

**TALLANGATTA FARM
LOTS 50 AND 1456 GREAT NORTHERN HIGHWAY, MUCHEA**

**ENVIRONMENTAL ASSESSMENT
AND MANAGEMENT STRATEGY**

Prepared for

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1.0 INTRODUCTION

1.1 Background

Tallangatta Farm (Lots 50 and 1456 Great Northern Highway, Muchea) is located on the corner of Muchea East Road and Great Northern Highway, Muchea. Tallangatta Beef Pty Ltd, the owner of Tallangatta Farm, has applied to the Shire of Chittering for the property to be rezoned from Agricultural Resource to General Industry. The *Muchea Industrial Park Structure Plan* (MIPSP) shows Tallangatta as part of Precinct 2 (General Industry Core) of the Muchea Industrial Park. Figure 1 shows the location of the site within the draft Muchea Industrial Park Structure Plan area.

The total area of Tallangatta is 213 hectares. Figure 2 shows the boundaries of the site. Figure 3 shows a preliminary conceptual plan of subdivision.

The Local Structure Plan for Tallangatta has been submitted to the Department of Planning, Lands & Heritage and the Shire of Chittering, and is currently being considered by these agencies.

1.2 Scope of the EAMS

The scope of this Environmental Assessment & Management Strategy (EAMS) is to:

- document the existing environment of the site;
- briefly describe the proposed development;
- examine the potential impacts of development;
- propose management strategies to avoid or mitigate impacts; and
- outline a proposed monitoring program.

This EAMS is accompanied by a Local Water Management Strategy (LWMS), which deals specifically with water-related matters including water supply, drainage, groundwater management and wastewater disposal.

1.3 Relevant Guidelines and Policies

1.3.1 Better Urban Water Management

Better Urban Water Management (WAPC, 2008) sets out the following objectives for water sensitive urban design:

Water Conservation

- Consumption of 100kL/pp/yr including less than 40-60 kL/p/yr scheme water.

Water Quantity

- Ecological Protection – Maintain pre-development flow rates and volumes for the 1 year ARI event. Maintain or restore desirable environmental flows and/or hydrological cycles.
- Flood Management – Maintain pre-development flow rates and volumes for the 100 year ARI event.

Water Quality

- Maintain pre-development nutrient outputs (if known) or meet relevant water quality guidelines (e.g. ANZECC & ARM CANZ, 2000).
- Treat all runoff in the drainage network prior to discharge consistent with the Stormwater Management Manual.
- As compared to a development that does not actively manage stormwater quality, achieve:
 - at least 80% reduction of Total Suspended Solids;
 - at least 60% reduction of Total Phosphorus;
 - at least 45% reduction of Total Nitrogen; and
 - at least 70% reduction of gross pollutants.

Mosquitoes and Midges

- Design detention structures so that, between the months of November and May, stormwater is fully infiltrated within 96 hours.
- Design permanent water bodies (where accepted by DWER) to maximise predation of mosquito larvae by native fauna.

1.3.2 Shire of Chittering Local Planning Scheme No. 6

“The following development requirements shall apply to the development and subdivision of land within industrial zones and to industrial land uses –

- (a) the effect on the environment by means of discharge of pollutants or contaminants into the air, ground and water be avoided, or managed within acceptable limits;
- (b) where an on-site wastewater disposal system is proposed –
 - i. land capability assessment may be required to demonstrate the capability of the site to manage wastewater and the suitability of the proposed system;
 - ii. the use of fill and drains to achieve the required separation from groundwater is to be limited; and

- iii. a suitable and unencumbered land application area is to be set aside to distribute treated sewage, where required;
- (c) within sewerage sensitive areas secondary treatment systems with nutrient removal are to be utilised;
- (d) notwithstanding any other provisions of this scheme, industrial development not connected to reticulated sewerage (for treatment on-site or off-site) is to be restricted to 'dry industry' being land uses that intend to dispose of wastewater on site to the environment of a kind and volume ordinarily discharged from a habitable building at a daily volume of less than 540 litres per 1,000m² of the site area [R10 equivalent];
- (e) where trade waste is to be managed and/or disposed of on-site or off-site the associated risks must be identified and addressed, including the vulnerability of the receiving environment where relevant;
- (f) where a caretaker's dwelling is a discretionary use –
 - i. only one dwelling be permitted on each lot;
 - ii. the dwelling is to have a maximum floor area of 100m²;
 - iii. the dwelling is to be incidental to the industrial land use;
 - iv. subdivision of the dwelling from the parent lot will not be permitted;
 - v. the use of notifications on title may be considered to advise prospective purchasers of potential impacts from noise, dust, odour or amenity that may arise from the location of a residential land use within the zone;
 - vi. the local government will not consider applications for caretakers' dwellings prior to the primary site activity being either approved or constructed;
 - vii. where simultaneous approval has been granted by local government for both a caretaker's dwelling and the main activity on the same lot, the main activity must be developed and operational prior to occupation of the dwelling; and
 - viii. caretaker's dwellings are to be carefully sited and constructed so the potential site (or estate) impacts from noise, dust, odour or amenity are minimised;
- (g) in considering rezoning proposals for industrial zones, the local government may require the preparation of a structure plan, and any information relevant to the site conditions, in keeping with the matters listed in clause 67 of the deemed provisions and clause 5.7 of the scheme; and
- (h) any other requirement as included in a Local Planning Policy adopted by the local government."

The Scheme shows most of Tallaangatta as part of a Water Prone Area (Ellen Brook Palusplain), within which the following special provisions apply:

"5.3.3 Planning Requirements

The local government will impose conditions on any Development approval relating to -

- a) the construction and occupation of any dwelling or outbuilding;
- b) the type of effluent disposal system used in this area shall be high performance with bacterial and nutrient stripping capabilities to the specifications of local government and the Health Department and shall be located in a position determined by local government.;
- c) minimum floor levels for any building above the highest known water levels;
- d) any land use that may contribute to the degradation of the surface or sub-surface water quality.
- e) no development other than for conservation purposes will be permitted within 30 metres of any natural water body; AMD 21 GG 3/4/09
- f) damming, draining or other developments which may alter the natural flow of surface water will not be permitted unless such works are part of an approved Catchment Management Plan.”

Schedule 11 of the Scheme contains the following provisions that apply to the Mueha Industrial Park:

“2.2 Environmental Management Plans

The following Environmental Management Plans shall be prepared and used to inform the design and proposed subdivision and development within the Structure Plan area. They shall be submitted as an additional detail of a Structure Plan unless otherwise determined by the Western Australian Planning Commission.

2.2.1 Local Water Management Strategy

The developer shall submit to the Local Authority a Local Water Management Strategy (LWMS) for approval as an additional detail of a Structure Plan pursuant to clause 5.19 in order to ensure that surface and ground waters are managed with the aim of maintaining the natural water balance. The Local Authority must notify and consult with the authority responsible for water and the environment on the proposed strategy in advertising the Local Structure Plan(s) pursuant to Part 4 of the deemed provisions.

The LWMS shall be prepared in accordance with Better Urban Water Management or its successor document.

The Structure Plan design shall respond to the LWMS required by 2.2.1 and shall be implemented to the satisfaction of the Local Authority, having regard to any advice from the Department of Water.

2.2.2 Environmental Assessment and Management Strategy

The developer shall submit to the Local Authority an Environmental Assessment and Management Strategy for approval as an additional detail of a Local Structure Plan pursuant to Part 4 of the deemed provisions in order to ensure the local structure plan provides a comprehensive and coordinated response to all environmental features within the Structure Plan area and in accordance with the Muchea Industrial Park Structure Plan.

The Environmental Assessment and Management Strategy is to include the following:

- Identification of significant environmental features within the local structure plan area including flora, vegetation, fauna, wetlands and waterways.
- Identification of appropriate management strategies, consistent with industry best practice, to ensure that the local structure plan responds appropriately to these environmental features. Appropriate management strategies might include identification of buffers / setbacks, potential areas of revegetation / rehabilitation, public open space and fauna relocation.
- Consideration of Acid Sulphate Soils (if present) and identification of the likely requirement for ASS management during future planning stages.
- Identification of, and the means for retention and protection of, key cockatoo habitat trees / locations.
- Identification of measures to retain the rural character of views of the Structure Plan area from roads within, adjoining, or in the vicinity of the Structure Plan area, by providing details of vegetation screen planting, as well as the details for the siting and design of structure and major earthworks within the Structure Plan area.

The Local Authority must consult with the relevant environmental agencies regarding the proposed strategy in advertising the Local Structure Plan pursuant to clause 5.19.

The Environmental Assessment and Management Strategy shall be consistent with the EPA's current Guidance Statement No. 33 Environmental Guidance for Planning and Development, or any successor Guidance Statement.

The Environmental Assessment and Management Strategy required by 2.2.2 shall be implemented to the satisfaction of the Local Authority on the advice of the applicable environmental agencies."

This Environmental Assessment and Management Strategy (EAMS) has been prepared to satisfy the requirements of Clause 2.2.2 of Schedule 11.

1.3.3 Government Sewerage Policy

The Government Sewerage Policy (2019) requires that all new subdivision and development should be deep-sewered unless it is exempt for one of several reasons. For exempt developments, the policy establishes minimum site capability requirements and, where appropriate, density limits. In these cases, on-site effluent disposal may be approved where the responsible authority is satisfied that:

- each lot is capable of accommodating on-site sewage disposal without endangering public health or the environment; and
- the minimum site requirements for on-site sewage disposal as set out in the Policy can be met.

The Policy designates certain areas as Sewage Sensitive Areas (SSAs), including land:

- within the coastal catchment of the Swan Estuary; and
- within 1km upgradient or 250m downgradient (or overall 1km where the groundwater gradient is unknown) of a significant wetland.

Additional restrictions and requirements apply to on-site effluent disposal in SSAs, including:

- a minimum lot size of one hectare (unless exempted on a case-by-case basis);
- minimum vertical separation of 1.5m from the discharge point of effluent disposal systems to the highest groundwater table level; and
- secondary effluent treatment systems with nutrient removal.

The Policy shows all of Tallangatta except for about 6ha in the north-east corner within an SSA associated with the Ellen Brook catchment. The remaining 6ha is shown within an SSA associated with a significant wetland. Figure 3 shows the mapped SSAs.

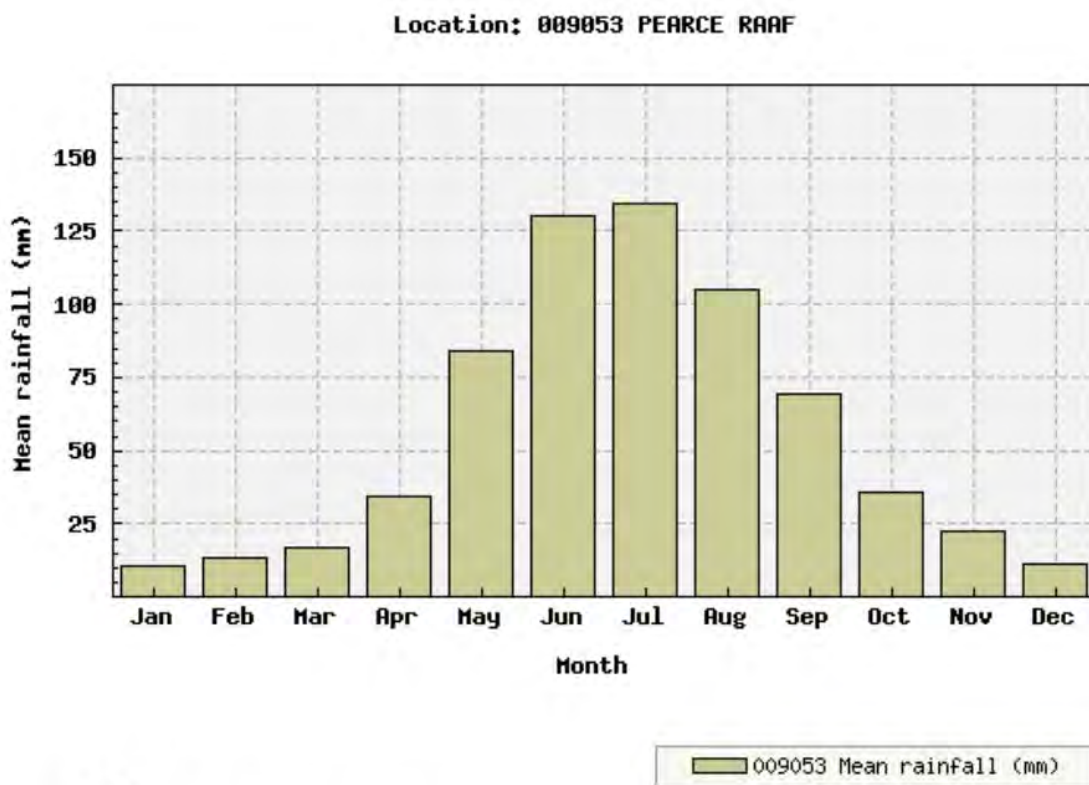
The SSA mapping associated with the wetland is considered to be erroneous. The wetland in question (a Conservation category dampland) is located more than 300m upgradient of the site and is maintained by surface flow and/or locally perched groundwater (the mapped permanent groundwater table is 45-50m below the ground surface), so there is no possibility of groundwater flow from the site to the wetland. This matter is examined further in the LWMS (Appendix A).

2.0 EXISTING ENVIRONMENT

2.1 Rainfall

Muchea, like the rest of the greater Perth region, has a strongly seasonal rainfall, with most of the annual rain falling between May and September in association with winter cold fronts. Occasional heavy falls may occur from summer thunderstorms. The long-term average annual rainfall for Pearce RAAF Base (located 6.5km south of the site) is 679.7mm, of which 77% falls between the months of May and September.

Figure 4 shows a rainfall occurrence chart for Pearce RAAF.



Australian Government
Bureau of Meteorology

Figure 4 Pearce RAAF Mean Rainfall

2.2 Physiography

2.2.1 Topography

Tallangatta is located on the western footslopes of the Gingin Scarp, just west of the Darling Fault. The site slopes generally westward from a high point of 93m AHD in the north-east to a low of 53m AHD at the north-west corner. The gradient averages about 2.5%. The

steepest slopes are in the north-east, reaching up to 10% in places. Figure 5 shows the topography.

2.2.2 Geology, Landforms and Soils

Most of Tallangatta is mapped by the GSWA (Gozzard, 1982) as Guildford Formation (Qpa), with soils consisting of pebbly silt (Mgs₁). This unit is described as having generally low permeability and shallow groundwater, with a low to moderate capability for effluent and drainage disposal. The foundation stability may vary, with differential settling possible in clayey areas. Sand pads are generally necessary for foundations.

The eastern part of the property is mapped as Colluvium (Qc), with soils of medium to coarse grained brown sand (S₅) and sandy silt (Msg). The S₅ soil type has high permeability and generally high capability for drainage and effluent disposal. The Msg type has low permeability and consequently low suitability for effluent disposal. Both soil types provide good foundations when compacted.

A small area in the north-east of the property is mapped as Leederville Formation (Klb), with soils derived from siltstone (ST₁). This unit is described as moderately stable but prone to weathering when disturbed, with low permeability making it of low suitability for drainage or effluent disposal.

Figure 5 shows the GSWA mapping. Drilling at nine locations across the site in June 2017 (Figure 5) generally confirmed the GSWA mapping. Soil logs from the drilling are attached in the Local Water Management Strategy (Appendix A).

2.2.3 Soil Permeability

The permeability of the site soils will vary depending on the clay content. Test pumping during sampling of the on-site bores indicated hydraulic conductivities in the subsoil (1–5 m bgl) ranging from about 0.06 to 0.42 m/day. The permeability of the top 2m of the soil profile is expected to be higher.

Brown Geotechnical carried out falling-head permeability tests between 0.5m and 1m depth at three locations across the property (Figure 5) in 2020. The tests returned estimated permeabilities ranging from 8.5×10^{-5} m/day in dense gravelly sandy clay to 53 m/day in sandy gravel.

For preliminary drainage and effluent design purposes, a permeability of 1 m/day has been assumed. Constant-head permeability tests in accordance with the method set out in Australian Standard AS1547:2012: – *On-site Domestic Wastewater Management* will be undertaken prior to subdivision.

2.2.4 Acid Sulphate Soils

The DBCA maps the site as Low to Nil risk of Acid Sulphate Soils (ASS). The nearest mapped High ASS risk area is a palusplain about 1.6km to the south.

Bore sampling in August 2017 found no indicators of potential or actual ASS in the groundwater. No further investigation of ASS is considered necessary.

2.2.5 Phosphorus Retention Index

Previous experience has shown that the gravelly and silty clay soils of the Guildford Formation and other alluvial and colluvial soils generally have moderate to high PRI.

PRI is a measure of the ability of a soil to adsorb and retain phosphorus from solution. A high PRI indicates that a soil is unlikely to leach phosphorus to the water table. Typical ranges for PRI values in soils are as follows:

<i>PRI Range</i>	<i>Rating</i>	<i>Typical soils</i>
0 – 0.5	Very Low	Bassendean Sand
2 – 4	Low – Moderate	Karrakatta Sands
5 – 12	Moderate – High	Cottesloe Sands
12 – 20	High	Crushed Limestone, Limesand
20 – 1000+	Very High	Clay

The DWER recommends a minimum PRI of 15 for soils beneath infiltration basins and swales. The site soils are expected to meet or exceed this requirement. PRI testing of soils beneath proposed infiltration basins will be undertaken before subdivision.

2.3 **Hydrology**

2.3.1 Groundwater

Groundwater flows from east to west beneath the site at a gradient of between 0.01 and 0.02. The low permeability of the soil profile means that groundwater throughflow would be very low.

Regional mapping by the DWER shows superficial groundwater present at minimum elevations of 48m to 55m AHD. Figure 6 shows the DWER contours.

Groundwater measurements in nine bores in and around the site on 21 August 2020 (Figure 6), during a drier than average winter, gave the water depths and levels shown in Table 2.1. Groundwater measurements collected from the site since 2017 are detailed in the LWMS.

Simultaneous measurements of DWER bores located 1,400m south (Swan GWA 2-98) and 40m north (Gnangara Monitoring GD20) enabled Average Annual Maximum (AAMGL) and

Maximum (MGL) groundwater levels at the site to be calculated. Figure 6 shows the calculated AAMGL and depth to AAMGL contours across the site. Figure 7 shows the hydrographs of the DWER bores.

Table 2.1 shows that the groundwater levels measured in August 2020 were about 0.4m below the AAMGL. The winter of 2020 was drier than average, and the levels measured on 21 August are considered to approximate the peak for the year.

Figure 6 shows that the AAMGL is within one metre of the ground surface in parts of the west, south and north-west of the site. The AAMGL is predicted to intersect the ground surface in small areas in the west, south and north-east.

Filling and/or subsoil drainage is likely to be necessary in areas of the site where the depth to groundwater is less than 1.5m in order to provide groundwater clearance for roads, buildings and effluent disposal. The requirement for filling will depend on the size of the lots and the uses to which they are put. Most of the site has sufficient slope and depth to groundwater that subsoil drainage alone may be sufficient to create the necessary groundwater clearance for building, effluent disposal and drainage.

Table 2.1 Groundwater Depths and Levels 21 August 2020

<i>Bore (Figure 6)</i>	<i>Depth (mbgl)</i>	<i>Level (m AHD)</i>	<i>AAMGL (m AHD)</i>	<i>MGL (m AHD)</i>	<i>Depth to AAMGL (m)</i>	<i>Depth to MGL (m)</i>
TB1	4.64	60.61	61.037	61.617	4.213	3.633
TB2	2.95	82.05	82.477	83.057	2.523	1.943
TB3	0.7	79.85	80.277	80.857	0.273	-0.307
TB4	0.41	54.39	54.817	55.397	-0.017	-0.597
TB5	>3.45	<63.55				
TB6	0.37	53.63	54.057	54.637	-0.057	-0.637
TB7	1.14	57.26	57.687	58.267	0.713	0.133
TB8	1.11	64.14	64.567	65.147	0.683	0.103
TB9	0.56	74.24	74.667	75.247	0.133	-0.447
MB1	0.285	51.305	51.732	52.312	-0.142	-0.722
MB3	1.59	50.99	51.417	51.997	1.163	0.583
MB5	0.77	56.02	56.447	57.027	0.343	-0.237
WB2	>4.98	<65.89				
GD20	0.88	60.6	59.85	61.35	1.63	0.13
2-98	2.117	56.173	56.6	57.18	1.69	1.11

2.3.2 Surface Water

A significant creek flows from east to west along the northern edge of the property. Two smaller drains flow across the site near the southern boundary. All of the watercourses are seasonal or ephemeral. The remainder of the property would drain by sheet flow during heavy rainfall. Figure 8 shows the drainage lines and their catchments.

The northern creekline is a natural waterway, incised at the eastern side of the property but flatter and shallower at the western side. The depth of the creek channel is estimated at 1m in the east and 0.5m at the west, with a width of 5-10m. The creek drains an upstream catchment of about 360ha and an additional catchment of 250ha within the property.

Historical Landgate aerial photography shows that the middle drainage line is an artificial drain, constructed between 1965 and 1977. It is shallow and slightly incised, about 0.5m deep and 8-10m wide. It has an upstream catchment of about 38ha and an internal catchment of another 30ha.

The southernmost drainage line is also a constructed drain, dating from between 1977 and 1979. It is slightly incised, about 0.5m deep with a width ranging from 4-8m in the east to 12m in the west. It drains an upstream catchment of about 117ha and an internal catchment of another 3ha.

All drainage from the site flows eventually into Ellen Brook, the major drainage feature of the region. The Ellen Brook catchment is the largest sub-catchment of the Swan-Canning River system, contributing 6% of the total annual flow, and is the largest single contributor of nutrients to the system (WA Govt, 2011).

Ellen Brook has a surface catchment of 715km² (WRC, 2012). The Brook rises as Chandala Brook about 22km north-northwest of the site. The Brook is seasonal, flowing between May and November with an annual flow ranging from 2.1 to 48.6 GL (SRT, 2009).

Table 2.2 summarises estimated 100-year ARI (average recurrence interval) flows under current conditions in the three drainage lines, calculated using the Rational Method (Institute of Engineers Australia, 1987). A runoff coefficient of 0.3 for the 100-year storm was assumed for all catchments. Table 2.2 also shows estimated water depths, widths and flow velocities in the watercourses at the upstream and downstream ends of the site, calculated using Manning's open channel flow formula (Fang, 2002), using a roughness coefficient (Manning's *n*) of 0.03.

Table 2.2 100-year ARI Flows

<i>Drainage Line</i>		<i>North</i>	<i>Middle</i>	<i>South</i>
<i>Upstream Catchment (ha)</i>		360	38	117
<i>100-yr ARI Flow (m³/sec)</i>		7.04	1.21	3.9
<i>Water Depth (m)</i>	<i>Upstream</i>	0.7	0.2	0.5
	<i>Mid-point</i>	0.8	-	-
	<i>Downstream</i>	0.4	0.2	0.5
<i>Top Water Width (m)</i>	<i>Upstream</i>	4.6	9.4	8.2
	<i>Mid-point</i>	6.9	-	-
	<i>Downstream</i>	28	11	11
<i>Flow Velocity (m/sec)</i>	<i>Upstream</i>	3.5	1.0	1.5
	<i>Mid-point</i>	2.0	-	-
	<i>Downstream</i>	1.1	1.1	1.1

The flow calculations in Table 2.2 suggest that the northern creek is likely to overtop its banks at its western end during a 100-year storm, creating flooding to about 15m each side of the creek. The eastern part of the northern creek, and the two southern drainage lines, appear unlikely to overtop in a 100-year storm.

The flow velocity in the eastern part of the northern creek is relatively high and may cause scouring of the creek bed in a 100-year storm. Given that a storm of this size may not have occurred since the creekline and its catchment were cleared for farming, such an event may significantly alter the shape of the watercourse. Some protection works (such as revegetation, riffing and barriers) may be necessary to reduce the risk of this occurring.

The calculations shown in Table 2.2 are preliminary and based on desktop estimates of channel morphology and catchment characteristics. They are not for design purposes.

2.4 Water Quality

2.4.1 Groundwater

Groundwater samples were collected from the nine on-site bores in August 2017. Table 2.3 shows the groundwater quality data from August 2017. The samples show that the groundwater quality across the site is generally moderate, with some notable features:

- Nitrogen (both total and NO_x) levels were elevated across most of the site, particularly in Bore TB1 in the centre of the property. This is probably due largely to the high density of cattle then being stocked on the property. Nitrogen levels are expected to decline once cattle are removed from the property.
- Bore TB3 is quite saline (Conductivity 12 mS/cm = 7,200 mg/L) as well as being very acidic (ph 3.7, Total Acidity 96) and high in some metals (aluminium, potassium, iron, lead and zinc). These are consistent with its origin as seepage from clay and siltstone. The sulphate level is also elevated, although the low sulphate/chloride ratio (0.09) and the elevation and soil type suggests that these characteristics are not indicative of the presence of ASS.
- Dissolved phosphorus levels were low across the site.

2.4.2 Surface Water

Surface water samples were collected from six locations (three inflowing, three outflowing) in August 2017 (Figure 8). The results show that the surface flows into and out of the site are generally of similar and moderate quality. The water in the northern creek has elevated salinity, but shows little of the high acidity found in the adjacent Bore TB3. Water flowing from the east in the vicinity of the Midland Brick quarry had very low pH but only moderate acidity. Table 2.4 shows the surface water data from August 2017.

Table 2.3 Groundwater Quality 17/8/2017
(see Figure 6 for bore locations)

Parameter		Unit	Aquatic Ecosystems ^a	Irrigation Water ^b	TB1	TB2	TB3	TB4	TB5	TB6	TB7	TB8	TB9	Notes
Nutrients	Total Nitrogen	mg/L	1.2	5	19	0.9	9.5	5.3	2	2.3	0.6	1.2	6.2	ng denotes "no guideline"; na denotes "not analysed" a. ANZECC (2000) Aquatic Ecosystem trigger values (Nutrient, pH and Conductivity are for lowland rivers; Dissolved Metals are for freshwater ecosystems 90% species protection) b. ANZECC (2000) Irrigation trigger values (long-term irrigation up to 100 years) c. DEC(20_) oxidation indicator triggers for ASS-affected groundwater. d. ANZECC (2000) Irrigation trigger values for pasture and fodder for grazing animals except pigs and dairy animals.
	NOx	mg/L	0.15	ng	19	0.72	0.15	3.7	1.4	1.2	0.18	0.25	3.8	
	Total Kjeldahl Nitrogen	mg/L	ng	ng	<0.2	0.2	9.4	1.6	0.6	1.1	0.4	1	2.4	
	Total Phosphorus	mg/L	0.065	0.05	0.89	0.09	0.54	0.49	0.43	0.48	0.04	0.3	3.5	
	Reactive Phosphorus	mg/L	0.04	ng	0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Physical	pH		6.5-8.0	6-8.5	5.9	6.8	3.7	6.8	6.5	7.3	6.6	7	7.4	
	Conductivity	mS/cm	0.12-0.3	1.3	1	0.53	12	2.2	0.29	0.7	0.49	0.55	0.63	
	Salinity (from EC)	mg/L	72-180	780	600	318	7200	1320	174	420	294	330	378	
	Acidity	mg/L	40 ^c	ng	19	5	96	<5	13	9	19	7	7	
	Alkalinity	mg/L	ng	ng	10	28	<5	21	22	100	50	38	67	
	Acidity:Alkalinity Ratio		1 ^c	ng	1.90	0.18	>19.2	<0.24	0.59	0.09	0.38	0.18	0.10	
	Hardness	mg/L	ng	60-350	95	64	1310	208	27	56	59	63	48	
	Sulphate	mg/L	ng	ng	60	26	310	29	18	66	17	40	23	
	Chloride	mg/L	ng	350	240	150	3600	690	94	110	100	110	130	
SO ₄ :Cl Ratio		0.5	ng	0.25	0.17	0.09	0.04	0.19	0.60	0.17	0.36	0.18		
Major Ions	Calcium	mg/L	ng	ng	5	6	30	9	4.2	5.8	5.6	9.1	7.2	
	Sodium	mg/L	ng	230	130	61	2100	350	36	110	54	60	80	
	Potassium	mg/L	ng	ng	0.2	0.4	60	0.6	1.2	<0.1	0.9	3.8	6.6	
	Magnesium	mg/L	ng	ng	20	12	300	45	4	10	11	9.9	7.2	
	Iron	mg/L	ng	10	0.26	0.09	2.4	0.3	0.07	0.36	0.04	0.02	0.16	

Dissolved Metals	Aluminium	mg/L	0.08	5	1.7	0.3	9.2	1.1	0.2	0.8	<0.1	<0.1	0.3
	Arsenic (III & V)	mg/L	0.136	0.1	<0.002	<0.002	0.002	0.001	<0.002	0.001	<0.002	<0.002	<0.002
	Cadmium	mg/L	0.0004	0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	Chromium (VI)	mg/L	0.006	0.1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	Copper	mg/L	0.0018	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Mercury	mg/L	0.0019	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Nickel	mg/L	0.013	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Lead	mg/L	0.0056	2	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Zinc	mg/L	0.015	2	0.08	<0.01	0.04	0.02	<0.01	0.01	0.01	<0.01	<0.01

Table 2.4 Surface Water Quality 17/8/2017
(see Figure 8 for sample locations)

Parameter		Unit	Aquatic Ecosystems ^a	Irrigation Water ^b	TS1 (inflow)	TS2 (outflow)	TS4 (outflow)	TS5 (outflow)	TS6 (inflow)	TS7 (inflow)	Notes
Nutrients	Total Nitrogen	mg/L	1.2	5	0.8	0.9	3.5	1.1	3.8	0.2	ng denotes "no guideline". na denotes "not analysed" a. ANZECC (2000) Aquatic Ecosystem trigger values (Nutrient, pH and Conductivity are for lowland rivers; Dissolved Metals are for freshwater ecosystems 90% species protection) b. ANZECC (2000) Irrigation trigger values (long-term irrigation up to 100 years) c. DEC(20__) oxidation indicator triggers for ASS-affected groundwater. d. ANZECC (2000) Irrigation trigger values for pasture and fodder for grazing animals except pigs and dairy animals.
	NOx	mg/L	0.15	ng	0.01	0.1	0.81	<0.01	0.93	<0.01	
	Total Kjeldahl Nitrogen	mg/L	ng	ng	0.8	0.8	2.7	1.1	2.9	0.2	
	Total Phosphorus	mg/L	0.065	0.05	0.09	0.1	0.16	0.08	0.08	0.09	
	Reactive Phosphorus	mg/L	0.04	ng	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Physical	pH		6.5-8.0	6-8.5	6.3	6.1	9.3	7.5	10.4	3.8	
	Conductivity	mS/cm	0.12-0.3	1.3	3.2	3.3	0.95	1	1	2.2	
	Salinity (from EC)	mg/L	72-180	780	1920	1980	570	600	600	1320	
	Acidity	mg/L	40 ^c	ng	6	<5	<5	<5	<5	27	
	Alkalinity	mg/L	ng	ng	10	<5	100	11	130	<5	
	Acidity:Alkalinity Ratio		1 ^c	ng	0.60	-	<0.02	<0.45	<0.04	>5.4	
	Hardness	mg/L	ng	60-350	353	382	94	90	76	145	
	Sulphate	mg/L	ng	ng	52	62	98	55	110	170	
	Chloride	mg/L	ng	350	890	980	190	290	220	570	
SO ₄ :Cl Ratio		0.5	ng	0.06	0.06	0.52	0.19	0.50	0.30		
Major Ions	Calcium	mg/L	ng	ng	16	16	28	8.2	24	3.8	
	Sodium	mg/L	ng	230	540	630	110	120	120	330	
	Potassium	mg/L	ng	ng	14	16	27	7.4	28	5.6	
	Magnesium	mg/L	ng	ng	76	83	5.9	17	4	33	
	Iron	mg/L	ng	10	0.1	0.1	0.07	0.05	<0.01	2.8	

Dissolved Metals	Aluminium	mg/L	0.08	5	<0.1	<0.1	<0.1	<0.1	<0.1	1.2
	Arsenic (III & V)	mg/L	0.136	0.1	0.002	0.002	0.002	<0.002	0.002	<0.002
	Cadmium	mg/L	0.0004	0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	Chromium (VI)	mg/L	0.006	0.1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	Copper	mg/L	0.0018	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Mercury	mg/L	0.0019	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Nickel	mg/L	0.013	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	0.02
	Lead	mg/L	0.0056	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Zinc	mg/L	0.015	2	<0.01	<0.01	<0.01	<0.01	<0.01	0.01

2.5 Wetlands

The north-west and north-east corners of Tallangatta are mapped as Multiple Use palusplain (seasonally waterlogged plain) by the DBCA. Palusplain also covers an extensive area west of the property in the floodplain of Ellen Brook. Figure 8 shows the mapped wetlands.

Multiple Use category wetlands are degraded and are regarded by the DBCA as developable, provided that the hydrological functions (mainly drainage) of the wetland are maintained or replicated.

No other wetlands are present on or immediately downstream of the property.

2.6 Vegetation

2.6.1 Vegetation Type and Condition

Tallangatta is cleared except for a number of scattered paddock trees (some apparently planted) and a small group of denser trees around the creekline in the north-east corner. The paddock trees are mostly located in the northern two-thirds of the property, with the southern third being almost entirely cleared.

The paddock trees are mostly mature Marri and Wandoo with a few Jarrah, with some large specimens up to 15-20m tall. Flooded Gums are present near the creekline in the north-east corner of the property.

2.6.2 Vegetation Complexes

Most of Tallangatta is mapped as Coonambidgee Complex, described by Heddle *et al.* (1980) as ranging from a low open forest and low woodland of pricklybark-banksia (*E. tottiana* - *B. attenuata* - *B. menziesii* – *B. ilicifolia*) with local admixtures of *B. prionotes*, to an open woodland of marri-banksia.

A narrow band on the western side of the property is mapped as Yanga Complex, which Heddle *et al.* (1980) described as a mixture of low open forest of banksia-pricklybark on the higher areas and an open woodland of marri-banksia in the moister low-lying areas.

The more elevated eastern side is mapped as Reagan Complex, described as ranging from low open woodland of *B. attenuata* – *B. menziesii* – *E. tottiana* to closed heath, depending on the depth of soil.

Figure 9 shows the mapped vegetation complexes. None of these vegetation complexes survives in identifiable form on the property.

2.6.3 Rare and Significant Flora

The DBCA's Naturemap and Commonwealth databases of Threatened and Priority Flora list 42 plant taxa with the potential to occur within the site (Table 2.5). Of these, 19 are listed as Threatened under the *Biodiversity Conservation Act 2016*. Two species are listed as Priority 1, six as Priority 2, 11 as Priority 3 and six as Priority 4. One Priority 4 species (*Centrolepis caespitosa*) is also listed as Threatened under the EPBC Act. Table 2.5 summarises the likelihood of occurrence of these species at the site.

No Threatened Flora pursuant to the *Biodiversity Conservation Act 2016* or the *EPBC Act 1999* were recorded during the site surveys. Given the degree of clearing, it is unlikely that any rare or threatened species or communities would be present.

2.6.4 Floristic Communities

Owing to the state of clearing and degradation of the vegetation on Tallangatta, it is not possible to assign the vegetation to any floristic community type. No identifiable Threatened or Priority Floristic Communities pursuant to State or Commonwealth legislation are present at the site.

Table 2.5 Significant Flora Potentially Occurring Within the Site

<i>Taxon</i>	<i>DBCA Cons Code</i>	<i>EPBC Cons Code</i>	<i>Recorded Habitat(s)</i>	<i>Closest Record</i>	<i>Likelihood of Occurrence</i>
<i>Acacia anomala</i>	DRF	VU	Western slopes of the Darling Range east of Perth, on shallow grey sands over laterite.	4km	Unlikely
<i>Acacia drummondii ssp. affinis</i>	P3		Lateritic gravelly soils.	5km	Unlikely
<i>Adenanthos cygnorum ssp. chamaephyton</i>	P3		Grey sand, lateritic gravel.	2km	Unlikely
<i>Andersonia gracilis</i>	DRF	EN	Known from the Badgingarra, Dandaragan and Kenwick areas. Seasonally damp, black sandy clay flats near swamps.	111km	Unlikely
<i>Anigozanthos viridis ssp. terraspectans</i>	DRF	VU	Winter-wet depressions on grey sandy clay loam or grey sand in low heath that is regenerating after fire.	111km	Unlikely
<i>Anthocercis gracilis</i>		VU	Sandy or loamy soils. Granite outcrops.	31km	Unlikely
<i>Caladenia huegelii</i>	DRF	EN	Mixed woodland of Jarrah, Banksia, Sheoak, marri from just north of Perth to Busselton, usually within 20m of the coast. Mostly deep grey-white sand of the Bassendean dune system.	16km	Unlikely
<i>Centrolepis caespitosa</i>	P4	EN	Winter-wet claypans dominated by low shrubs and sedges.	8km	Unlikely
<i>Chamaescilla gibsonii</i>	P3		Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.	4km	Unlikely
<i>Chamelaucium sp. Gingin</i> (N.G. Marchant 6)	DRF	EN	White/yellow sand in woodland with <i>Eucalyptus todtiana</i> , <i>Banksia attenuata</i> and <i>Hibbertia</i> sp.	13km	Unlikely
<i>Conospermum densiflorum ssp. unicephalum</i>	DRF	EN	Low-lying sandy clay soils with surface gravel, over 10km between Gingin and Moora.	75km	Unlikely
<i>Cyathochaeta teretifolia</i>	P3		Grey sand, sandy clay in swamps and creek edges.	3km	Unlikely
<i>Darwinia foetida</i>	DRF	CE	Grey-white sand on swampy, seasonally wet sites.	1.6km	Unlikely
<i>Diplolaena andrewsii</i>	DRF	EN	Loam, clay. Granite outcrops and hillsides.	17km	Unlikely
<i>Diuris micrantha</i>	DRF	VU	Seasonally wet flats among sedges and scattered shrubs.	73km	Unlikely

<i>Diuris purdei</i>	DRF	EN	Under dense shrubs in seasonally-wet swamps and drainage lines.	55km	Unlikely
<i>Drakaea elastica</i>	DRF	EN	Bare patches of grey-white sand in low-lying areas alongside winter-wet swamps, typically in banksia woodland or spearwood thicket.	32km	Unlikely
<i>Drosera occidentalis</i> ssp. <i>occidentalis</i>	P4		Sandy and clayey soils. Swamps and wet depressions.	1.2km	Unlikely
<i>Drosera sewelliae</i>	P1		Laterite and silica sand soils.	6km	Unlikely
<i>Eryngium pinnatifidum</i> ssp. <i>Palustre</i> (G.J. Keighery 13459)	P3		Winter-wet areas, damplands and claypans.	2km	Unlikely
<i>Eleocharis keigheryi</i>	DRF	VU	Clay, sandy loam. Emergent in freshwater: creeks, claypans.	10km	Unlikely
<i>Eucalyptus balanites</i>	DRF	EN	Gently sloping heathlands on light-coloured sandy soils over laterite.	64km	Unlikely
<i>Eucalyptus leprophloia</i>	DRF	EN	Known over 90km range from north of Badgingarra to the Mt Adams area. Range of habitats including slopes of hills in brown loam over laterite.	154km	Unlikely
<i>Grevillea althoferorum</i> ssp. <i>fragilis</i>	DRF	EN	Base of the Darling Scarp on greyish-yellow colluvial sand, in banksia woodland.	2.7km	Unlikely
<i>Grevillea christinae</i>	DRF	EN	Clay loam, sandy clay, often moist.	76km	Unlikely
<i>Grevillea corrugata</i>	DRF	EN	Known from two locations 10km south of Bindoon, on gravelly loam in partially-cleared eucalyptus woodland on roadsides.	16km	Unlikely
<i>Grevillea curviloba</i> ssp. <i>curviloba</i>	DRF	EN	Winter wet, deep peaty grey sands over limestone.	4km	Unlikely
<i>Grevillea curviloba</i> ssp. <i>incurva</i>	DRF	EN	Open heath in winter-wet areas on sand over limestone or ironstone.	2km	Unlikely
<i>Guichenotia tuberculata</i>	P3		Sandy clay over laterite, sand.	69km	Unlikely
<i>Haemodorum loratum</i>	P3		Grey or yellow sand, gravel.	63km	Unlikely
<i>Hibbertia glomerata</i> ssp. <i>ginginensis</i>	P1		Sand, brown clay, laterite and near roadsides.	30km	Unlikely
<i>Oxymyrrhine coronata</i>	P4		Slopes and flats with dry gravel over laterite.	4km	Unlikely
<i>Persoonia rudis</i>	P3		White, grey or yellow sand, often over laterite.	4km	Unlikely
<i>Platysace ramosissima</i>	P3		Sandy soils.	2km	Unlikely

<i>Schoenus</i> sp. Bullsbrook (J.J. Alford 915)	P2		Grey peaty sand, low-lying flats.	13km	Unlikely
<i>Stenanthemum sublineare</i>	P2		Littered white sand on the Swan Coastal Plain.	13km	Unlikely
<i>Stylidium aceratum</i>	P2		Sandy soils, swamp heathland.	3km	Unlikely
<i>Stylidium longitubum</i>	P3		Sandy clay, clay. Seasonal wetlands.	14km	Unlikely
<i>Stylidium paludicola</i>	P3		Peaty sand over clay. Winter-wet habitats. Marri and melaleuca woodlands.	14km	Unlikely
<i>Stylidium squamellosum</i>			Brown to red-brown clay loam. Winter-wet depressions. Open woodland, shrubland.	2km	Unlikely
<i>Synaphea grandis</i>	P4		Laterite.	1km	Unlikely
<i>Tetraria</i> sp. Chandala (G.J. Keighery 17055)	P2		Mound springs, wetlands and peaty sands.	14km	Unlikely
<i>Thelymitra manginii</i> K. Dixon & Batty ms (<i>Thelymitra dedmaniarum</i>)	DRF	EN	Open wandoo woodlands on red-brown sandy loam associated with dolerite and granite outcrops.	18km	Unlikely
<i>Thelymitra stellata</i>	DRF	EN	Low heath and scrub in jarrah and wandoo woodland on ridges and slopes, also on river banks and breakaways, on red, brown, yellow or grey sandy loams, clay or gravel over laterite or gravel.	5km	Unlikely
<i>Trichocline</i> sp. Treeton (B.J. Keighery & N. Gibson 564)	P2		Sand over limestone, sandy clay over ironstone. Seasonally wet flats.	8km	Unlikely
<i>Verticordia lindleyi</i> ssp. <i>lindleyi</i>	P4		Sand, sandy clay. Winter-wet depressions.	5km	Unlikely
<i>Verticordia serrata</i> var. <i>linearis</i>	P4		White sand, gravel. Open woodland.	3km	Unlikely

2.7 Fauna

2.7.1 Species and Habitats

The largely cleared project area offers little habitat for native fauna, apart from disturbance-tolerant species such as kangaroos (which may graze in the paddocks from refuges to the east) and birds which might nest in some trees.

2.7.2 Significant Fauna

A search was made of relevant databases for the area surrounding the project area. The databases searched included:

- DBCA Naturemap (15km radius including the project area);
- DBCA Threatened Fauna Database (15km radius including the project area);
- EPBC Protected Matters Search Tool (10km radius including the project area); and
- Birds Australia Birddata database (1 degree/60nm square including the project area).

The searches produced an extensive list of Threatened Fauna species, Priority Fauna species and otherwise significant species from the search area. Many of those were marine or aquatic species for which no habitat exists in the project area. Species that might occur in the project area or its surrounds are summarised, and their likelihood of occurrence in the project area assessed, below:

- Carnaby's Black Cockatoo *Calyptorhynchus latirostris* (S1, EN) – Feeds and breeds in eucalypt and Banksia woodland from the lower Murchison to the lower south-west. Numerous records of occurrence near the project area. A flock of about 30 birds was observed overflying the project area in June 2017. The project area contains food resources including Marri trees and potential nesting sites. No direct or indirect signs of feeding (e.g. chewed nuts) were observed during the site inspections in 2020, although feeding evidence has been observed in surrounding areas.
- Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* (S1, VU) - Feeds and breeds in eucalypt and Banksia woodland from Gingin to the lower south-west. One individual was observed overflying the project area in June 2017. The project area contains food resources including Marri trees and potential nesting sites.
- Black-striped Snake *Neelaps calonotos* (P3) - Inhabits dense leaf litter in Banksia and eucalypt woodlands with sandy soil from Lancelin south to Mandurah. Unlikely to be present in the project area due to the absence of dense vegetation or leaf litter.
- Black-flanked Rock Wallaby *Petrogale lateralis* subsp. *lateralis* (T, EN) – Restricted to parts of Cape Range, Little Sandy Desert, granite rocks in the Avon Wheatbelt, Kalbarri National Park and Barrow and Salisbury Islands. Occurs on rocky habitats with a preference for complex caves and crevices. Unlikely to be present in the project area due to the absence of suitable habitat.

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- Woylie *Bettongia penicillata ogilbyi* (T, EN) - Formerly widespread species now restricted to six known sites in the south-west. Inhabits open eucalypt forest, open mallee woodlands and shrublands. Unlikely to be present in the vicinity due to absence of suitable habitat and predation by foxes and cats.
 - Douglas' Broad-headed Bee *Hesperocolletes douglasi* (T, CR) – Recently rediscovered in Banksia woodland at Pinjar in 2019 after being presumed extinct. Only previous sighting was on Rottnest Island in 1938. Unlikely to be present in the project area.
 - Chuditch *Dasyurus geoffroyi* (S3, VU) - Occurs in a wide range of habitats including woodlands, dry sclerophyll forests and riparian vegetation. The project area provides little or no suitable foraging habitat although the species may be an occasional visitor.
 - Peregrine Falcon *Falco peregrinus* (S4) - A wide-ranging species that prefers nesting in cliff faces. Likely to overfly the project area but would not be resident.
 - Rainbow Bee-eater *Merops ornatus* (S3, MI) - A common and widespread migratory species that utilises a wide range of habitats, with a preference for nesting in open sandy ground. The project area has few open sandy areas and is unlikely to provide habitat for the species.
 - Fork-tailed Swift *Apus pacificus* (S3, MI) - A widespread and almost entirely aerial species. Likely to overfly the project area but would not be resident or dependent upon it.
 - A short-tongued bee *Leioproctus douglasiellus* (CR) - Known from only three locations within the Perth metropolitan area in association with two plant species: *Goodenia filiformis* and *Anthotia junciforme*, neither of which are present at the site.
 - Brush-tailed Phascogale *Phascogale tapoatafa* (P3) - Inhabits dry sclerophyll forests and open woodlands with hollow-bearing trees and sparse ground cover between Perth and Albany. Unlikely to be present at the site due to its scarcity and the absence of its preferred habitat.
 - Graceful Sunmoth *Synemon gratiosa* (P4) - Inhabits coastal heathland on Quindalup dunes and banksia woodland on Spearwood and Bassendean dunes in association with two species of mat-rush, *Lomandra maritima* and *L. hermaphrodita*. Neither plant species was found in the project area so the moth is unlikely to be present.
 - Inornate Trapdoor Spider *Euoplos inornatus* (northern Jarrah Forest) (P3) – Known from several locations in the northern Jarrah forest, the closest 6.5km south-east of the site. Unlikely to be present at the site due to the absence of undisturbed leaf litter.
 - A short-tongued Bee *Leioproctus contrarius* (P3) – Occurs on the Swan Coastal Plain in association with *Scaevola repens* var. *repens* and *Lechenaultia* spp, neither of which are present at the site.
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- Quenda *Isoodon obesulus fusciventer* (P4) - Inhabits dense ground cover in forests, woodlands and heaths, preferring areas around wetlands and damplands. Unlikely to be present at the site due to the absence of cover.
- Grey Wagtail *Motacilla cinerea* (MI) – Breeds in northern Europe and migrates to the southern hemisphere, mostly Africa and Asia. Two Western Australian records from near Pemberton and Northcliffe. Unlikely to be present at the site.

2.7.3 Black Cockatoo Habitat Assessment

Feeding Habitat

The project area contains two species recorded by Valentine & Stock (2008) as food resource species for Carnaby's Cockatoo: *Corymbia calophylla* and *Eucalyptus marginata*. These species are present at low density, so the site offers limited food resources for black cockatoos. The large Marri trees in the cleared areas would be expected to provide food for black cockatoos. However, no direct or indirect evidence of feeding by black cockatoos was observed.

Roosting Habitat

The EPBC Act Referral Guidelines for Black Cockatoos (DSEWPC, 2012) define black cockatoo roosting sites as tall trees or groups of tall trees, usually close to an important water source and within an area of quality feeding habitat.

Water sources exist east of the project area in the form of ponds and sumps within the Midland Brick quarry, although given the level of disturbance and activity in the quarry it is questionable whether this would be used by cockatoos. The project area contains little feeding habitat. It is therefore unlikely that black cockatoos will roost in the project area.

Breeding Habitat

The DSEWPC (2012) defines black cockatoo breeding habitat as follows:

- Current breeding habitat - Trees of suitable species (including Marri, Jarrah and Wandoo) with suitably-sized hollows (generally minimum 140mm opening, 200mm internal width, 450mm depth).
- Potential breeding habitat - Trees of suitable species of size at least 500mm diameter at breast height (dbh) (or 300mm for Wandoo).

A tree survey in August 2020 found 383 trees with diameter at breast height (dbh) greater than 0.5m (0.3m for Wandoo), which are considered large enough to contain breeding hollows now or in the future. Of these, 39 contained potential cockatoo breeding hollows (possible openings 120mm or larger in diameter).

BES inspected all potential hollows in October 2020 with a pole-mounted camera (Cocky Cam) supplied by Birdlife Australia. The inspection found five hollows in use by Corellas and two by Australian Kestrels. No evidence of current or previous black cockatoo nesting was

found. Nineteen potential hollows were found to be unusable (either not hollow, too shallow, too large or without floors), while another nine apparently usable hollows showed no sign of usage. A significant number of hollows (seven of 35 examined) contained feral bee hives.

Figure 9 shows a consolidated map of all potential nesting trees identified by BES (2020). The full findings of the tree survey are reported in Appendix B.

2.8 Aboriginal Heritage Sites

The DPLH online database shows two registered Aboriginal heritage sites on or near Tallangatta:

- DAA 3525: Ellenbrook - Upper Swan (mythological); and
- DAA 20008: Gingin Brook Waugal Site (mythological, camping, hunting, plant resource, water source).

The DPLH has advised that the gazetted boundary of site DAA 3525 intersects the northern end of the Tallangatta property. The results of the database search and the DPLH advice are attached in Appendix C.

Under Section 18 of the *Aboriginal Heritage Act 1972*, permission from the Minister for Aboriginal Affairs is required for any disturbance of a registered Aboriginal site. An application under Section 18 will be required before any ground-disturbing development work is undertaken in the affected area.

2.9 Land Uses and Potential Contamination

Historical Landgate aerial photography shows that Tallangatta has been cleared and used primarily for broadacre farming since before 1965. The photographs show stock pens (possibly for pigs or poultry) near the farmhouse in the centre of the property between 1965 and about 2000; however, this use appears to have been small-scale and essentially domestic. Residual contamination from pesticides such as dieldrin could be present around the site of the stock pens.

Between 2004 and 2011 the property was used as an intensive live cattle export depot. Between about 2006 and 2010, manure from the feedlot operation was stockpiled in windrows about 250m east of the cattle handling sheds in the middle of the property. When the feedlot operation ended the stockpiled compost was removed from the site.

Intensive agriculture is regarded as a potentially contaminating land use by the Department of Environmental Regulation (DER, 2004); however, the agricultural chemicals available for use since 2004 do not include many of the chemicals often responsible for persistent soil contamination, such as organochlorine pesticides.

Feedlots are potential sources of soil and groundwater contamination by nutrients (nitrogen and phosphorus), organic matter and pathogens (particularly faecal bacteria). All of these contaminants are mobile and/or short-lived, and are not likely to result in persistent soil or groundwater contamination or to pose a long-term risk to health.

The DWER Contaminated Sites Database shows no records of contamination on or near Tallangatta. A desktop study carried out by Connell Wagner in 2007 for the Muccha Employment Node Structure Plan identified a number of sites of possible contamination in the greater Employment Node; it is unknown whether any of these were in Tallangatta. The Structure Plan recommended that a detailed contamination study, involving a site history and possibly soil sampling, be undertaken to investigate the sites identified by Connell Wagner and any others subsequently identified.

Given the previous land uses on Tallangatta, it is expected that any contamination found by the detailed study will be low-level, localised and readily remediated to a level suitable for industrial use.

2.10 Odour

Two poultry farms are present about 200m west of Tallangatta and another is located about 300m to the north. The Muccha landfill is located 1.5km to the north-east.

The EPA (2015) recommends a buffer of 300-1000m between poultry farms and sensitive land uses, and a 1000m buffer for putrescible landfills. The EPA defines “sensitive land uses” as “...places where people live or regularly spend time and which are therefore sensitive to emissions from industry”. The term is most often applied to residential uses but previous advice from the EPA indicates that it may also be applied to some commercial and even light industrial uses requiring a high level of public amenity, such as retail warehouses and display centres.

The existing poultry farms may constrain high-amenity uses such as retail from areas in the south-west of Tallangatta close to Great Northern Highway. Given the relatively small size of the poultry farms, the required buffers are likely to be at the lower end of the EPA’s recommended range.

Industrial land uses within Tallangatta that produce odour or other emissions may require buffering from sensitive land uses outside the estate. The Muccha townsite is located about 1km to the west; isolated residences are located immediately to the north-west and 230m south-west of the property. Allocation of land uses within the estate will need to take account of these external land uses and allow for adequate separation distances where necessary. This is unlikely to be a significant constraint on the development of the property for industry.

2.11 Landscape

Tallangatta is visible from Great Northern Highway and Muchea East Road, from where it presents a view of open grazing paddocks with scattered trees. The view is mostly unobstructed by the few trees and shrubs present in the road verge. Figure 10 shows views of the site from the adjoining roads.

3.0 ENVIRONMENTAL IMPACTS AND MANAGEMENT

3.1 Surface Water Protection

The project area drains to Ellen Brook via culverts beneath Great Northern Highway and small drainage lines within and adjacent to the site.

Ellen Brook is a major tributary of the Swan-Canning River system and the largest contributor of nutrients, mostly from agriculture on the grey sandy soils west of the Brook. Small creeks and drainage lines are important contributors to the flow and water quality of Ellen Brook.

Industrial development has the potential to affect the volume, rate and quality of water flows in the drainage lines and Ellen Brook. The Structure Plan recognises the project area's sensitivity with respect to its proximity to Ellen Brook by restricting future land uses within Precinct 2 to industries with low water requirements that do not produce large amounts of industrial waste water. Water outputs will be limited to stormwater, groundwater and minor process water (such as washdown water). In addition, the limited availability of water (groundwater or scheme) will mitigate against the establishment of industry with high water requirements.

The Structure Plan has been laid out in order to provide physical protection to the northern creek line that crosses the project area.

Management

The aim of surface water protection is to improve the quality of surface water leaving the project area. Given the site's current use for agriculture, this is considered achievable.

The contaminant of major concern in Ellen Brook and the Swan-Canning River system is phosphorus. Monitoring in September 2018 (BES, 2019) showed that Ellen Brook carries very heavy phosphorus loads. Phosphorus is a major contaminant in agricultural runoff but a minor component in runoff from industrial areas.

Management strategies to be implemented include:

- In accordance with the Shire of Chittering Town Planning Scheme No. 4, industries permitted will be those that dispose of domestic-quality wastewater at a rate less than 5,400 litres per hectare per day (R10 equivalent).
- Wastewater from toilets and bathrooms will be treated by nutrient-removing systems (e.g. ATU or modified leach drains) in accordance with Health Department requirements. An analysis of the capability of the site to support on-site effluent disposal is presented in the Local Water Management Strategy (Appendix A).
- Existing drainage lines crossing the project area will be retained and protected within vegetated streamlines or swales (see LWMS and Landscape Master Plan).

- All road runoff will be captured and infiltrated (up to 1-year ARI 1-hour storm) or detained (up to critical 100-yr storm) in bioretention swales in accordance with DWER guidelines. Stormwater management is detailed in the LWMS. Figure 11 shows an overview of the stormwater management system.
- Any process wastewater generated by industries will be treated on-site to a standard suitable for discharge or disposed offsite.
- All lot drainage from storms up to 1-year ARI will be retained and infiltrated within individual lots. Runoff from critical storms up to 100-year ARI will be detained within lots and released at a rate no greater than the pre-development rate.
- A monitoring program for stormwater outflows from the site will be implemented as detailed in the LWMS.
- Temporary drainage controls will be implemented during the construction period (see Section 3.5).

3.2 Groundwater Protection

Groundwater is an important contributor to water flow and quality in Ellen Brook. Given the silty clay soils of the project area, groundwater throughflow and discharge will be relatively low.

Groundwater approaches close to the ground surface in the south, north-west and north-east of the project area in very wet winters, possibly leading to groundwater discharge to surface drains.

Bore samples collected in August 2020 show that the quality of groundwater is generally moderate, with low concentrations of phosphorus but elevated nitrogen levels.

The Structure Plan aims to maintain groundwater levels, discharge volumes and quality at their pre-development levels. With the removal of horse and cattle grazing, the quality of groundwater is expected to gradually improve.

Management

Groundwater protection measures are detailed in the LWMS and will include:

- Development will be restricted to those industries with low water use and minimal or no waste water (see Structure Plan report).
- Subsoil drains, if required, will be set at or above the pre-existing Average Annual Maximum Groundwater Level (AAMGL).

- Subsoil and stormwater drains will discharge via free-draining outlets to vegetated swales with PRI of at least 15 (see LWMS).

3.3 Noise

Industrial land use is inherently noisy. Noise sources include traffic, machinery, power tools, ventilators and impacts.

The western side of the project area currently experiences high levels of noise from Great Northern Highway. The volume of traffic and hence the noise level on this part of Great Northern Highway has diminished significantly with the opening of the new Tonkin Highway.

Noise-sensitive premises (residences) are located in Muchea, 1,200 metres west of the project area. Isolated residences are also located west of Great Northern Highway (70m west of the project area), north and south of Muchea East Road (20-25m north of the project area), and about 200m to the east and south.

Other noise sources include an active clay quarry located 100m east and air traffic (including jets) from Pearce RAAF Base located 7km south. The project area is in line with the main runway at Pearce.

Future noise sources will include industry to the north, south, east and west as part of the Muchea Industrial Park.

Management

Active management of noise within and from the Structure Plan area will not generally be required. Industries with high noise emissions may be required to undertake technical analyses to determine separation requirements. These industries may be restricted to certain parts of the Structure Plan area where suitable separations are available.

3.4 Dust

Industrial land uses may generate significant amounts of dust, depending on the activities carried out and the condition of the ground surface. Potential dust sources include processing (materials handling), unsealed roads and exposed soil surfaces.

The silty soils of the project area are susceptible to dust generation when disturbed. The main dust risk will be during construction work. Management of construction impacts is detailed in Section 3.5.

Sensitive dust receptors are the same as those for noise: the town of Muchea and residences located north, south, east and west of the project area.

Management

Individual lot holders within the project area will be required to manage dust generation so as to prevent dust escape beyond their boundaries. Industries that generate appreciable process dust will be required to hold a DWER licence, which will specify dust limits and monitoring requirements.

3.5 Construction Impacts

Construction of the project may be carried out at various times, in accordance with the land owner's preferences. Construction of roads, drainage and other services will be undertaken by the owner as part of each stage of subdivision.

Construction-stage impacts relate mainly to the movement of machinery and the presence of areas of exposed soil, and include noise, vibration, dust, erosion and sedimentation.

Management

Management of construction impacts will be the subject of conditions attached to subdivision approvals, works approvals and development approvals.

In general, control of construction impacts will be the responsibility of the construction contractor. The contractor will implement a Construction Management Plan for the development dealing with dust management, erosion and sediment control, containment of environmentally hazardous materials (chiefly fuel and oils) and spill response. The key elements of the Construction Management Plan will include the following:

Dust Minimisation

- No topsoil stripping will be undertaken in dry conditions when the wind speed is greater than 25km/h unless appropriate dust control watering is undertaken prior to and during disturbance..
- No earthworks will be undertaken in dry conditions when the wind speed is greater than 40km/h unless appropriate dust control watering is undertaken prior to and during disturbance.
- Dust will be suppressed on open ground and stockpiles by regular watering, hydromulching, wind fencing and/or covering.
- An adequate supply of water for dust suppression will be kept on site at all times.
- Soil stockpiles will be limited to a height of 2.5m to minimise dust generation and to facilitate watering.
- Other dust minimisation measures will include minimising areas of disturbance, limiting volume and speed of construction traffic and instructing site workers in dust minimisation.

Erosion and Sedimentation

- Drains and bunds will be constructed at the beginning of site disturbance as necessary to capture and direct all runoff from disturbed areas into settling ponds. Drains, bunds and ponds will be appropriately designed and sized to provide adequate settling of sediments from drained water before release.

- Vehicles and machinery will be kept to designated roads, tracks and work areas.

Water Conservation

- Water consumption during construction will be minimised by:
 - limiting dust suppression watering to prevent ponding and runoff; and
 - use of non-water dust control methods such as wind fencing and hydromulching where appropriate.

Hazardous Materials

- All environmentally hazardous materials will be stored in their original labelled containers (or labelled jerrycans or drums in the case of petroleum fuels) in a ventilated enclosure equipped with appropriate signage, fire extinguishers and a spill response kit.
- Petroleum products will be held in a bunded enclosure.
- Material Safety Data Sheets (MSDS) and a chemical register for all hazardous materials on the site will be maintained by the site supervisor in the site office.

Complaints Register

- The site supervisor will maintain a record of any public complaints and the actions taken in response.

3.6 Vegetation and Flora

The native vegetation over most of the project area consists of scattered mature paddock trees and rows of planted trees.

Remnant trees within the development area will be preserved where possible. No remnant trees may be cleared without a Development Approval from the Shire of Chittering and/or a clearing permit from the DWER.

Landscaping within private lots and public areas (e.g. road reserves and drainage swales/basins) will be carried out using local native species.

3.7 Fauna

No significant fauna habitat will be cleared in the development of Tallangatta.

Fauna habitat will be created in the revegetation of drainage swales and basins. Street trees planted within the project area will focus on native tree species that provide habitat for nectar-eating and seed-eating birds.

3.8 Landscape

3.8.1 Overview

Development in accordance with the Structure Plan will change the landscape of the project area from predominantly rural to industrial, in keeping with the industrial landscape of the overall Muchea Industrial Park.

The objective of landscaping will be not to hide the industry from view but to provide vegetation features that “soften” and break up the industrial landscape. This will include plantings within lots along the interface of Great Northern Highway and Muchea East Road, bioretention swales and basins, vegetated creek lines, verge trees within the developed areas and landscape buffers within lots.

3.8.2 Landscape Plantings

The Shire of Chittering Town Planning Scheme imposes a general requirement that all non-residential lots should provide landscaping with approved species to a minimum of 10% of the total site area, including a minimum of one shade tree per four car parking bays.

The Shire of Chittering’s *Muchea Industrial Park Design Guidelines* (2018) set out the Council’s requirements and recommendations for development layout within lots, streetscaping, landscaping, bushfire management, fencing, signage and building design. The Guidelines require:

- a minimum 2m wide landscape buffer on the primary road frontage;
- a minimum 1m wide landscape buffer on secondary road interface and side boundaries extending to the building setback line;
- one shade tree per four car parking bays; and
- one tree per 10m of road frontage.

The landscape plantings within lots will be of a mix of native trees, shrubs and ground covers. The 1-year ARI 1-hour bioretention swales within each lot will be densely planted with native sedges and low shrubs. This will form part of the 10% landscaping requirement for each lot.

3.8.3 Streamline Revegetation

Roadside bioretention swales and through-drainage swales will be densely planted with native sedges and low shrubs to stabilise the beds and banks of the swales, slow water flows and promote the uptake of sediments and nutrients from the water. The northern creekline will be retained and protected within a vegetated foreshore and POS reserve that extends at least 30m and up to 150m from the creekline. The areas to be planted, species and planting densities are described in more detail in the Landscape Master Plan (BES, 2021).

Plantings within the swales will be kept to a height that meets the definition of Shrubland in the Bushfire Hazard Assessment (Eco Logical Australia, 2020) so as not to create an unacceptable fire hazard.

4.0 MONITORING

Baseline water quality results for the project area are shown in Tables 2.3 and 2.4. Groundwater levels and quality will continue to be monitored and compared against baseline levels and relevant guidelines. Surface water quality in drainage lines upstream and downstream of the project area will be monitored to determine what (if any) impacts the development may be having on surface water quality.

The developer of each stage of subdivision will be responsible for monitoring water quality in bores and drainage swales within that stage.

Water quality sampling will be conducted nominally once a year in late winter. Detailed water monitoring and response procedures will be developed as part of the Urban Water Management Plans to be prepared for each stage of subdivision.

5.0 IMPLEMENTATION AND FURTHER MANAGEMENT PLANS

Subdivision and development in the project area will be undertaken in accordance with the Structure Plan, this EAMS and the attached LWMS.

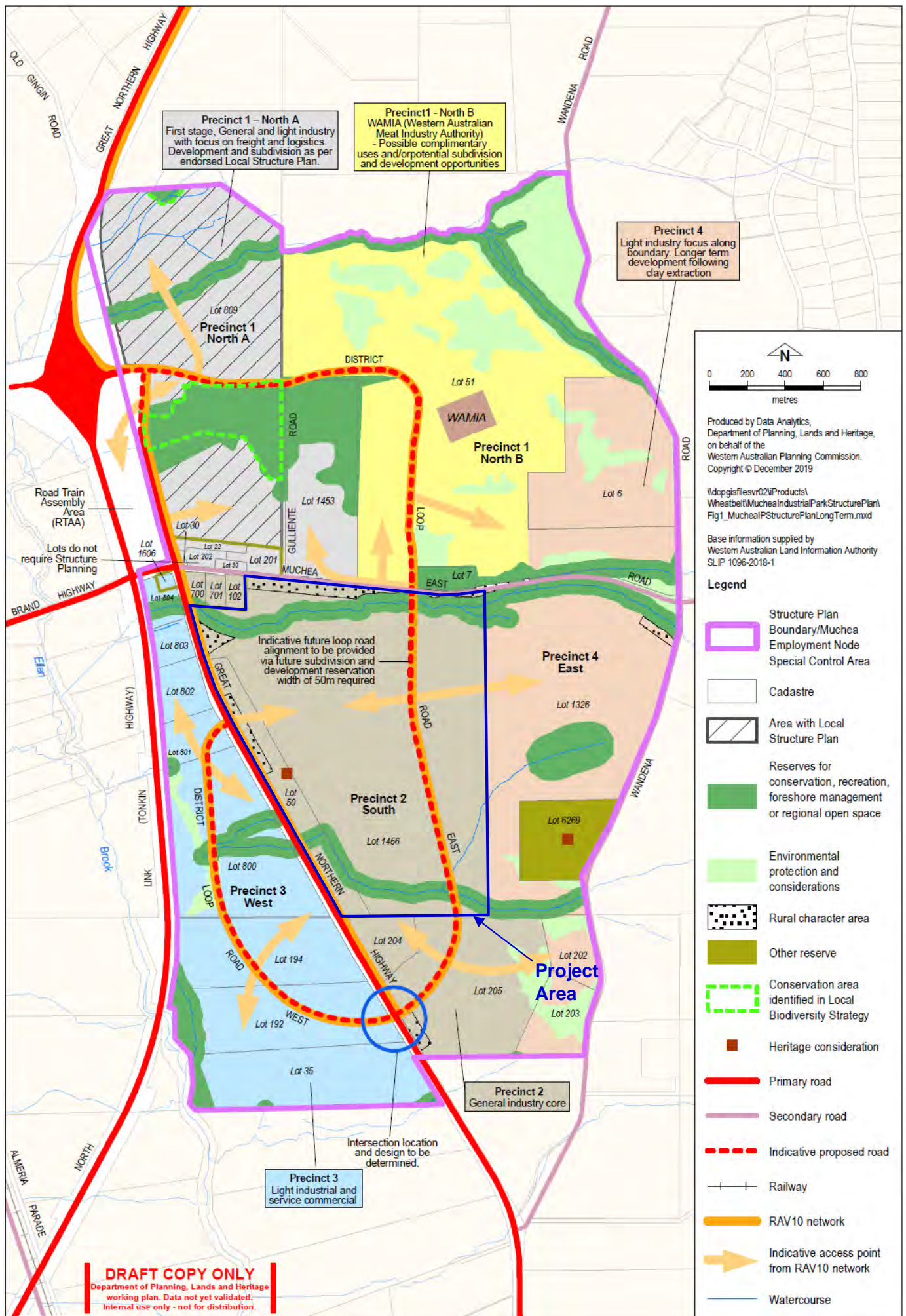
Development may occur in accordance with a subdivision approval or, in the absence of subdivision, a Development Approval. Subdivision approvals will include a requirement for an Urban Water Management Plan (UWMP). If development occurs without a subdivision, a Local Water Management Plan (LWMP) may be required to set out drainage design for the development.

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Figures



Source: WAPC, 2019

Figure 1

DRAFT MUCHEA INDUSTRIAL PARK STRUCTURE PLAN





Figure 2

THE SITE AND SURROUNDINGS



Image source: Google 2018

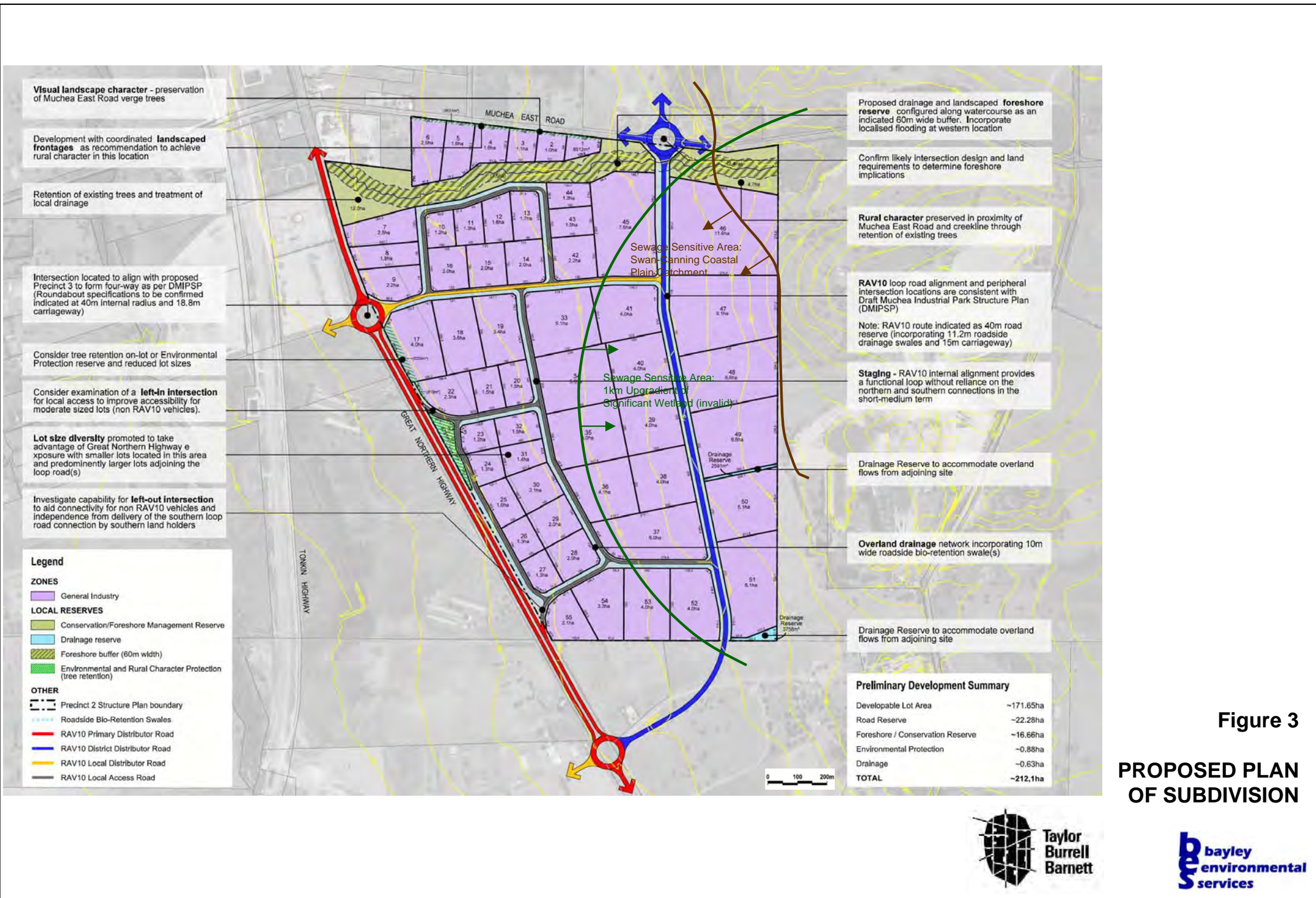


Figure 3

PROPOSED PLAN OF SUBDIVISION

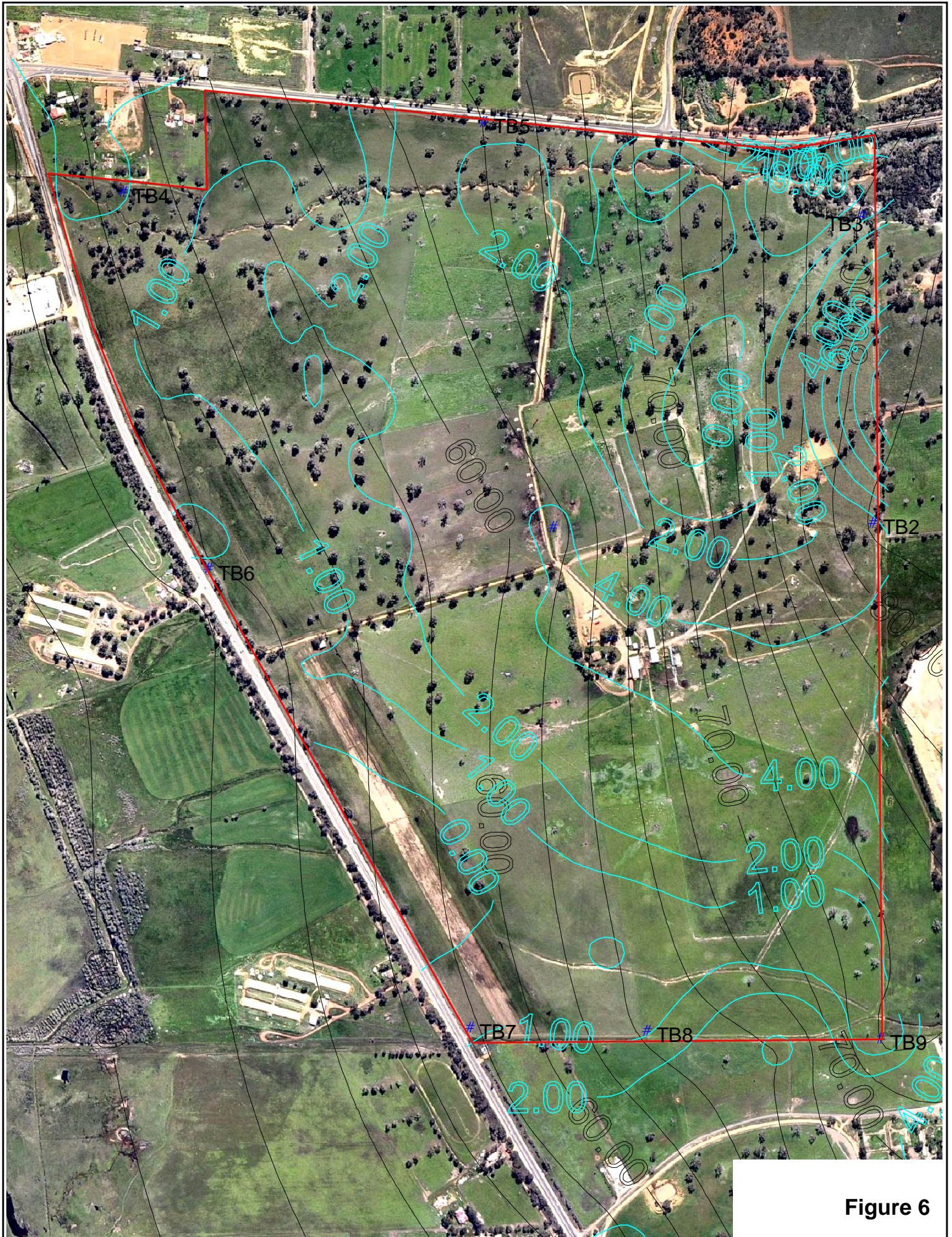




Figure 5

PHYSIOGRAPHY

- Site boundary
- Borehole
- 1m Topographic contour (m AHD)
- Geological boundary



0 200 400 600 Meters

- Site boundary
- Monitoring bore
- AAMGL (m AHD)
- Depth to AAMGL (mbgl)

Figure 6

**GROUNDWATER
HYDROLOGY**

Department of Water and Environmental Regulation

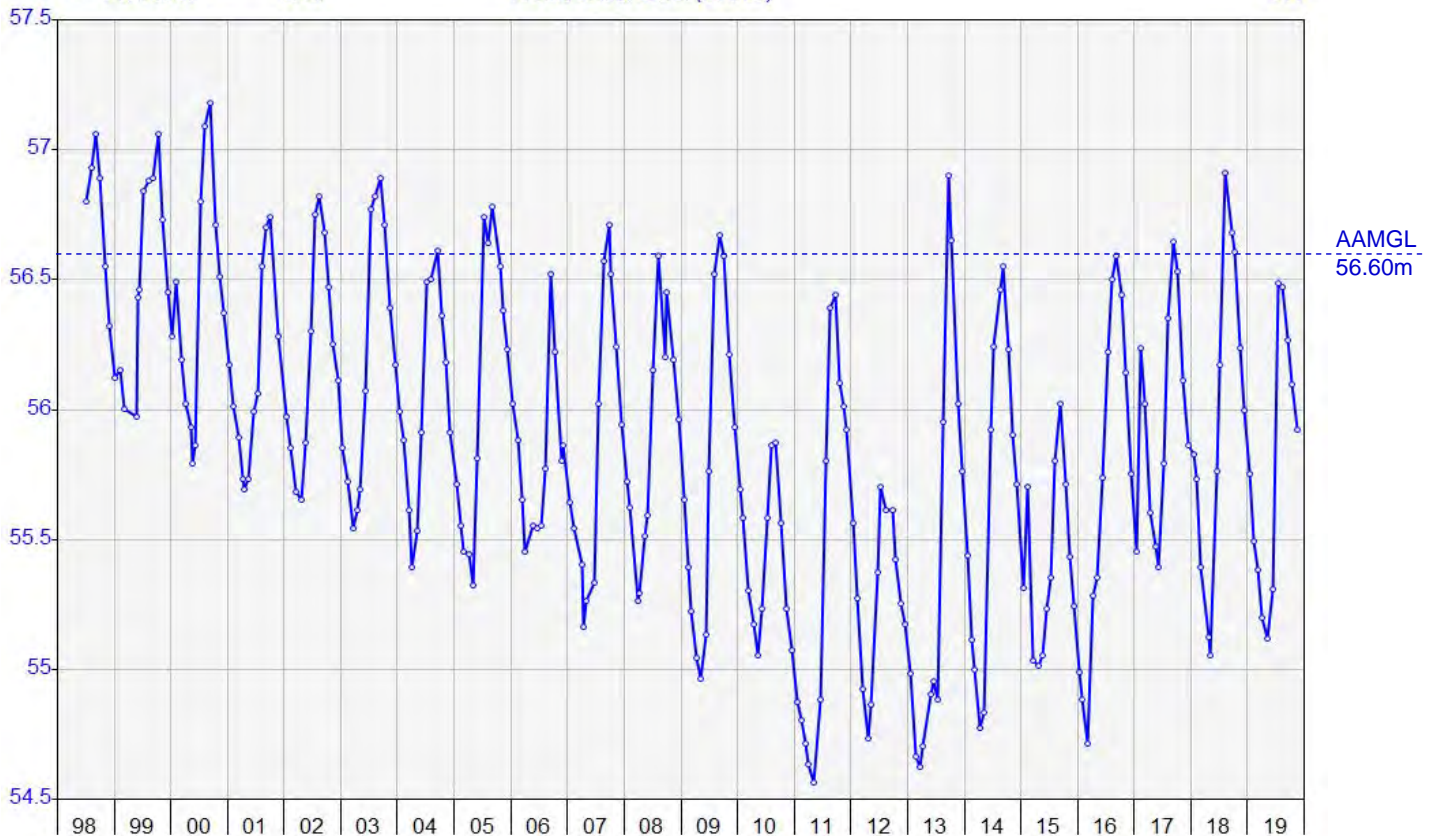
HYPLOT V134 Output 14/11/2019

Period 22 Year 01/01/1998 to 01/01/2020

1998-2019

61618559 2/98 115.00 Water Level (mAHD)

GW



Department of Water and Environmental Regulation

HYPLOT V134 Output 31/10/2019

Period 42 Year 01/01/1978 to 01/01/2020

1978-2019

61611073 GD20 115.00 Water Level (mAHD)

GW

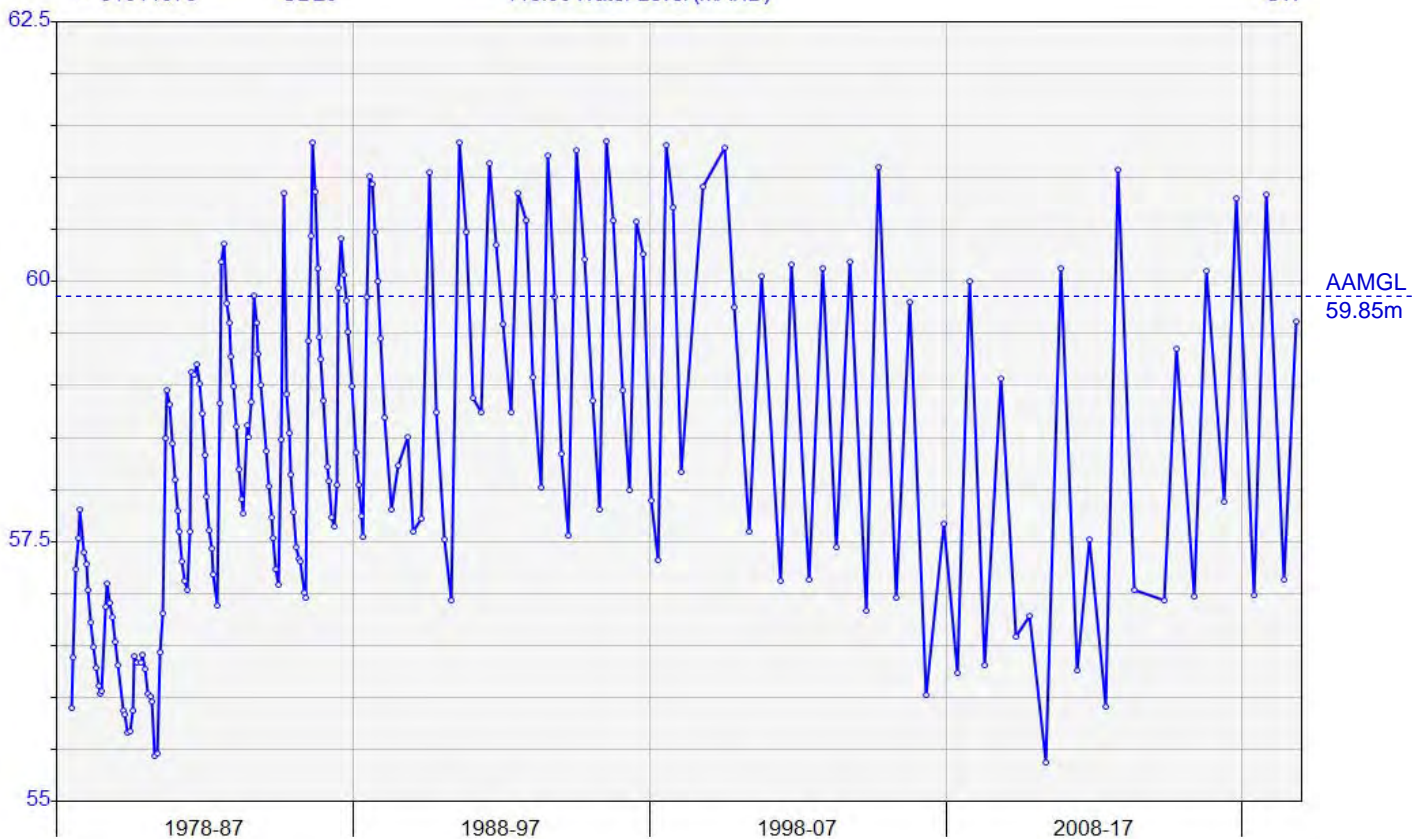
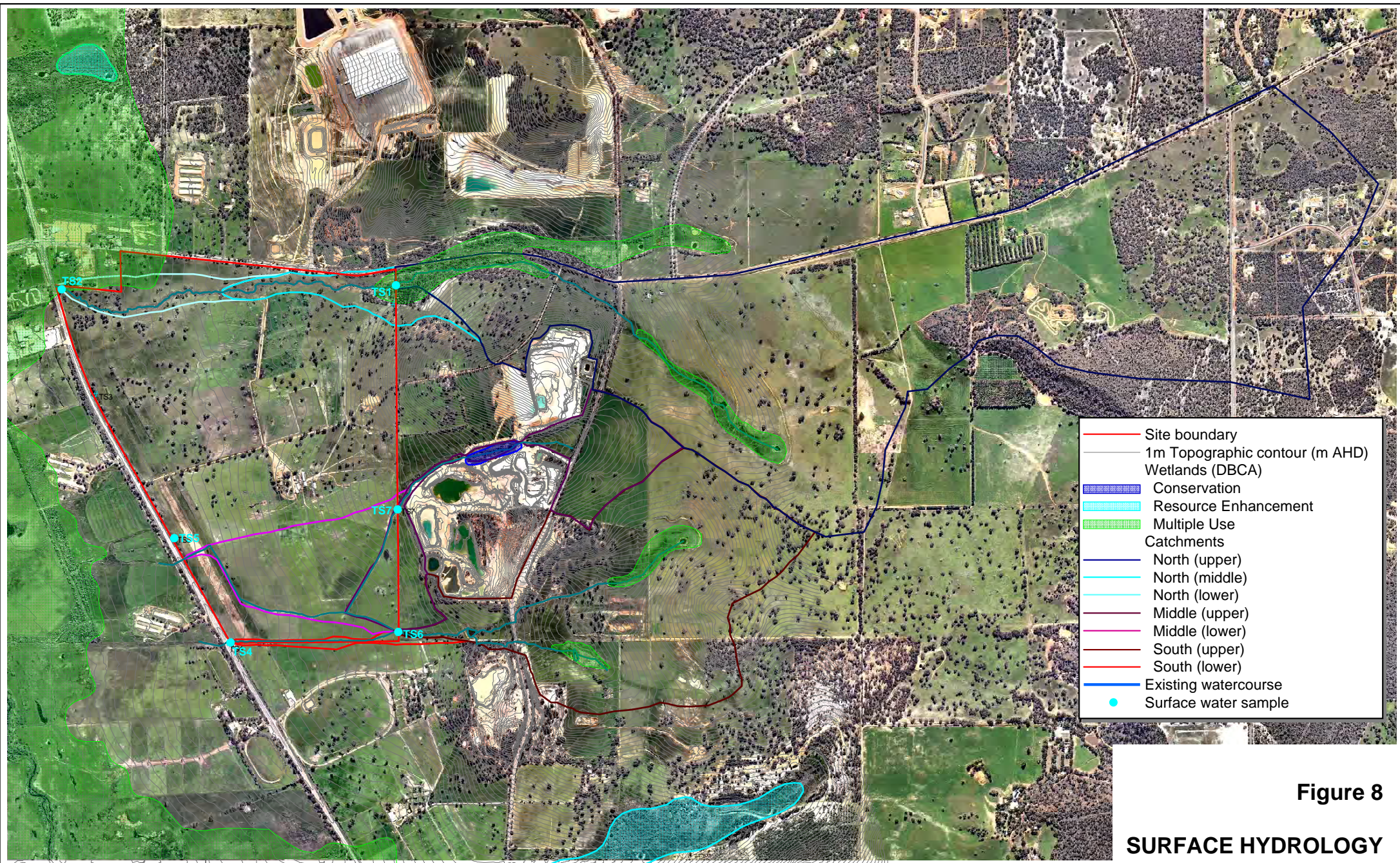


Figure 7

DWER BORE
HYDROGRAPHS





- Site boundary
- 1m Topographic contour (m AHD)
- Wetlands (DBCAs)
- Conservation
- Resource Enhancement
- Multiple Use
- Catchments
- North (upper)
- North (middle)
- North (lower)
- Middle (upper)
- Middle (lower)
- South (upper)
- South (lower)
- Existing watercourse
- Surface water sample

Figure 8

SURFACE HYDROLOGY



Figure 9

VEGETATION AND FAUNA



1 Great Northern Highway looking north-east



2 Great Northern Highway looking north-east



3 Great Northern Highway looking south-east



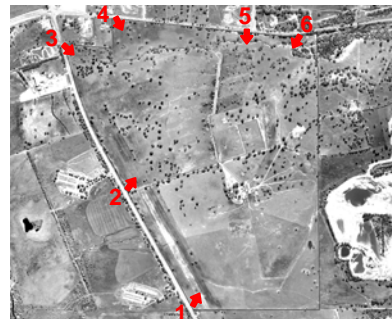
4 Muchea East Road looking south-east



5 Muchea East Road looking south

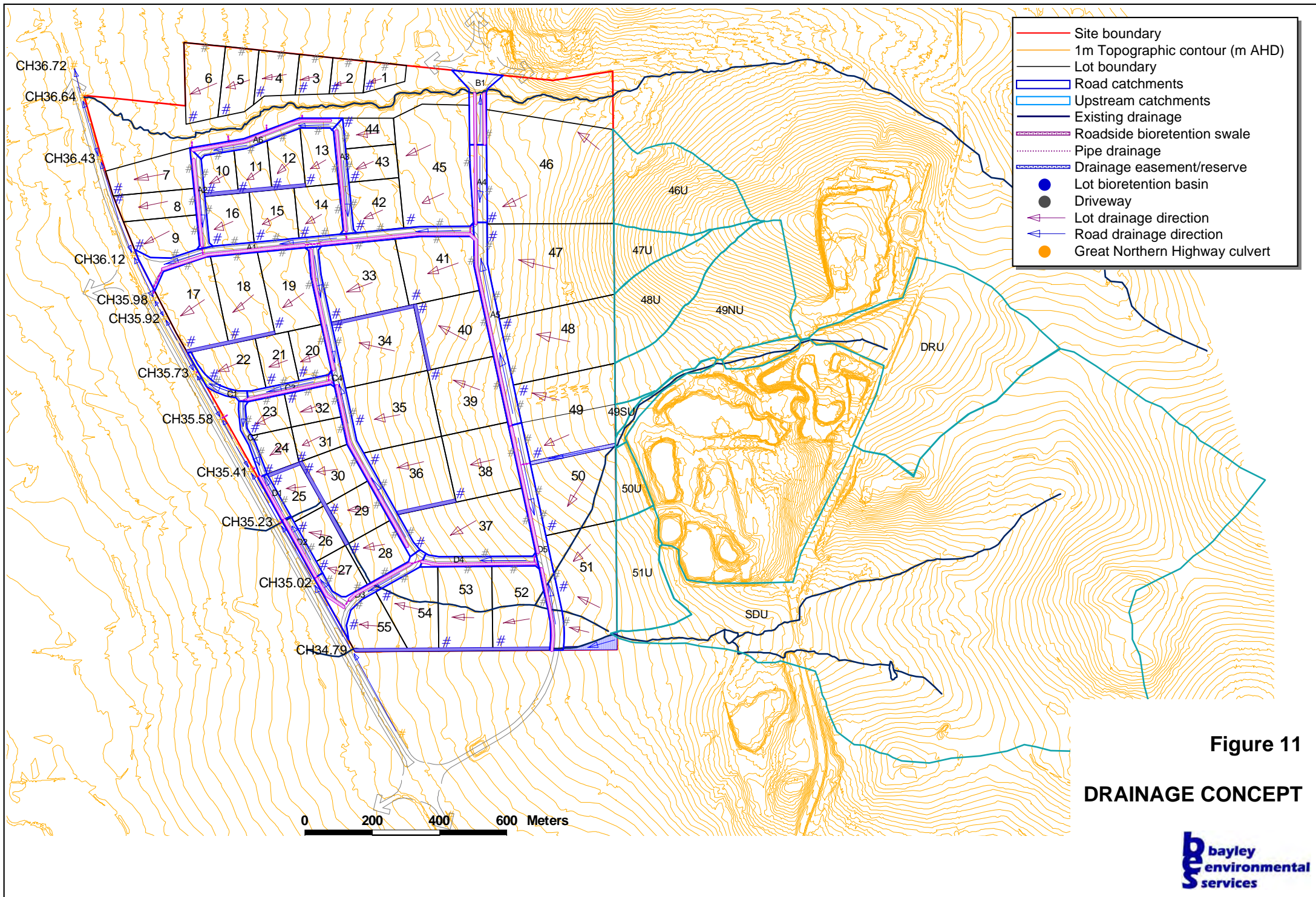


6 Muchea East Road looking south-west



Images: Google (2018)

Figure 10
VIEWS FROM GREAT NORTHERN HIGHWAY
AND MUCHEA EAST ROAD



Appendix A

Local Water Management Strategy

Appendix B

Tree Survey Results

Talangatta Tree Survey

List of Trees over 0.5m dbh

Wpt	Easting	Northing	Species	DBH (m)	Height (m)	Description	Hollow Inspection 261020
621	406296	6504203	uk	1	20	Dead stag, possibly Marri, several possible hollows, nothing large	No usable hollow.
622	406303	6504210	uk	1	15	Several possible hollows inc 2 large openings @ 5-8m	2 ok looking hollows, no sign of use.
623	406356	6504213	uk	0.9	15	Dead stage, several potential hollows & spouts	Corella chick in 1 hollow.
624	406369	6504916	uk	0.7	5	Dead stag, snapped at 5m no hollows	
625	405595	6504489	Wandoo	0.8	8	Healthy, spreading, no hollows	
626	405616	6504496	Marri	1	8	Bifurcated at 1m, spreading, no hollows	
627	405589	6504548	Marri	1.1	15	Spreading, no hollows	
628	405472	6504453	Wandoo	0.9	15	Spreading, no hollows	
629	405290	6504767	Wandoo	0.9	15	Healthy, spreading, no hollows	
630	405291	6504785	Wandoo	0.7	18	Straight, no hollows, stick nest up high	
631	405280	6504792	Wandoo	0.6	18	Straight, no hollows	
632	405263	6504837	Marri	0.8	10	Old, spreading, sparse foliage, no hollows	
633	405248	6504860	Marri	0.8	15	Spreading, no hollows	
634	405215	6504893	Wandoo	0.7	15	Few possible small hollows, none cocky size	
635	405211	6504901	Wandoo	0.7	4	Snapped off at 4m, dead branches, no hollows	
636	405243	6504937	Marri	0.7	10	Spreading, no hollows	
637	405387	6504937	Marri	0.8	12	Healthy, spreading, no hollows	
638	405450	6504823	Marri	0.8	15	Healthy, no hollows	
639	405546	6504791	Marri	0.9	15	Senescent, dead limbs, poss small hollows, none cocky sized	
640	405520	6504834	Marri	0.7	15	Spreading, healthy, no hollows	
641	405520	6504846	Marri	0.7	12	Spreading, healthy, no hollows	
642	405527	6504880	Marri	1	15	Spreading, healthy, no hollows	
643	405495	6504952	Marri	0.9	18	Healthy, 1 small hollow, not cocky sized	
644	405599	6504892	Marri	1	12	Healthy, spreading, no hollows	
645	405627	6504856	Marri	0.8	12	Spreading, no hollows	
646	405614	6504831	Marri	0.6	8	Many dead terminal branches, no hollows	
647	405807	6504920	Flooded gum	0.7	18	Possible ES euc, heavily branched, no hollows	
648	405790	6504950	Marri	0.9	12	Spreading, v senescent, no hollows	
649	405782	6505023	Wandoo	0.6	15	Possible ES euc, spreading, no hollows	
650	405877	6504976	Flooded gum	1.8	25	Probably ES euc, heavily branched at 2m, 1 stick nest, no hollows	
651	405845	6504974	Wandoo	0.9	20	Probably BG, no hollows	
652	405903	6504984	Flooded gum	1	20	Probably ES euc, no hollows	
653	405873	6504942	Wandoo	0.8	18	Sparse foliage, no hollows	
654	405891	6504904	Wandoo	0.7	15	Possible Wandoo, no hollows	
655	406047	6504922	Marri	0.7	8	Spreading, no hollows	
656	406066	6504948	Marri	0.7	10	Spreading, no hollows	
657	406077	6504920	Marri	0.6	12	Bifurcated at GL, senescent, no hollows	
658	406110	6505013	Marri	0.9	18	Healthy, no hollows	
659	406080	6505072	Marri	0.5	8	Sparse branches, no hollows	
660	406098	6505108	Marri	1	15	Old, senescent, no hollows	
661	406110	6505058	Marri	0.8	18	Spreading, no hollows	
662	406146	6505017	Marri	0.6	8	Spreading, no hollows	
663	406166	6505021	Marri	0.8	12	No hollows	
664	406183	6504956	Marri	0.7	8	No hollows	
665	406219	6504970	Marri	0.5	8	Slender, 1 sided, no hollows	
666	406202	6505040	Marri	0.6	10	No hollows	
667	406152	6505089	Jarrah	0.7	15	Bifurcated at GL, healthy, no hollows	
668	406164	6505116	Marri	0.7	12	Healthy, spreading, no hollows	
669	406130	6505149	Jarrah	0.8	8	Leaning, spreading, healthy, no hollows	
670	406165	6505143	Jarrah	0.7	5	Heavily senescent, leaning, poor health, no hollows	
671	406219	6505104	Marri	0.8	12	Healthy, spreading, no hollows	
672	406270	6505104	Marri	0.7	12	Spreading, healthy, no hollows	

673	406225	6505149 Marri	0.9	10	Senescent, dead limbs, possible hollows/spouts	
674	406171	6505232 Marri	1	20	Spreading, no hollows	
675	406162	6505265 Marri	1	18	Spreading, no hollows	
676	406203	6505269 Marri	0.8	12	No hollows	
677	406245	6505355 Wandoo	0.5	8	Bifurcated at 1m, no hollows	
678	406322	6505333 Wandoo	0.8	15	2 large dead sections, Corellas, 1 or 2 potential large spouts at 4 & 6 m	
679	406313	6505327 Wandoo	1	15	Most trunk dead (1 side), 2 possible hollows/spouts, 28s & Corellas squabbling	
680	406301	6505312 Wandoo	0.7	8	No hollows	
681	406293	6505297 Wandoo	0.7	5	Snapped off at 2.5m, no hollows	
682	406258	6505273 Marri	0.7	10	Top 3-4m dead, 1 small hollow occupied by 28s	
683	406260	6505226 Marri	0.5	6	No hollows	
684	406249	6505218 Marri	0.6	10	No branches below 6m, no hollows	
685	406234	6505213 Marri	0.7	15	no branches below 6m, stick nests in top, no hollows	
686	406240	6505186 Marri	0.5	6	Spreading, no hollows	
687	406324	6505350 Wandoo	0.5	5	Bifurcated at 1m, no hollows	
688	406298	6505375 Wandoo	0.5	8	1-2 small hollows, not cocky sized	
689	406257	6505355 Wandoo	0.5	10	No hollows	
690	406274	6505346 Wandoo	0.5	8	Heavily branched, no hollows	
691	406357	6505377 Wandoo	0.6	10	No hollows	
692	406366	6505351 Wandoo	0.9	15	Dead sections of trunk & branches, 1 possible cocky hollow	
693	406349	6505137 Marri	0.6	10	No hollows	
694	406322	6505160 Marri	0.6	12	Twin marris, spreading, no hollows	
695	406318	6505161 Marri	0.5	5	No hollows	
696	406316	6505165 Marri	0.7	7	No hollows	
697	406314	6505152 Marri	0.7	10	Spreading, no hollows	
698	406308	6505137 Marri	0.8	10	Spreading, no hollows	
699	406366	6505023 Marri	1	6	Strongly leaning, senescent, hollow at 2m with beehive	
700	406359	6505583 Wandoo	0.6	6	Heavily branched, spreading, no hollows	
701	406352	6505576 Wandoo	0.5	6	Branching, no hollows	
702	406332	6505581 Wandoo	0.5	10	Spreading, no hollows	
703	406307	6505575 Wandoo	0.7	8	2 Wandooos, no hollows	
704	406280	6505537 Wandoo	0.7	15	Spreading, 1 sided, no hollows	
705	406281	6505518 Wandoo	1.1	8	Snapped off at 6m, possible large spout in top	
706	406264	6505541 Wandoo	0.7	10	No hollows	
707	406185	6505489 Marri	0.7	8	No hollows	
708	406168	6505464 Wandoo	0.7	15	Healthy, no hollows	
709	406203	6505414 Wandoo	0.6	15	No hollows	
710	406245	6505451 Wandoo	0.6	15	No hollows	
711	406279	6505453 Wandoo	0.7	15	2 or 3 small hollows up high, none cocky sized	
712	406302	6505481 Wandoo	0.6	15	Spreading, no hollows	
713	406177	6505395 Jarrah	0.8	12	Spreading, leaning, no hollows	
714	406124	6505374 Marri	0.8	15	No hollows	
715	406121	6505346 Marri	0.8	18	Healthy, spreading, no hollows	
741	405456	6505041 Wandoo	0.7	12	Healthy, no hollows	
742	405449	6505030 Wandoo	0.8	15	Healthy, spreading, several potential large and small hollows	2 hollows, 1 obstructed, other messy, no use.
743	405428	6505043 Wandoo	0.7	15	Spreading, one hollow at 3m another at 6m, 2 other potentials	No usable hollow.
744	405360	6505004 Wandoo	0.9	12	1 small hollow at 5m, possibly other small ones towards top	No usable hollow.
745	405399	6505065 Marri	1	10	No hollows	
746	405394	6505094 Wandoo	0.9	12	1 hollow at 8m with beehive, 2 other small potentials	1 hollow 0.5m deep with bees.
747	405395	6505110 Marri	1	8	1 potential large hollow at 3m	No usable hollow.
748	405343	6505115 Marri	0.9	15	Spreading, dead upper branches, no hollows	
749	405316	6505132 Marri	0.8	12	1 small hollow at 3m	No usable hollow.
750	405337	6505177 Marri	1.1	15	Spreading, no hollows	
751	405345	6505219 Marri	0.8	10	No hollows	
752	405345	6505219 Marri	0.7	8	No hollows	
753	405378	6505217 Marri	0.6	6	No hollows	
754	405394	6505211 Marri	1	10	Lots of carellas, no hollows	

755	405393	6505264 Marri	0.7	12	No hollows	
756	405389	6505272 Marri	0.8	12	No hollows	
757	405389	6505302 Marri	0.8	10	Spreading, no hollows	
758	405394	6505343 Marri	0.7	10	Spreading, sparse foliage, possibly poor health, no hollows	
759	405390	6505456 Marri	0.7	15	No hollows	
760	405359	6505457 Marri	0.7	10	No hollows	
761	405402	6505482 Marri	0.8	10	No hollows	
762	405438	6505530 Marri	0.6	10	Senescent, scrappy looking, no hollows	
763	405401	6505642 Marri	0.9	10	Spreading, no hollows	
764	405353	6505702 Marri	0.8	10	Everything above 3m dead, senscent, hollow at 3-4m mark with a beehive near	Decent hollow, beehive next to it.
765	405358	6505726 Marri	1	10	Spreading, no hollows	
766	405322	6505688 Marri	0.6	10	No hollows	
767	405339	6505627 Marri	0.9	15	Straight, clean, no hollows	
768	405226	6505585 Wandoo	0.6	12	Straight, no hollows	
769	405272	6505482 Wandoo	0.6	15	Straight, clean, no hollows	
770	405290	6505490 Wandoo	0.6	15	2 possible small hollows at 5 and 7m	1 hollow with 2 corellas
771	405328	6505482 Marri	0.9	18	Spreading, no hollows	
772	405210	6505405 Marri	0.7	12	No hollows	
773	405231	6505376 Wandoo	0.7	12	No hollows	
774	405255	6505359 Wandoo	0.6	8	No hollows	
775	405311	6505387 Marri	0.9	8	Spreading, no hollows	
776	405325	6505405 Wandoo			Recently deceased, no hollows	
777	405324	6505336 Marri	0.6	6	No hollows	
778	405326	6505336 Marri	0.5	5	No hollows	
779	405335	6505326 Marri	1	15	Senescent, aggressive hive at base, 1 large hollow at 5m with possible traffic marks	Large hollow 0.5m deep, no use.
780	405322	6505314 Marri	0.5	8	No hollows	
781	405300	6505311 Marri	0.5	8	Heavily laden with nuts, no hollows	
782	405267	6505327 Marri	0.7	10	No hollows	
783	405244	6505333 Wandoo	0.8	8	1 large gap from 2m, 2 small hollows at 4-5m - not cocky sized	
784	405298	6505295 Marri	0.7	15	No hollows	
785	405305	6505276 Marri	0.8	12	1 possible large hollow at 6m, white feather stuck to outside	No usable hollow.
786	405310	6505004 Wandoo	1	15	Very senscent, basically dead 3m up, dead branches, several possible hollows (1 lrg)	1 hollow with kestrel on eggs.
787	405296	6504995 Wandoo	0.6	8	No hollows	
788	405181	6504954 Marri	0.9	15	One sided to east, trimmed off from powerline, no hollows	
789	405174	6504977 Marri	0.7	8	No hollows	
790	405159	6504991 Marri	0.8	10	One sided, no hollows	
791	405123	6505056 Marri	0.7	10	No hollows	
792	405118	6505068 Marri	1.3	15	One sided, no hollows	
793	405092	6505107 Marri	1	10	Cut away from powerline, 1 v small hollow at 8m	
794	405069	6505179 Wandoo	1	10	No hollows	
795	405045	6505201 Wandoo	0.6	8	Bifurcated at 0.5m, larger is 0.6, no hollows	
796	405032	6505247 Marri	1	8	Spreading, no hollows	
797	405010	6505279 Wandoo	0.7	10	No hollows	
798	405009	6505285 Wandoo	0.8	10	Possibly one hollow forming	No usable hollow - perhaps future.
799	404977	6505363 Marri	0.7	10	No hollows	
800	404964	6505353 Stag	0.9	4	Cut off at top, no hollows	
801	404971	6505372 Marri	0.9	10	Spreading, no hollows	
802	404976	6505388 Marri	0.9	10	Spreading, no hollows	
803	405052	6505467 Marri	0.9	8	No hollows	
804	405064	6505447 Marri	0.9	10	No hollows	
805	405082	6505378 Marri	0.8	6	Old, no hollows	
806	405090	6505367 Marri	0.7	6	No hollows	
807	405106	6505391 Wandoo	0.8	15	No hollows	
808	405133	6505417 Wandoo	0.7	12	No hollows	
809	405154	6505409 Wandoo	0.7	10	No hollows	
810	405187	6505391 Wandoo	0.9	10	Big dead chunk on trunk, one very large hollow at 3.5m	Big spout, no occupancy.
811	405207	6505340 Wandoo	0.7	10	Bifurcated at 1m, larger is dead, spout at 3m	No usable hollow.

812	405170	6505318 Marri	0.8	12	Old, senescent, few potential hollows, none current	
813	405158	6505324 Marri	0.6	8	Spreading, no hollows	
814	405147	6505307 Marri	0.7	8	Largest of 3 next to each other by combining 2 trunks, senescent, no hollows	
815	405218	6505190 Marri	0.7	8	Spreading, no hollows	
816	405070	6505596 Wandoo	0.6	6	Trifurcated at 0.5, no hollows	
817	405088	6505672 Wandoo	0.9	15	No hollows	
818	405016	6505698 Wandoo	0.6	10	No hollows	
819	405009	6505704 Wandoo	0.7	10	Spreading, no hollows	
820	404968	6505706 Wandoo	0.5	15	No hollows	
821	404982	6505730 Wandoo	0.6	15	No hollows	
822	404887	6505670 Wandoo	0.5	10	No hollows	
823	404942	6505656 Wandoo	0.5	10	No hollows	
824	405117	6505713 Dead Stag - Wandoo	0.7	10	No hollows	
825	405164	6505672 Wandoo	0.7	15	2 small hollows, none cocky sized, 1 stick nest 5m	
826	405171	6505674 Marri	0.7	10	Double trunk, larger dead, no hollows	
827	405200	6505665 Wandoo	0.7	8	Triple trunked, 1 small hollow, nothing cocky sized	
828	405205	6505647 Marri	0.7	8	Spreading, no hollows	
829	405185	6505641 Marri	0.7	8	No hollows	
830	405204	6505625 Wandoo	0.6	8	No hollows	
831	405216	6505730 Marri	0.7	8	No hollows	
832	405299	6505750 Marri	0.5	10	No hollows	
833	405312	6505764 Marri	0.6	8	Several trunks, no hollows	
834	405337	6505767 Marri	0.6	8	No hollows	
835	405345	6505766 Marri	0.8	10	Almost entirely dead, no hollows	
836	405356	6505746 Marri	0.8	15	Mostly dead, 1 low potential cocky hollow 5m	2 hollows, 1 possibly with corellas, other with 2-3 kestrel chicks.
837	405363	6505799 Marri	0.6	12	No hollows	
838	405366	6505799 Marri	0.6	10	1m east of 837, no hollows	
839	405379	6505801 Marri	0.6	10	No hollows	
840	405387	6505795 Marri	0.5	10	Recently dead, no hollows	
841	405403	6505801 Wandoo	0.6	8	No hollows	
842	405444	6505806 Wandoo	0.6	8	No hollows	
843	405513	6505799 Wandoo	0.5	6	1 very small hollow 3m	
844	405563	6505794 Marri	0.7	10	No hollow, 1 possible forming 3m	
845	405630	6505807 Marri	0.7	8	Recently deceased, spreading, no hollows	
846	405680	6505787 Marri	0.6	8	No hollows	
847	405715	6505771 Marri	0.5	12	No hollows	
848	404844	6505779 Wandoo	0.6	5	No hollows	
849	404839	6505793 Marri	1	15	"Large impressive specimen", no hollows	
850	404819	6505813 Marri	0.7	8	Spreading, no hollows	
850 (2)	405506	6505061 Wandoo	0.9	20	Small dead branches&twigs, otherwise healthy, spout and beehive possible at 10, 5m	Decent hollow, no usage.
851	405508	6505079 Wandoo	0.5	10	No hollows	
852	405493	6505099 Wandoo	0.7	10	Lots of dead small upper branches, no hollows	
853	405553	6505191 Marri	0.9	12	Large dead sections, 2 possible future hollows	
854	405508	6505299 Marri	0.8	6	Major bifurcation 1.5m, one side mostly dead, hollow 4m with carella, another small at 6	1 good hollow with corellas.
855	405489	6505240 Marri	0.7	10	Dead branches, no hollows	
856	405611	6505542 Marri	0.8	10	Spreading, no hollows	
857	405867	6505825 Jarrah	0.9	8	Senescent, spreading, dead branches, 3 small/potentia hollows, none cocky sized	
858	405937	6505814 Marri	0.7	7	Senescent, dead branches, no hollows	
859	406008	6505816 Marri	0.9	10	Old, 1 hollow homing a 28	Decent hollow, no occupant.
860	406018	6505824 Marri	0.8	12	No hollows, 1 magpie nest up high	
861	406358	6505753 Dead Stag - Wandoo	0.6	10	No hollows	
862	406360	6505721 Marri	0.7	18	Healthy, no hollows	
863	406362	6505712 Marri	0.5	8	No hollows	
864	406323	6505698 Marri	0.7	15	No hollows	
865	406311	6505707 Marri	0.6	18	No hollows	
866	406276	6505707 Marri	1	20	1 possible large spot at 6m, 1 very large hollow at 12m, may or may not be habitable	No usable hollow.
867	406243	6505671 Marri	0.7	12	Senescent, no hollows	

868	406307	6505672 Marri	0.7	15	No hollows	
869	406324	6505680 Marri	0.7	12	No hollows	
870	406340	6505676 Marri	0.6	6	Old, spreading, no hollows	
871	406343	6505661 Marri	0.6	8	Spreading, no hollows	
872	406359	6505646 Marri	0.6	8	Senescent, no hollows	
873	406356	6505619 Wandoo	0.5	8	No hollows	
874	406314	6505609 Marri	0.7	20	No hollows	
875	406301	6505627 Marri	0.9	15	Bifurcated at 2m, no hollows	
876	406275	6505610 Marri	0.9	18	No hollows	
877	406284	6505595 Marri	0.6	15	No hollows	
878	406301	6505600 Wandoo	0.5	10	No hollows	
879	406312	6505609 Marri	0.8	18	No hollows	
880	406300	6505594 Marri	0.7	10	Dead, No hollows	
881	406273	6505567 Wandoo	0.5	8	No hollows	
882	406264	6505583 Marri	0.5	15	1 Stick nest at 10m, no hollows	
883	406215	6505575 Marri	0.7	20	No hollows	
884	406210	6505548 Marri	0.7	18	Trifurcated at 1.5m, spreading, senescent, no hollows	
885	406233	6505535 Wandoo	0.8	20	No hollows	
886	406214	6505525 Wandoo	0.7	8	Top 3m dead, no hollows	
887	406169	6505534 Marri	0.5	8	1 large dead upright but no visible hollow, possible future spout	
888	406154	6505561 Marri	0.7	15	Bifurcated at 0.5m, no hollows	
889	406166	6505590 Marri	0.7	15	No hollows	
890	406043	6505515 Marri	0.6	8	No hollows, 1 28 at top	
891	406029	6505508 Marri	0.5	8	Sparse, no hollows	
892	406000	6505508 Marri	0.8	20	1 small hollow at 5m, not cocky sized	
893	405976	6505512 Marri	0.6	18	No hollows	
894	405932	6505485 Marri	0.9	18	Spreading, no hollows	
895	405844	6505488 Marri	0.7	12	Almost dead, no hollows	
896	405773	6505474 Marri	0.6	8	No hollows	
897	405756	6505628 Marri	0.6	6	Old, no hollows	
898	405785	6505643 Marri	0.7	10	No hollows	
899	405852	6505670 Marri	0.7	10	Senescent, lots of dead branches, no hollows	
900	405851	6505710 Marri	0.8	8	No hollows	
901	405863	6505714 Marri	0.7	8	No hollows	
902	405897	6505728 Marri	0.7	15	No hollows	
903	405956	6505700 Marri	0.8	8	No hollows	
904	405964	6505712 Marri	0.7	12	Mostly dead, 1 small hollow 5m, not cocky sized	
905	405978	6505713 Marri	0.6	12	No hollows	
906	406008	6505737 Marri	0.8	20	No hollows	
907	406029	6505763 Marri	0.8	20	Fairly sparse, no hollows, 1 magpie	
908	406074	6505758 Marri	0.9	20	Beehive at base and another at 4m, hollows at 6 and 10m - not cocky sized	
909	406080	6505717 Marri	0.6	12	No hollows	
910	406088	6505718 Marri	0.7	15	Partly dead, 2 very small hollows	
911	406096	6505723 Marri	0.7	12	No hollows	
912	406102	6505713 Marri			Dead branch low down, higher up is healthy, no hollows	
913	406125	6505751 Marri			Mostly dead, one small hollow 3m	
914	406133	6505753 Marri	0.6	15	No hollows	
915	406139	6505735 Marri	0.8	18	No hollows	
916	406157	6505748 Marri	0.6	15	No hollows	
917	406175	6505758 Marri	0.7	10	No hollows	
918	406190	6505731 Marri	0.7	12	No hollows	
919	406167	6505691 Marri	0.7	15	Leaning, no hollows	
920	406139	6505694 Marri	0.9	20	Large possible spout 10m, another slightly higher	Big deep hollow, no sign of use.
921	406128	6505661 Marri	0.6	10	No hollows	
922	406042	6505643 Marri	0.7	15	No hollows	
923	406033	6505551 Marri	0.7	15	No hollows	
924	406006	6505576 Marri	0.6	8	No hollows	

925	405960	6505634 Marri	0.8	12	Lots of dead branches, quite senescent, 1 hollow 8m with beehive	
926	405965	6505667 Marri	0.7	12	No hollows	
927	404877	6505827 Wandoo	0.6	15	No hollows, stick nest at 12m	
928	404896	6505814 Wandoo	0.5	10	1 of a group, 1 small hollow 4m - not cocky sized	
929	404920	6505808 Wandoo	0.6	8	4 trunks, bushy, spreading, no hollows	
930	404938	6505841 Wandoo	0.6	8	Bushy, spreading, no hollows	
931	405072	6505810 Marri	0.6	8	No hollows	
932	405096	6505795 Wandoo	0.6	8	No hollows	
933	405090	6505794 Wandoo	0.6	6	No hollows	
934	405089	6505790 Wandoo	0.6	8	No hollows	
935	405078	6505772 Wandoo	0.5	8	No hollows	
936	405074	6505770 Wandoo	0.5	8	No hollows	
937	405080	6505766 Wandoo	0.7	10	4 trunks, no hollows	
938	405087	6505745 Wandoo	0.5	10	2 trunks, no hollows	
939	405133	6505861 Wandoo	1	20	1 possible hollow 5m	2 hollows, 1 too shallow, other had beehive.
940	405101	6505929 Wandoo	1	20	Trunk snapped at 4m, possible very large spout at top	Huge chimney in top, too big for nest.
941	405106	6505955 Wandoo	0.6	8	No hollows	
942	405130	6505996 Dead stag - Marri	0.6	8	No hollows	
943	405135	6505996 Marri	0.8	15	2 hollows, both with beehive	
944	405142	6505989 Wandoo	0.9	15	No hollows	
945	405160	6505988 Wandoo	0.7	18	No hollows	
946	405195	6505954 Marri	1.1	20	Very broad base - 2m+, no hollows	
947	405214	6505943 Marri	0.7	15	No hollows	
948	405203	6505916 Marri	0.7	15	No hollows	
949	405211	6505882 Marri	0.6	10	Double trunk, no hollows	
950	405265	6505892 Marri	0.6	12	1 possible hollow 10m	No usable hollow.
951	405239	6505990 Marri	0.9	20	Next to powerline, no hollows	
952	405282	6505835 Marri	0.7	7	Snapped off at 4m, huge spout in snapped part, probably not hollow	Big deep spout, no sign of use.
953	405267	6505825 Marri	0.7	10	1 hollow with beehive	
954	405257	6505787 Marri	0.6	15	No hollows	
955	405217	6505759 Wandoo	0.7	15	No hollows	
956	405264	6505767 Marri	0.8	18	No hollows	
957	405254	6505782 Marri	0.6	10	No hollows	
958	405309	6505856 Marri	0.8	18	No hollows	
959	405351	6505818 Marri	0.6	15	No hollows	
960	405395	6505838 Marri	0.7	15	No hollows	
961	405401	6505828 Stag - Marri	0.6	6	No hollows	
962	405420	6505840 Marri	1	15	1 small hollow at 3m	
963	405436	6505825 Marri	0.8	18	No hollows	
964	405474	6505821 Marri	0.6	10	No hollows	
965	405482	6505824 Wandoo	0.9	20	1 possible future hollow at 8m	
966	405523	6505887 Marri	1	15	No hollows	
967	405561	6505827 Wandoo	0.9	20	Beehive in very small hollow 3.5m, large hollow right next to it, another possible 10m	No usable hollows.
968	405586	6505862 Marri	0.9	18	Very spreading, no hollows	
969	405628	6505913 Marri	0.8	15	No hollows	
970	405637	6505943 Marri	0.7	18	2 trunks from 0.5m, no hollows	
971	405626	6505848 Marri	0.7	15	No hollows	
972	405673	6505867 Marri	0.7	15	top half dead, no hollows	
973	405687	6505895 Marri	0.6	15	Recently dead, no hollows	
974	405695	6505909 Marri	0.7	18	Split at 0.5m, no hollows	
975	405700	6505936 Marri	0.8	15	Large hollow 5m	Decent hollow, occupied by ants nest.
976	405732	6505935 Marri	0.7	12	No hollows	
977	405763	6505930 Stag - Marri	0.6	10	No hollows	
978	405754	6505899 Marri	0.6	10	Most of main trunk dead, possible spout 4m	No usable hollow.
979	405756	6505879 Marri	0.7	15	Mostly recently dead, no hollows	
980	405759	6505860 Marri	0.8	15	No hollows	
981	405745	6505862 Stag	0.7	5	No hollows	

982	405794	6505891 Marri	0.7	15	1 Stick nest at 15m, no hollows	
983	405798	6505872 Marri	0.6	8	No hollows	
984	405858	6505864 Marri	0.8	15	No hollows	
985	405851	6505863 Marri	0.6	8	3m south of 984, no hollows	
986	405878	6505883 Marri	0.7	15	3 trunks, 1 possible small hollow 4m - not cocky sized	
987	405987	6505877 Marri	0.8	20	Spreading, no hollows	
988	406052	6505897 Stag - Marri	1	8	2 possible spouts at ends of branches, nothing visible	
989	406086	6505832 Marri	0.6	15	No hollows	
990	406104	6505840 Marri	0.6	15	No hollows	
991	406159	6505863 Wandoo	0.7	15	1 possible hollow at 10m, substantial stick nest 12m	Beehive in hollow.
992	406171	6505862 Wandoo	0.6	8	No hollows	
993	406220	6505857 Marri	0.8	20	Top 5m mostly dead, possible spout 18m	No usable hollow.
994	406245	6505853 Marri	0.6	8	No hollows	
995	406207	6505890 Wandoo	0.5	8	No hollows	
996	406317	6505904 Stag	0.8	15	No hollows	
997	406340	6505854 Marri	0.6	15	Split at 0.5m, no hollows	
998	406330	6505853 Marri	0.6	6	Old, no hollows	
999	406288	6505851 Marri	0.6	10	No hollows	
1001	406286	6505845 Marri	0.6	12	3 trunks from 0.5m, no hollows	
1002	406295	6505853 Marri	0.9	6	Fallen, no hollows	
1003	405084	6505767 Wandoo	0.6	12	3-4 trunks from ground level, no hollows	
1004	405076	6505768 Wandoo	0.5	10	No hollows	
1005	405052	6505731 Marri	0.5	12	No hollows	
1006	405048	6505736 Marri	0.7	15	Trifurcated at 0.5m, no hollows	
1007	405004	6505759 Wandoo	0.7	6	No hollows	
1008	405000	6505746 Wandoo	0.7	12	No hollows	
1009	404979	6505752 Wandoo	0.5	8	No hollows	
1011	405832	6505351 Marri	0.5	8	Senescent, dead tips, no hollows	
1012	405840	6505407 Marri	0.95	20	Old, healthy looking, 1 likely hollow at 8-9m - not cocky sized but inhabited	
1013	405843	6505412 Marri	0.6	7	2m NE of 1012, no hollows	
1014	405866	6505382 Marri	0.6	7	Senescent, no hollows	
1015	405903	6505370 Marri	0.8	18	Spreading, no hollows	
1016	405893	6505435 Marri	1	15	Spreading, no hollows	
1017	405942	6505404 Marri	0.8	15	No hollows	
1018	405997	6505413 Marri	0.7	15	No hollows	
1019	405975	6505395 Marri	0.7	12	No hollows	
1020	406028	6505367 Jarrah	0.9	5	Almost entirely dead, burnt out at base, 2 potential huge spouts at 4m	2 very large hollows, no usage.
1021	405933	6505319 Marri	0.7	10	Almost dead, probably dying possible 20cm hollow 5m, another smaller one 6m	1 hollow with corellas, 1 other smaller, no use.
1022	405047	6505798 Wandoo	0.4	6	No hollows	
1023	405033	6505797 Wandoo	0.5	8	No hollows	
1024	404935	6505820 Wandoo	0.4	8	Double trunk, no hollows	
1025	404894	6505706 Wandoo	0.4	8	Triple trunked, no hollows	
1026	404922	6505742 Wandoo	0.5	5	Double trunked, 1 very small hollow 3m - not cocky sized	
1027	404912	6505757 Wandoo	0.5	6	Lots of dead foliage at top, no hollows	
1028	404945	6505677 Wandoo	0.4	7	Spreading, no hollows	
1029	404883	6505661 Wandoo	0.5	8	Triple trunked, no hollows	

Appendix C

Aboriginal Sites Search Report and DPLH Advice



Search Criteria

2 Registered Aboriginal Sites in Coordinates search area: 404797.00mE, 6505844.00mN z50 (MGA94) : 405094.00mE, 6505817.00mN z50 (MGA94) : 405094.00mE, 6506005.00mN z50 (MGA94) : 406180.00mE, 6505893.00mN z50 (MGA94) : 406368.00mE, 6505923.00mN z50 (MGA94) : 406376.00mE, 6504206.00mN z50 (MGA94) : 405598.00mE, 6504197.00mN z50 (MGA94) : 404958.00mE, 6505368.00mN z50 (MGA94)

Disclaimer

The *Aboriginal Heritage Act 1972* preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Aboriginal Affairs by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you email the details to the Department at heritageenquiries@daa.wa.gov.au and we will make every effort to rectify it as soon as possible.

South West Settlement ILUA Disclaimer

Your heritage enquiry is on land **within or adjacent to** the following Indigenous Land Use Agreement(s): Whadjuk People ILUA

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

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

Likewise, from 8 June 2015 the Department of Mines and Petroleum (DMP) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DMP, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at <https://www.dpc.wa.gov.au/lantu/Claims/Pages/SouthWestSettlement.aspx>.

Further advice can also be sought from the Department of Aboriginal Affairs (DAA) at heritageenquiries@daa.wa.gov.au.



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Coordinate Accuracy

Accuracy is shown as a code in brackets following the coordinates. Map coordinates (Latitude/Longitude and Easting/Northing) are based on the GDA 94 Datum. The Easting/Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '500000mE:Z50' means Easting=500000, Zone=50.

Terminology (NB that some terminology has varied over the life of the legislation)

Place ID/Site ID: This a unique ID assigned by the Department of Aboriginal Affairs to the place

Status:

- o **Registered Site:** The place has been assessed as meeting Section 5 of the *Aboriginal Heritage Act 1972*
- o **Other Heritage Place which includes:**
 - **Stored Data / Not a Site:** The place has been assessed as not meeting Section 5 of the *Aboriginal Heritage Act 1972*
 - **Lodged:** Information has been received in relation to the place, but an assessment has not been completed at this stage to determine if it meets Section 5 of the *Aboriginal Heritage Act 1972*

Status Reason: e.g. Exclusion - Relates to a portion of an Aboriginal site or heritage place as assessed by the Aboriginal Cultural Material Committee (ACMC). e.g. such as the land subject to a section 18 notice.

Origin Place ID: Used in conjunction with Status Reason to indicate which Registered Site this Place originates from.

Access and Restrictions:

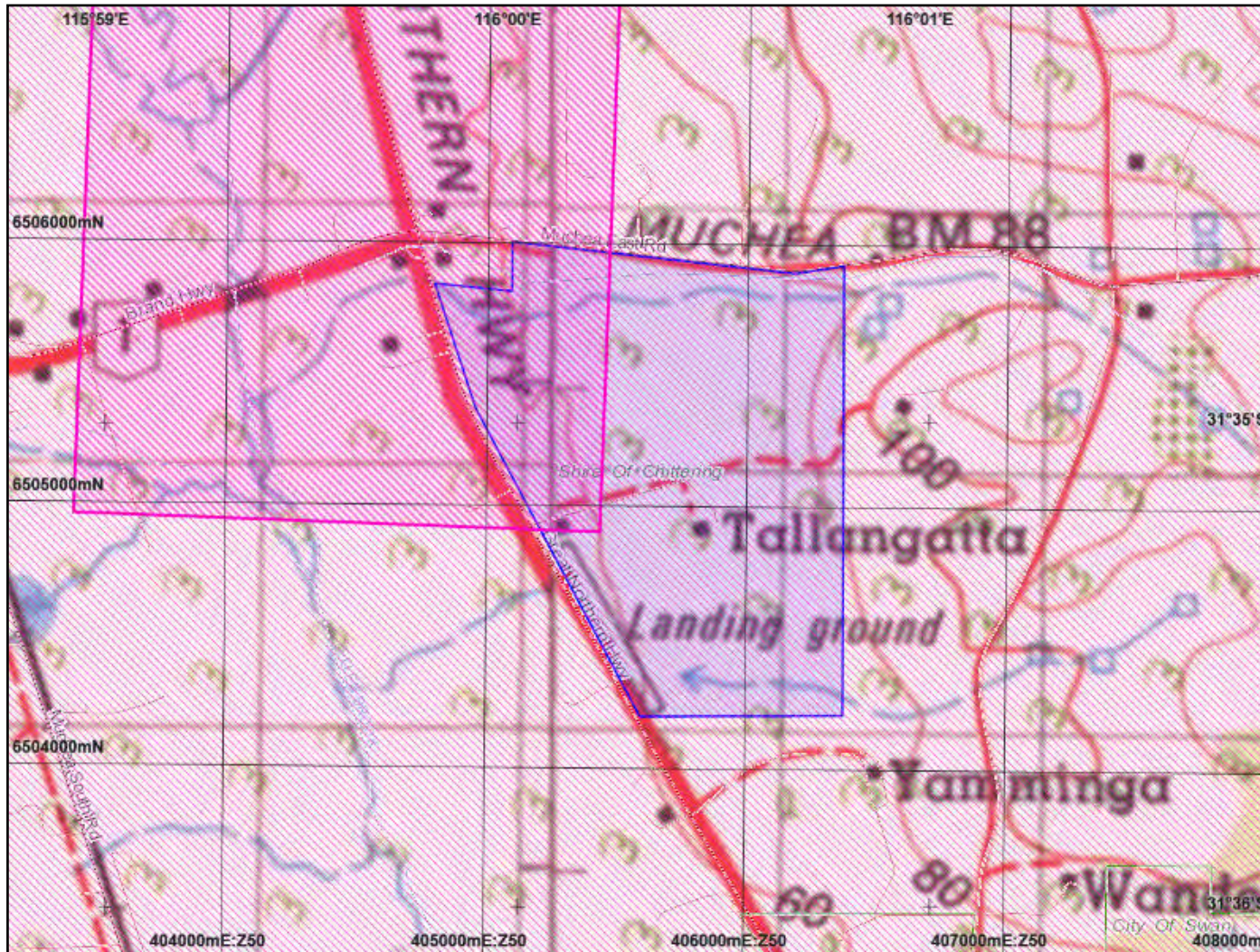
- o **File Restricted = No:** Availability of information (other than boundary) that the Department of Aboriginal Affairs holds in relation to the place is not restricted in any way.
- o **File Restricted = Yes:** Some of the information that the Department of Aboriginal Affairs holds in relation to the place is restricted if it is considered culturally sensitive. This information will only be made available if the Department of Aboriginal Affairs receives written approval from the informants who provided the information. Download the [Request to Access Restricted Information](#) letter and form.
- o **Boundary Restricted = No:** place location is shown as accurately as the information lodged with the Registrar allows.
- o **Boundary Restricted = Yes:** To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the place is located. If you are a landowner and wish to find out more about the exact location of the place, please contact DAA.
- o **Restrictions:**
 - **No Restrictions:** Anyone can view the information.
 - **Male Access Only:** Only males can view restricted information.
 - **Female Access Only:** Only females can view restricted information

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place. This has been replaced by the Place ID / Site ID.








List of Registered Aboriginal Sites with Map

Site ID	Site Name	File Restricted	Boundary Restricted	Restrictions	Status	Status Reason	Origin Place ID	Site Type	Knowledge Holders	Coordinates	Legacy ID
3525	ELLEN BROOK: UPPER SWAN	Yes	Yes	No Gender Restrictions	Registered Site			Mythological	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	S02516
20008	Gingin Brook Waggyl Site	Yes	Yes	No Gender Restrictions	Registered Site			Historical, Mythological, Camp, Hunting Place, Plant Resource, Water Source	*Registered Knowledge Holder names available from DAA	Not available when location is restricted	



Legend

Selected Heritage Sites

-  Registered Sites
-  Aboriginal Community Occupied
-  Aboriginal Community Unoccupied
-  Town
-  Search Area

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ENQUIRIES: Heritage Enquiries- Ph 6551 8000
OUR REF: 2017/0048-01

Mr Phil Bayley
Bayley Environmental Services

via Email: bayley@iinet.net.au

Dear Mr Bayley

ABORIGINAL HERITAGE INQUIRY MUCHEA

Thank you for your email dated 7 April 2017 regarding Muchea East Road and Great Northern Highway, Muchea.

A review of the Register of Places and Objects as well as the Department of Aboriginal Affairs (DAA) Aboriginal Heritage Database concludes that DAA 3525 (Ellen Brook: Upper Swan) intersects within the northern portion of the study area.

Please note that while DAA 4299 (Upper Swan Bridge) and DAA 27868 (Upper Swan Lot 39 Artefact Scatter) intersects within the study area the actual boundary as administered by DAA is not within the study area and no approvals under the *Aboriginal Heritage Act 1972 (AHA)* are required.

DAA suggests that as there is a registered Aboriginal site within the study area that before any development is undertaken that contact be made to DAA with regards to whether any application under the AHA will be necessary.

If you have any questions regarding the above, please contact Heritage Enquiries on 6551 or email heritageenquiries@daa.wa.gov.au.

Yours sincerely

Tanya Butler
DIRECTOR HERITAGE OPERATIONS

12 April 2017