Nearby landowners were notified directly by letter, and a notice was placed on the City of Albany website.

City of Albany

Business Case

Renewable Energy Installation on City facilities

Document Approval	
Document Development Officer:	**Document Owner:** *(Member of EMT)*
Environmental Sustainability Officer	Executive Director Infrastructure, Development and Environment
Document Control	
File Number - Document Type:	
Synergy Reference Number:	(Created when cover sheet is created in Synergy Records Module)
Status of Document:	Draft
Quality Assurance:	Executive Management Team
Distribution:	

CONTENTS

1. EXECUTIVE SUMMARY

The City of Albany is transitioning to a cleaner energy future. Wind energy generation in Albany has been successful, producing up to 70% of Albany's energy requirements, however thermal energy from fossil fuel coal fire stations remains Western Australia's dominate energy source.

To increase the City's renewable energy commitment, two integrated renewable energy feasibility studies (2019) were completed to identify potential sites for renewable energy generation technology as well as energy efficiency and tariff optimisation opportunities. Integrated energy systems such as battery storage and 'Virtual Power Plant' options have been considered within the feasibility studies, however are not financially viable at the time of this report.

In line with the recommendations of the two feasibility studies, energy efficiency initiatives, tariff optimisation and load data anomalies, which were implemented in early 202 in conjunction with Synergy's contestable energy agreement, and the new tariff rates have been applied with an estimated savings of $42,000. Energy efficiency options such as LED lighting have been included in the long-term financial plan.

Roof top solar Photovoltaic (PV) systems recommendations from the feasibility studies form the scope of this business case, to ensure long-term sustainable and viable implementation, have been allocated over three phases. Phase one of the project is the installation of roof top solar PV on 11 city owned and operated buildings. Phase two is the installation of roof top solar PV on City of Albany sites that are owned and leased, and phase three will include additional renewable energy storage and distributed energy such as battery storage and VPP options.

At the time of this report, there is currently no funding available for renewable energy installations to Local Governments. It is estimated that phase one of the solar installation project will cost $1.3 million pre small-scale technology certificate credits (STC's), and will be implemented over a 5 year period to ensure that it aligns with the long term financial plan and the roof replacement program, with an estimated payback period of between 5 and 6 years.

This project aligns with the City of Albany Community Strategic Plan for a Clean, Green & Sustainable City, the Climate Change Action Declaration (2020), the Carbon Footprint Reduction Strategy (2014) and the Corporate Energy Plan (to be released early 2021).

2. INTRODUCTION

The proposed project aims to assist the City of Albany to transition City operations to 100% renewable energy by 2030.

The business case has been developed to support the installation on solar photovoltaic systems as well as other tariff optimisation and energy efficiency options for City of Albany owned buildings.

The City of Albany has been proactive in installing three PV systems since the adoption of the Carbon Footprint Reduction Strategy in 2014, with an estimated annual savings of $XX.

This project has been developed in accordance with initial energy feasibility studies

3. BACKGROUND

Energy generation and distribution in Western Australia is undergoing rapid transformation. Traditionally what has been fossil fuel based, is moving to more renewable energy sources such as wind, solar, wave and hydrogen, in an effort to decarbonise the energy market in line with global emission reduction targets.

Linear supply chains of generation, transmission, distribution and retail are no longer sustainable. To manage the changes in renewable energy generation and the phase out of fossil fuels the Western Australian government released the 'Energy Transformation Strategy' (2019) and the Distributed Energy Resources Roadmap (DER Roadmap). Outlines the path to achieving a safe, reliable and efficient electricity system to achieve net zero emissions by 2050.

Albany is home to 18 wind turbines, with a generating capacity of 35.4MW, supplying around 80 percent of Albany's annual electricity requirements. A $3.75 million grant from the State Government saw the development of the Wave Energy Research Centre (WERC) facility in Albany. The WERC facility undertakes offshore marine renewable energy research and technology with wave energy potentially providing a viable contribution to Western Australia's energy mix.

The City of Albany Carbon Footprint Reduction Strategy (2014) aims to provide a framework to assist in the reduction of carbon emissions and energy consumption. Annual energy expenditure has declined in the last 3 years with the installation of three rooftop solar PV arrays (2015-2017) totalling 55kW, and the biofuel energy system (installed December 2018) at the Albany Leisure and Aquatic Centre. The City has saved an estimated $92,000 on energy costs for 2019/20 financial year.

In April 2018, Council unanimously resolved that the City of Albany continue to explore renewable energy generation opportunities to become self-supporting in its corporate energy requirements. As a result, two integrated renewable energy feasibility studies undertaken in 2019 by independent consultants Blue Sky

Renewables (BSR) and Thales New Energy (TNE). Investigations identified potential savings through energy efficiencies opportunities, tariff optimisation, and renewable energy solutions.

The City of Albany in October 2020 unanimously adopted the City of Albany Climate Change Action Declaration in collaboration with the Albany Youth Advisory Council. The Declaration commits to developing GHG emission reduction targets and the development of a Corporate Energy Plan.

4. FEASIBILITY STUDIES

Two feasibility studies were undertaken as part this project.

4.1. . BLUE SKY RENEWABLES (BSR) REVIEW

BSR were engaged to undertake an energy assessment at the Albany Leisure and Aquatic Centre, which included:

- energy usage/efficiency review,
- renewable energy generation (including biofuel) and
- thermal energy supply.

Other considerations included, as part of this project was a possible future 50m pool expansion.

BSR's Integrated Renewable Energy System Feasibility Study analysed energy use data, and made recommendations on energy efficiency opportunities and alternative renewable energy generation options. The report identified a range of operational energy efficiency initiatives to reduce energy usage by 30-40%. Recommendation have been listed in Table 1, however there is currently works scheduled for the 2020/21 financial year for boiler upgrades, roof replacement and LED lighting upgrades in the ALAC carpark totalling $280,000.

Items marked * have been implemented, but due to the impacts of COVID-19 it is unclear what impacts these savings will have had, however staff will continue to monitor to assess against the planned savings.

Item	Recommendation	Financial Planning	Cost
Reclaim unit	Decommission	Capital Works	TBC
HVAC*	Reduce usage in evenings	Procedure	$0

Item	Recommendation	Financial Planning	Cost
Air Temp*	Lower air temp	Procedure	$0
LED Lighting Replacements	Replace lighting	Capital Works	$60,000
Leisure pool	Install variable frequency drive to leisure pool	Further Investigation required	TBC
Hot water heating systems	Install solar hot water systems to the stadium ablution blocks	Capital Works	$20,000
Roof Top Solar PV	Install 300 kW system	Capital Works	$750,000
Expansion of Biomass system	110- 120kW system	Contract negotiations	TBC
Energy Monitoring Program	Recommended energy monitoring platform	Planning (Sustainability program)	$0

Table 1: Recommendations from BSR Review for ALAC

4.2. THALES NEW ENERGY (TNE) REVIEW

TNE were engaged to undertake a building energy review on City owned and operated buildings as shown in table 2 (excludes ALAC). The review included:

- detailed review of electricity loads and load profiles
- identified operational load anomalies
- solar PV and battery systems potential
- potential City 'Virtual Power Plant' (VPP) capabilities
- Leased buildings potential to generate additional revenue

Site	Number of Buildings
Waste Facility	4
Heritage Park	6
Albany Airport	4
Central CBD	13
Vancouver Arts Centre	5
Centennial Precinct	4
Mercer Road Administration & Depot	5
Middleton Beach	4
Emu Point	5
Lockyer	2
Spencer Park	2
Frenchman's Bay	1
Total	**55**

Table 2: Breakdown of City Buildings included in TNE assessment

VPP is a network of decentralized, medium-scale power generating units such as solar to enable flexible power consumers and storage systems. The interconnected units are dispatched through the central control room of the VPP to relieve the load on the grid by distributing the power generated by the individual during peak load periods. The image below demonstrates a simple overview of a VPP scenario.

The contract with TNE, awarded April 2019, was terminated in March 2020 after TNE failed to submit their final report by the December 31st deadline or the 31st January extension deadline. Although the final report was never received, building assessments were obtained via presentations and the building data spreadsheet.

The TNE review made the following recommendations:

- Energy tariff/market negotiations with power provider to save money
- Solar system finance and delivery
- Solar PV power sales to tenants of leased buildings

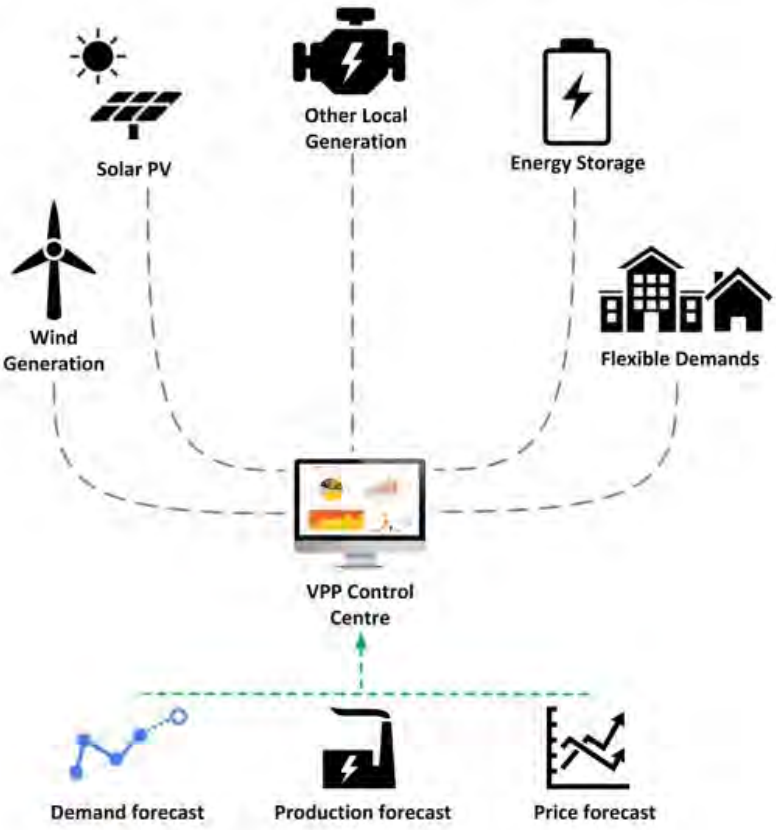

Image 1. Demonstration of Virtual Power Plant

TNE notes that VPP and battery storage options are not financially viable due to limited roof capacity to generate excess energy, and the cost of battery storage costs prohibitive. It is suggested that with a rapidly changing market, battery storage may become a more affordable option over the next 5-10years.

Building/Asset	Load kWh/y	Customer Status	Current Tariff	Annual Electricity Bill	New Tariff	New Bill after new Tariff	Annual Savings from new Tariff
Foundation Park/Toilet	22,200	Non-Contestable	L1	$6,795	R1 or better	$6,037	$758
Surf Life Saving Club	47,800	Non-Contestable	L1	$13,885	R1 or better	$11,923	$1,962
Centennial Cricket	165,000	Contestable	L1	$46,149	R1 or better	$42,695	$3,454

Building/Asset	Load kWh/y	Customer Status	Current Tariff	Annual Electricity Bill	New Tariff	New Bill after new Tariff	Annual Savings from new Tariff
Centennial Stadium	90,236	Contestable	L1	$25,629	R1 or better	$21,376	$4,253
North Road Admin	228,000	Contestable	L1	$63,977	R1 or better	$55,876	$8,101
Mercer Rd Depot	53,107	Contestable	L1	$15,351	R1 or better	$12,497	$2,854
Emu Point Restaurant	67,100	Contestable	BusFlex	$20,966	R1 or better	$17,834	$3,132
MRRF Facility	75,205	Contestable	BusFlex	$22,334	R1 or better	$21,498	$836
ANZAC Centre	121,817	Contestable	L3	$48,162	R3 or better	$39,993	$8,169
Albany Airport	231,362	Contestable	BusFlex	$57,026	New Rate	$50,481	$6,545
Total Savings:							$40,064

Table 3: Potential Tariff Savings

Since the completion of the review, tariff optimisation negotiations with Synergy have been successful. Some of the cost saving has been realised but the exact extent is unclear at present and will be monitored.

Buildings assessed	No. Solar systems	Current load	Est PV system size	Est. PV system cost	Annual PV Energy (1 year)	Current annual electricity bill	Est new bill with solar	Annual savings	Avg payback period
55	38	1,627,825 kWh/y	689 kW	$695,000	837,250	$453,500	$254,350	$198,000	4 years

Table 4: TNE Solar PV Summary

4. DISCUSSION

This business case investigates the installation of renewable power system (PV) on City Facilities. It considers the findings of the two reports provided by BSR and TNE.

The project has been divided into three phases:

Phase one - Installation of solar PV on City owned and operated buildings.

Phase two – Installation of solar PV on City owned and leased buildings.

Phase three – VPP and storage batteries.

It should be noted that the installation of the two solar hot water systems at ALAC is excluded from this business case and will be progressed separately as part of the Capital Works Program process.

4.1. PHASE 1

The buildings included in this phase are as follows:

- Albany Airport Terminal Building
- ALAC
- Aware Centre
- Fossickers Tip Shop
- Library
- Mercer Road Depot (expansion)
- Mercer Road Offices
- National ANZAC Centre
- North Road Administration Centre (expansion)
- Vancouver Arts Centre
- Weigh Bridge

All these buildings are City of Albany owned/operated and have sufficient building load scale and roof suitability. As part of the installation process small-scale technology, certificate (STC) pricing has been included. STC's are an environmental credit that is part of the Federal Government's Small-scale Renewable Energy Scheme (SRES). The STC scheme has been in operation since 2001 and were designed to support the uptake of small-scale renewable energy for households and small businesses. The value of renewable energy certificate fluctuates according to market value at the time of installation; at the time of this report was around 33 cents kW. There is an opportunity for the city to use the STC to reduce the cost of the system or sell them later and put that money into a reserve account for other energy efficiency and renewable projects.

Building	System Size kW	Cost *(pre STC+ GST)*	Cost (STC 33 c kW) + GST	Est Savings *Per year + GST*	Payback period years
2020-21					
Library	31	$49,299	$32,593	$9,582	3.4
Sub total	***31***	***$49,299***	***$32,593***	***$9,582***	
2021-22					
Albany Airport Terminal Building	88	$129,209	$91,360	$29,288	3.1
Albany Leisure & Aquatic Centre	300	$750,000	$510,000	$124,000	4.1
Sub Total	***388***	***$879,209***	***$601,360***	***$153,288***	
2022-23					
National ANZAC Centre	73.4	$113,777	$82,212	$28,615	2.9
North Road Administration Centre (expansion)	70	$112,865	$82,470	$27,833	3.0
Sub Total	***143.4***	***$226,642***	***$164,682***	***$56,448***	
2023-24					
Fossickers Tip Shop	6.8	$9, 572	$6,830	$1,878	3.6
Aware Centre	6	$8,456	$5,826	$1,613	3.6
Weigh Bridge	6.8	$6,830	$6,830	$1,873	3.6
Mercer Road Depot (expansion)	20	$40,167	$40,167	$7,759	5.2
Sub Total	***39.6***	***$65,025***	***$59,653***	***$13,123***	
2024-25					
Vancouver Arts Centre	12.2	$13,967	$13,967	$3,268	4.3
Mercer Road Office	30	$30,130	$30,130	$6,756	4.5
Sub Total	***42.2***	***$44,097***	***$44,097***	***$10,024***	
Total	**644.2**	**$1,264,272**	**$902,385**	**$242,465**	

Table 5: The proposed phase one solar PV installation program

An installation programme has been devised and is included in Table 5. This table assumes that the PV system will be installed as early as possible taking into consideration such items as planned roof replacements and works scheduled in the current ten-year financial plan. The works required have been broken down into financial years. Costs included in the table exclude any Project Management costs, structural engineering or western power approvals.

4.2. PHASE 2 AND 3

Following the Elected Members Strategic Workshop and the Sustainable Buildings Working Group Meetings it has been agreed by all parties that phases 2 and 3 of the solar installation program are yet to be determined due to gaps in the data and therefore will not form part of this business case. For phase two there needs to be further investigation into the cost of changes to current lease agreements and the viability of the VPP energy systems over the next 5 years. For phase three the information provided by TNE

lacks costing details of VPP systems and battery storage items in the load data analysis. It is envisaged that with the changes to the current state energy supply that these options may become more financially viable for local governments similar to what is being rolled out as part of the McGowan Governments Schools Virtual Power Plant Pilot Project.

5. FINANCING

Phase one of the Solar PV System installations project across **11 City of Albany building** assets including the Albany Leisure and Aquatic Centre, will cost approximately $1.3 million (pre-STC discount) including GST. The five-year project commencing 2020/21 will be completed in line with the planned roof replace schedule and the 10-year financial plan (subject to council approval).

As part of phase 1 the first 31kW solar system is scheduled to be installed at the Library/Visitors Centre early 2021 at the completion of the Library upgrades as part of 2020/21 Capital Works Program ($150k allocated).

6. RISK ASSESSMENT

The project risk is defined here as those conditions that will affect the schedule and cost baseline of the implementation of the Project.

6.1. SMALL-SCALE RENEWABLE ENERGY SCHEME (STC)

The Small-scale Renewable Energy Scheme is a financial incentive for individuals and small businesses to install eligible small-scale renewable energy systems (under 100 kW) such as solar panel systems, small-scale wind systems, small-scale hydro systems, solar water heaters and air source heat pumps. It does this through the creation of STC's which Renewable Energy Target liable entities have a legal obligation to buy and submit to the Clean Energy Regulator on a quarterly basis. STC's are provided 'up front' for the systems expected power generation over a 15-year period or, from 2017, from the installation year until 2030 when the scheme ends.

The Clean Energy Regulator's 2019/20 STC rate is currently 33-36 cents a kW (market dependant) and has been forecasted to remain steady until 2023.

6.2. TARIFF RATE CHANGES

The Synergy Business Plan (L1) tariff is a Government regulated electricity tariff with no fixed term. It is suitable for businesses that use energy all day, every day or during standard operating hours. Not all City of Albany buildings are included under the L1 tariff rate; however, it is indicative of changes to the pricing schedules with the exception of those that the City negotiates as part of the Contestable Energy Agreement with Synergy.

With the exception of the 2018-19 financial year, synergy's tariff rate have increased by 1.5%-2% (see table 6). Due to COVID-19 and the new Western Australian Energy Transformation Strategy (2020), future tariff rate increases is unclear.

2018-19 increased by 7%	
L1 Tariff	*Prices (Inc. GST)*
Fixed charge	$1.7154 per day
Variable charge (First 1650 units per day)	26.69 cents per unit
Variable charge (More than 1650 units per day)	30.10 cents per unit
2019-20 increased by 1.75%	
L1 Tariff	*Prices (Inc. GST)*
Fixed charge	$1.778 per day
Variable charge (First 1650 units per day)	27.682 cents per unit
Variable charge (More than 1650 units per day)	31.21 cents per unit
2020-21 increased by 1.75%	
L1 Tariff	*Prices (Inc. GST)*
Fixed charge	$1.8447 per day
Variable charge (First 1650 units per day)	28.7065 cents per unit
Variable charge (More than 1650 units per day)	32.3656 cents per unit

Table 6. Synergy tariff rate charges 2018-2021

6.3. ADDITIONAL PROJECT COSTS

PV installation costs as listed in table 5, exclude any project management costs, structural engineering reports (if required), planning and building approvals or western power approvals. As part of the capital works program each building will be re-evaluated and costs updated in accordance with the current market.

The Albany Leisure and Aquatic Centre PV install will be more complex as it will be greater than 150kW, Enquiry fee - $3,500 plus GST involves a high-level feasibility assessment, which usually determines whether there are any network impediments to the generator connecting. If there is sufficient hosting capacity. Application fee- $5,000 plus GST to conduct various studies and prepare Technical Schedules for the generator, network studies, a request to commission and a request for approval to operate. This application process will be the responsibility of the solar installer contractor.

Due to project management costs and Western Power approvals processes, all pricing for final installation has been modelled in accordance with the cost schedule on table 5 in line with the pre-STC rebates.

6.4. GRANT FUNDING

At the time of this report, no grant funding was available to local governments in Western Australia to install commercial scale solar PV systems. The introduction of the Energy Transformation Strategy (2020) and the DER roadmap, it anticipated that there might be future opportunities for the City of Albany to obtain funding for battery storage installation and VPP platforms which would assist in phase three of the implementation plan.

7. Social and Economic Benefits

The City's proposed solar PV system project aims to achieve the following objectives and outcomes:

- Business and Employment: Continued support to local businesses
- Community: demonstrate to the community that the City is committed to ensuring that it transitions to renewable energy and reduce the costs of energy usage at city of Albany facilities
- Environment: reduce GHG emissions and ecological footprint

Overall, the expected key benefits are as follows:

Description		Key Benefits
Local Business	Local jobs	▪ utilisation of local companies and personnel ▪ stimulate the local economy
Environment	Reduce carbon footprint and fossil fuel use	▪ improved air quality ▪ reduce the dependency on fossil fuel
Community	Community strategic Plan 'Clean, Green & Sustainable'	▪ Lower energy bills

8. Summary

To increase the City's renewable energy commitment in line with the City of Albany's aspiration to become Clean, Green and Sustainable, to achieve 100% corporate renewable energy, two integrated renewable energy feasibility studies, conducted in 2019.

The integrated renewable energy feasibility studies identified a number of energy reduction and renewable energy generation initiatives including energy efficiency, tariff optimisation and the installation of roof top solar PV. Energy efficiency recommendations such as lighting upgrades have already been included as part of the City's asset management plans and associated replacement schedules, and tariff

optimisation were completed early 2020 as part of the renewal of the contestable site agreements, in consultation with Synergy and the City's finance team.

It is estimated that a savings of $140,000 per year from the tariff optimisation and investigation into load data anomalies are realised. Total costs savings will be reviewed again at the conclusion of the 2021/22 financial year once a full 12 months has been completed.

Stand-alone solar PV systems were the most viable renewable energy technologies for City building assets. VPP and battery storage options was not financially viable in the current market and maybe considered again as phase two or three of the project.

There is no external funding available at the time of this report, however there has been some significant changes in the Western Australian energy sector as part the state government COVID recovery plan. Financing of the Solar PV systems has been scheduled as part of the 10-year plan over a 5-year period at a cost of $1.3 million pre STC discounts plus GST. Annual maintenance costs for bi-annual electrical inspections and panel cleaning, is approximately $6,000 and will be included as part of the current electrical maintenance contract