

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

**Prepared for**

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## 1.0 INTRODUCTION

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.

The Muchea Industrial Park will form the southern gateway to the Shire of Chittering. A priority of the Shire Council is that the MIP should present an attractive visual landscape for observers travelling on the main approaches into Chittering. This includes preserving native vegetation (mostly roadside trees and some paddock trees) where possible, landscape plantings, building design and layout of development within lots.

The Shire of Chittering has set out its priorities in its *Muchea Industrial Park Design Guidelines* (2018). The Guidelines deal with development layout within lots, streetscaping, landscaping, bushfire management, fencing, signage and building design. The Shire of Chittering Town Planning Scheme No. 6 also contains provisions relating to landscape within industrial zones. This Landscape Master Plan recognises and reflects the recommendations of the Design Guidelines and the Scheme provisions.

## **2.0 EXISTING 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 4 shows views of the site from the adjoining roads.

### 3.0 LANDSCAPING STRATEGY

Landscaping of the project area will focus on the use of species with low water demand. Plantings will include bioretention swales and basins, landscape buffers (to a minimum of 10% of the area of each lot) and street trees. The plantings will not be irrigated after the establishment phase. No turf grass will be planted in public areas, although individual lot owners may choose to plant grass. Lawn areas will not count towards the landscaping requirement on each lot.

Fertiliser use will be minimal. New tube stock plantings will be fertilised with slow-release nitrogen and phosphorus tablets on establishment and thereafter will be unfertilised.

The bioretention basins and swales will be densely planted with inundation and drought tolerant native species including sedges and low shrubs in order to stabilise the swales and maximise their ability to immobilise nutrients and sediments from the water.

The total area to be planted is approximately 40 hectares. If all of this area were planted simultaneously during the establishment phase at the DWER's default rate of 4,500 KL/ha/yr, approximately 180 ML of water would be required to irrigate the new plantings in the first year. As the project area is likely to be developed in a number of stages, the requirement for irrigation water is likely to be spread out over a number of years, with only a small part of the total demand being required in any one year.

The density of planting will be controlled to keep flammable ground fuel loads below 8 tonnes/ha, in accordance with the Bushfire Management Plan (Eco Logical Australia, 2021).

Figure 5 shows an overview of the Landscape Master Plan.

## **4.0 LANDSCAPING ZONES**

### **4.1 Great Northern Highway**

The Great Northern Highway road reserve includes a cleared verge 10m wide adjacent to the subject land. The road reserve is classed as “Excluded” under the Bushfire Management Plan, with a low fire hazard rating.

No landscape planting is proposed in the Great Northern Highway road reserve, in line with Main Roads WA advice (A. Rao, MRWA 2021 pers. comm.).

### **4.2 Muchea East Road**

The Muchea East Road reserve includes a 3m to 7m wide, mostly cleared verge adjacent to the project area. Near the north-eastern corner the verge includes a few Wandoo and Marri trees with little understorey.

The Muchea East Road reserve is currently classed as “Excluded” under the Bushfire Management Plan, with a low fire hazard rating. The fire hazard could be increased by any substantial increase in the overstorey canopy density or by an increased understorey.

Landscaping in the Muchea East Road reserve will be limited to retention of existing trees and weed control.

### **4.3 Northern Creekline and POS**

The existing creekline entering at the north-east of the property will be retained in its current alignment and protected within a vegetated foreshore and POS reserve that extends at least 30m and up to 150m from the creekline, measuring about 16.66ha in area. Appendix A presents a Foreshore Reserve Definition Study carried out in accordance with DWER Operational Policy River Restoration Series RR16 – *Determining Foreshore Reserves* (WRC, 2001) and Foreshore Policy 1 – *Identifying the Foreshore Area* (WRC, 2002a).

A smaller area of POS, measuring 0.88ha in area, will be located on the western boundary of the project area.

The POS areas will be planted with native sedges, shrubs and trees. In parts of the northern POS within 100m of lots, shrub plantings will be kept below 2m in height and trees will be spaced 15m apart in order to achieve a “Shrubland” bushfire hazard rating. In the north-west and north-east of the POS, more than 100m from lots, plantings of larger shrubs and denser trees may occur.

Existing native trees within the POS areas will be retained.

#### 4.4 Bioretention Swales, Drainage Easements and Reserves

Bioretention swales 5m to 9m wide will be located on one or both sides of all roads within the project area, as well as several dedicated 10m wide drainage easements and drainage reserves. The swales, easements and reserves will carry road runoff, excess lot runoff and throughflow from catchments upstream of the project area.

The swales, easements and reserves will be densely planted with native sedges, small (<2m) shrubs and widely-spaced small trees to stabilise the swales, slow the water flows and maximise the uptake of sediments and nutrients from the water. Figure 6 shows conceptual profiles of the roadside swales.

#### 4.5 Lots

The Shire of Chittering's Design Guidelines set out the Shire's requirements and recommendations for landscaping within lots. Other requirements arise from provisions for drainage and effluent disposal within the lots.

The general landscaping within lots will include:

- 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;
- one tree per 10m of road frontage;
- a bioretention basin to hold the 1-year ARI 1-year storm, typically measuring about 2.7% of the total area of the lot;
- an effluent disposal area (probably ATU irrigation area) planted with low shrubs, with size depending on the lot workforce (about 23m<sup>2</sup> per full-time employee); and
- other landscape plantings to a total of 10% of the area of the lot.

Plantings within lots will generally feature sedges and other ground covers, low shrubs (<2m) and widely-spaced trees in order to comply with the requirements of the Bushfire Management Plan. It is noted that the Design Guidelines' requirement for one tree every 10m of road frontage may, depending on the size of the trees, exceed the permissible canopy density for "Shrubland" under the Bushfire Management Plan. It is proposed instead to space trees 15m apart in all areas within 100m of lots.

Figure 7 shows an indicative layout of landscape plantings for a typical lot.

## 5.0 SPECIES SELECTION AND PLANTING DENSITY

Species to be planted in the project area will be local native species, with species for specific areas selected for their height and inundation and/or drought tolerance. Recommended species for each situation are listed below:

### 5.1 Public Open Space

- Two areas around northern creekline and on mid-western boundary.
- Total planting area approx. 17.5ha.
- Areas within 100m of lots planted with sedges (in creekline), low shrubs (<2m) and trees (15m spacing) – “Shrubland” classification.
- Areas more than 100m from lots may be planted with larger shrubs and closer spaced trees – “Woodland” classification.
- Retain existing native trees.

#### Sedges & Herbs

- Planting density - In creekline: 10,000/ha (1m spacing)  
- Elsewhere: Scattered clumps of 10,000/ha; overall 2,000/ha.

- Recommended species:

<i>Baumea articulata</i>	<i>Juncus kraussii</i>
<i>Baumea juncea</i>	<i>Juncus pallidus</i>
<i>Conostylis aculeata</i>	<i>Lepidosperma longitudinale</i>
<i>Dasyogon bromeliifolius</i>	<i>Lyginia imberbis</i>
<i>Gahnia trifida</i>	<i>Patersonia occidentalis</i>
<i>Hypolaena exsulca</i>	<i>Phlebocarya ciliata</i>

#### Shrubs (<2m)

- Planting density 2,500/ha (2m spacing)
- Recommended species:

<i>Acacia lasiocarpa</i>	<i>Phyllanthus calycinus</i>
<i>Hibbertia hypericoides</i>	<i>Regelia ciliata</i>
<i>Hypocalymma angustifolium</i>	<i>Xanthorrhoea preissii</i>

#### Tall Shrubs (>2m) and Trees

- Planting density <50/ha (15m spacing).
- Recommended species:

<i>Acacia saligna</i>	<i>Corymbia calophylla</i>
<i>Casuarina obesa</i>	<i>Eucalyptus wandoo</i>
<i>Viminaria juncea</i>	<i>E. rudis</i>



## 5.2 Drainage Structures

- Includes in-lot bioretention basins, roadside swales, drainage easements and reserves.
- Planting area approx. 11.9ha.
- Densely planted with sedges, herbs, low shrubs and scattered small trees.
- “Shrubland” classification.

### Sedges & Herbs

- Planting density 10,000/ha (1m spacing)
- Recommended species:
 

<i>Baumea articulata</i>	<i>Juncus kraussii</i>
<i>Baumea juncea</i>	<i>Juncus pallidus</i>
<i>Conostylis aculeata</i>	<i>Lepidosperma longitudinale</i>
<i>Dasypogon bromeliifolius</i>	<i>Lyginia imberbis</i>
<i>Gahnia trifida</i>	<i>Patersonia occidentalis</i>
<i>Hypolaena exsulca</i>	<i>Phlebocarya ciliata</i>

### Shrubs (<2m)

- Planting density 2,500/ha (2m spacing)
- Recommended species:
 

<i>Acacia lasiocarpa</i>	<i>Phyllanthus calycinus</i>
<i>Hibbertia hypericoides</i>	<i>Regelia ciliata</i>
<i>Hypocalymma angustifolium</i>	<i>Xanthorrhoea preissii</i>

### Tall Shrubs (>2m) and Trees

- Planting density <50/ha (15m spacing).
- Recommended species:
 

<i>Acacia saligna</i>	<i>Melaleuca raphiophylla</i>
<i>Casuarina obesa</i>	<i>Viminaria juncea</i>
<i>Melaleuca preissiana</i>	

## 5.3 Effluent Irrigation Areas

- Planting area approx. 1ha (depending on workforce on individual lots).
- Planted with dense low shrubs, sedges & herbs.
- “Shrubland” classification.

### Sedges & Herbs

- Planting density 10,000/ha (1m spacing).
- Recommended species:
 

<i>Hypolaena exsulca</i>	<i>Lyginia imberbis</i>
<i>Juncus kraussii</i>	<i>Patersonia occidentalis</i>
<i>Lepidosperma longitudinale</i>	<i>Phlebocarya ciliata</i>

*Low Shrubs (<2m)*

- Planting density 2,500/ha (2m spacing).
- Recommended species:
 

<i>Acacia lasiocarpa</i>	<i>Phyllanthus calycinus</i>
<i>Hibbertia hypericoides</i>	<i>Regelia ciliata</i>
<i>Hypocalymma angustifolium</i>	<i>Xanthorrhoea preissii</i>

**5.4 Lot Landscaping**

- Planting area approx. 9.5ha.
- Includes front & side boundary landscape buffers and other plantings to total 10% of lot area.
- Planted with sedges & herbs, low shrubs and scattered trees.
- “Shrubland” classification.

*Sedges & Herbs*

- Planting density 2,500/ha (2m spacing).
- Recommended species:
 

<i>Hypolaena exsulca</i>	<i>Lyginia imberbis</i>
<i>Juncus kraussii</i>	<i>Patersonia occidentalis</i>
<i>Lepidosperma longitudinale</i>	<i>Phlebocarya ciliata</i>

*Low Shrubs (<2m)*

- Planting density 2,500/ha (2m spacing).
- Recommended species:
 

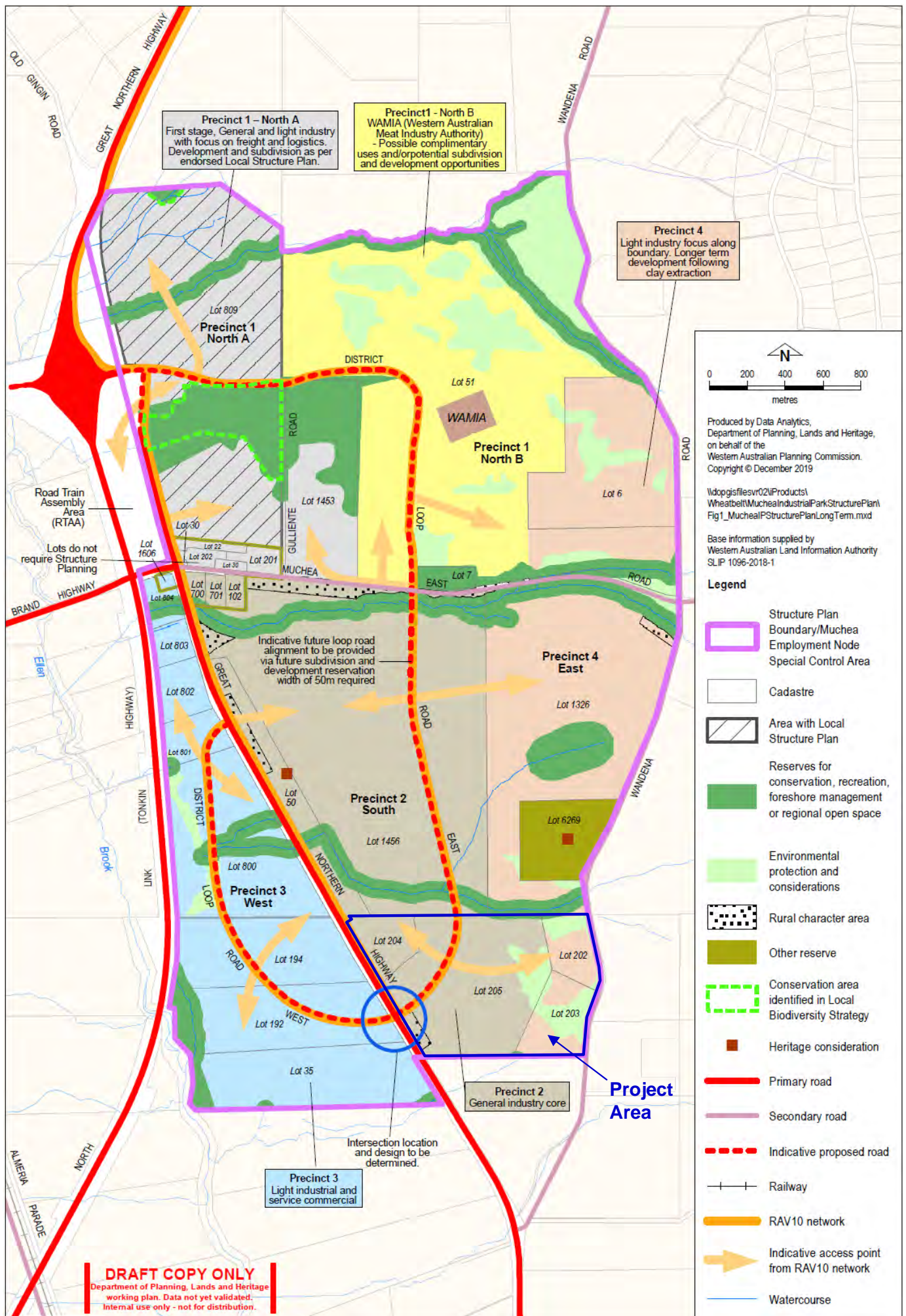
<i>Acacia lasiocarpa</i>	<i>Phyllanthus calycinus</i>
<i>Hibbertia hypericoides</i>	<i>Xanthorrhoea preissii</i>
<i>Hypocalymma angustifolium</i>	

*Tall Shrubs (>2m) and Trees*

- Planting density <50/ha (15m spacing).
- Recommended species:
 

<i>Allocasuarina fraseriana</i>	<i>M. teretifolia</i>
<i>Casuarina obesa</i>	<i>M. preissiana</i>
<i>Corymbia calophylla</i>	<i>M. raphiophylla</i>
<i>Eucalyptus rudis</i>	<i>Gastrolobium ebracteolatum</i>
<i>E. wandoo</i>	<i>Viminaria juncea</i>
<i>Melaleuca incana</i>	

# Figures



Source: WAPC, 2019

Figure 1

**DRAFT MUCHEA INDUSTRIAL PARK STRUCTURE PLAN**





Figure 2

THE SITE AND SURROUNDINGS



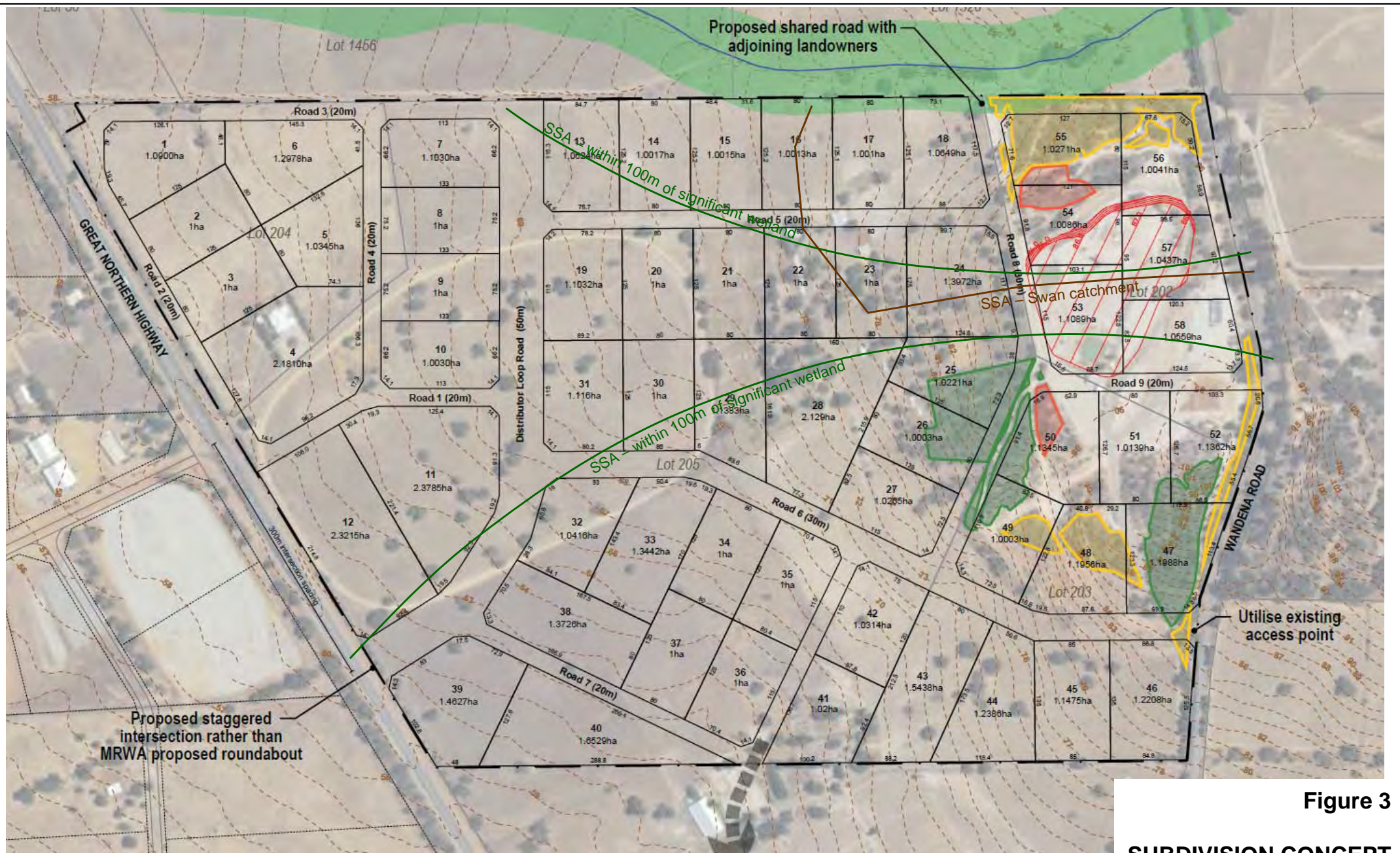


Figure 3  
**SUBDIVISION CONCEPT**



1 Great Northern Highway looking north-east



2 Great Northern Highway looking north-east



3 Great Northern Highway looking south-east



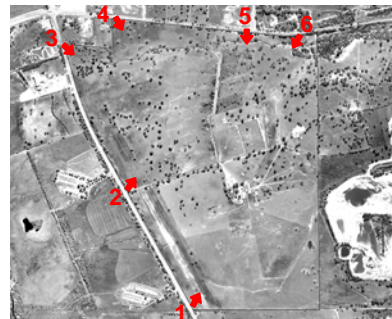
4 Muchea East Road looking south-east



5 Muchea East Road looking south



6 Muchea East Road looking south-west



Images: Google (2018)

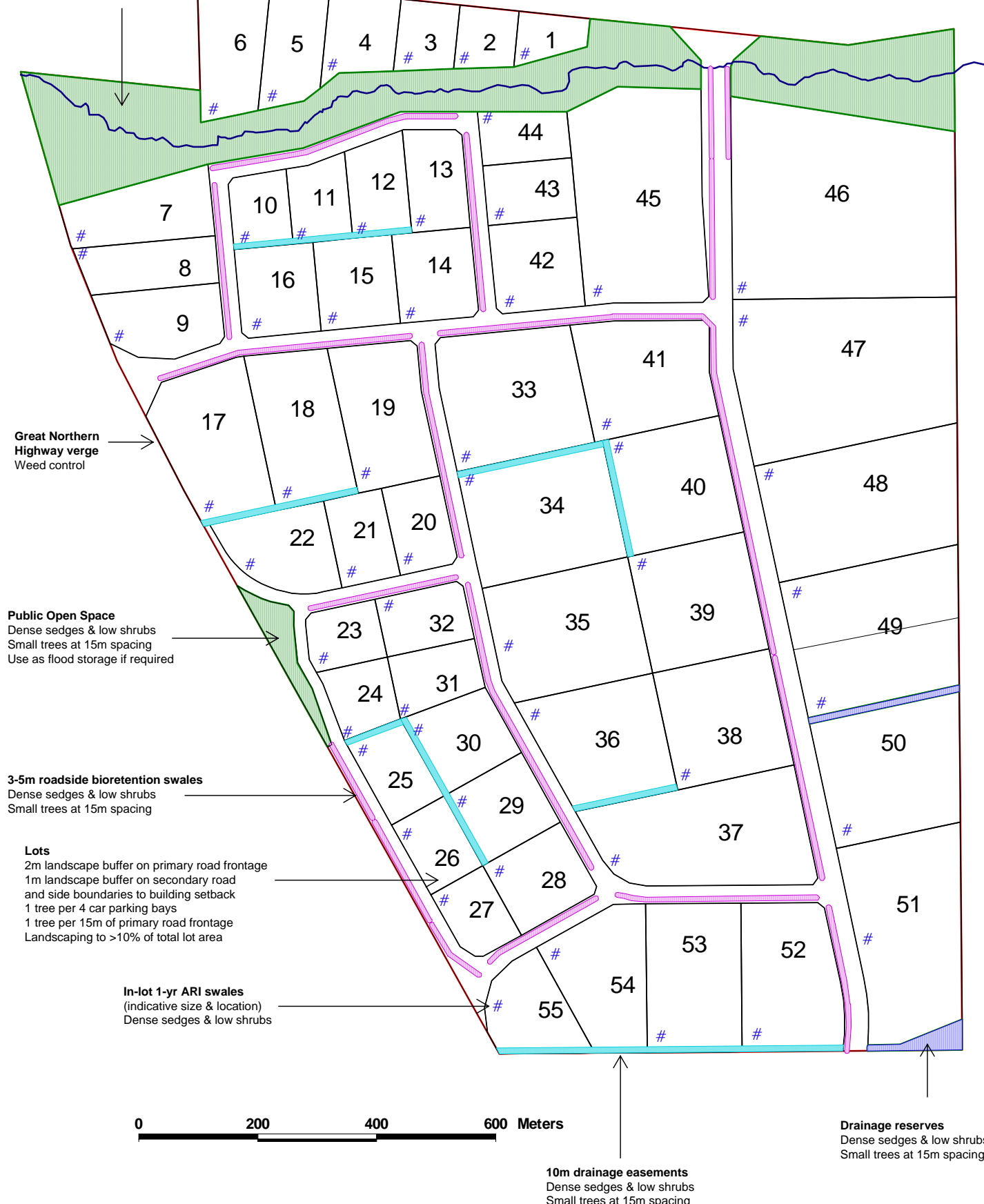
Figure 4

**VIEWS FROM GREAT NORTHERN HIGHWAY AND MUCHEA EAST ROAD**



**Northern Creekline POS**

Retain creek in current alignment  
 within 30-150m foreshore reserve  
 Dense sedges and shrubs in creekline  
 Shrubs and small trees in POS  
 Retain existing mature trees



**Great Northern Highway verge**  
 Weed control

**Public Open Space**  
 Dense sedges & low shrubs  
 Small trees at 15m spacing  
 Use as flood storage if required

**3-5m roadside bioretention swales**  
 Dense sedges & low shrubs  
 Small trees at 15m spacing

**Lots**  
 2m landscape buffer on primary road frontage  
 1m landscape buffer on secondary road  
 and side boundaries to building setback  
 1 tree per 4 car parking bays  
 1 tree per 15m of primary road frontage  
 Landscaping to >10% of total lot area

**In-lot 1-yr ARI swales**  
 (indicative size & location)  
 Dense sedges & low shrubs

0 200 400 600 Meters

**10m drainage easements**  
 Dense sedges & low shrubs  
 Small trees at 15m spacing

**Drainage reserves**  
 Dense sedges & low shrubs  
 Small trees at 15m spacing

**Figure 5**

**LANDSCAPE MASTER PLAN**



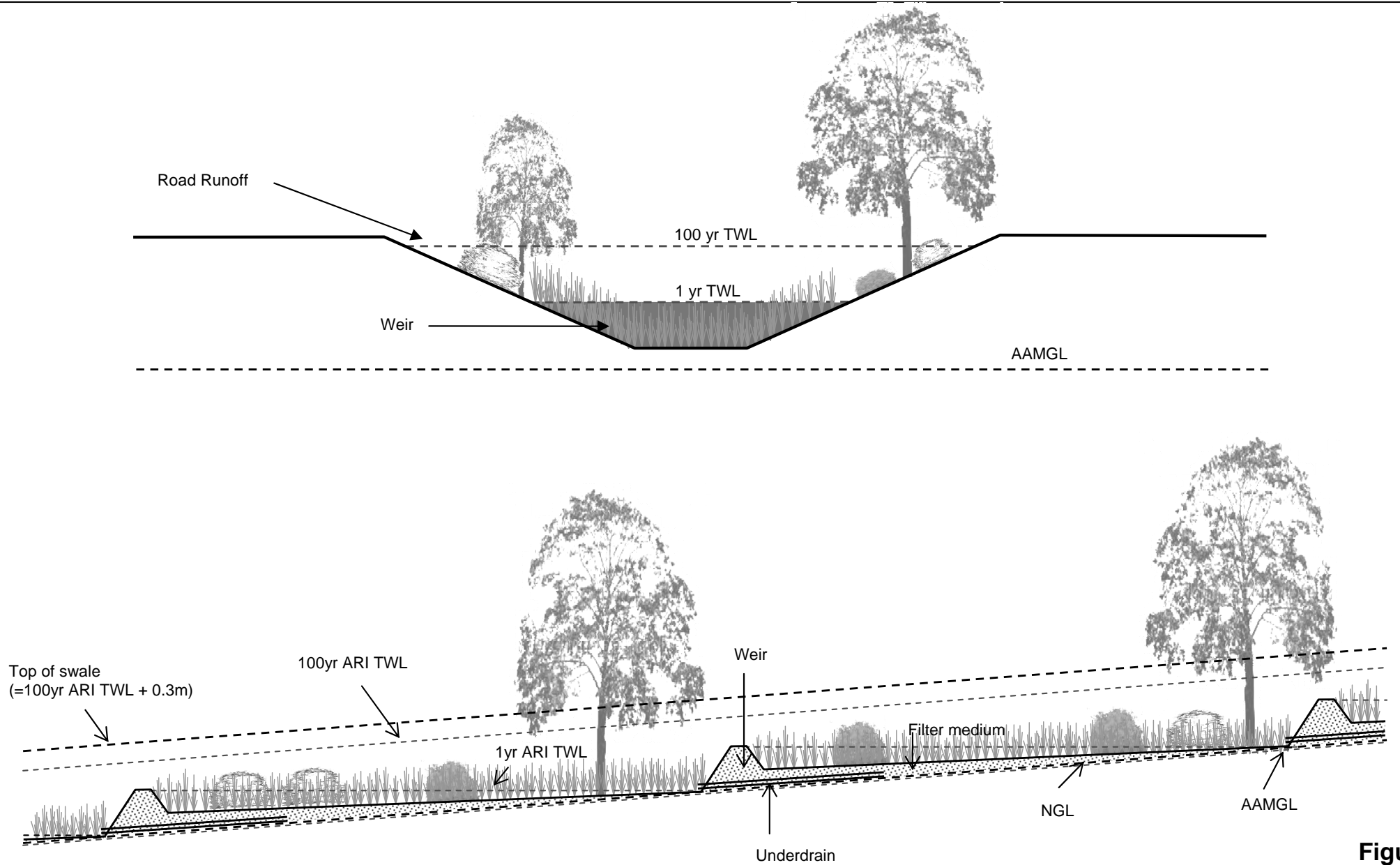
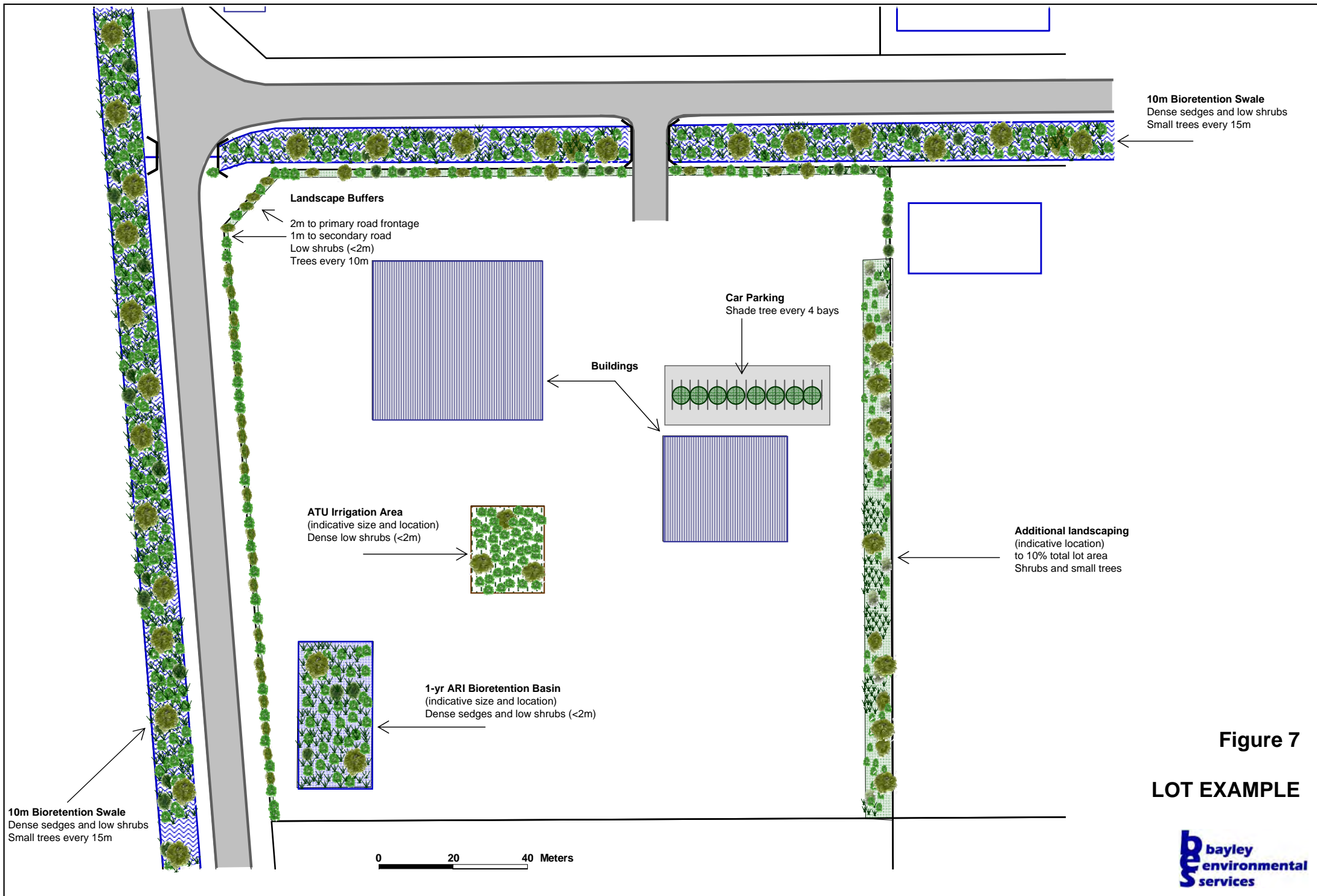


Figure 6

BIORETENTION SWALES



**Figure 7**  
**LOT EXAMPLE**

# **Appendix A**

## **Northern Creeklime Foreshore Definition**

## **DETERMINATION OF FORESHORE SETBACK USING THE METHODOLOGY SET OUT IN RIVER RESTORATION SERIES 16**

### **Introduction**

Foreshore reserve requirements for waterways are governed by WAPC Development Control Policy No. DC2.3: *Public Open Space in Residential Areas*. DC2.3 specifies a default foreshore reserve width of 30 metres for waterways but includes provision to vary the default setback for reasons of topography, condition of banks or floodway protection. DWER policy on foreshore setbacks is set out in Operational Policy River Restoration Series No. RR16 – *Determining Foreshore Reserves* (WRC, 2001) and Foreshore Policy 1 - *Identifying the Foreshore Area* (WRC, 2002a). These documents also set out a methodology for determining the foreshore setback in each case.

The Muchea Industrial Park Structure Plan (WA Govt, 2020) designated nominal 50m foreshore reserves on each side of the northern creekline and the middle drainage line in the south of the site. Historical Landgate aerial photography shows that the two drainage lines in the south of the site are artificial drains constructed between 1965 and 1979, as described in the EAMS (BES, 2021), and therefore do not require foreshore reserves.

The Structure Plan noted that the reserve could be modified at the Urban Water Management Plan stage in accordance with DWER *Operational Policy 4.3: Determining foreshore reserves* (DoW, 2012), *Water Note 23 – Determining Foreshore Reserves* (DoW, 2001) and *River Restoration Manual Chapter 16 – Determining foreshore reserves* (DoW, 2001).

This Foreshore Definition Study was undertaken in accordance with the above DoW policies to define the required foreshore reserve of the northern creekline.

### **Step 1: Background information and preliminary investigations**

#### *Waterway significance and management issues*

The northern creekline is a minor tributary of Ellen Brook. The Ellen Brook catchment is the largest sub-catchment of the Swan-Canning River system, contributing 6% of the total annual flow in the system, and is the largest single contributor of nutrients to the system (WA Govt, 2011).

The creekline is a natural waterway, incised at the eastern side of the property but flatter and shallower at the western side. The creek drains an upstream surface catchment of about 360ha and an additional catchment of 250ha within the property. 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 creekline within the property is set within cleared farm paddocks with scattered mature trees, mostly Marri and Wandoo. It has low habitat value in its present state.

#### *Aerial photography*

Figure 1 shows an aerial photograph of the northern creekline and its setting within the subject land.

*Maps of extent of floodway and floodplains, topographical features, cadastral boundaries, soils, underlying geology and vegetation complexes.*

These features are shown on Figure 2.

#### *Relevant reports on the river and region*

No previous reports have been published on the northern creekline. A number of reports have been published on Ellen Brook and its catchment, including:

- Water & Rivers Commission (1999). *Foreshore Assessment in the Ellen Brook Catchment*. Water Resource Management Series No. 16.
- WRC (2002b). *Hydrogeological Information for Management Planning in the Ellen Brook Catchment*. Salinity and Land Use Impacts Series No. SLUI 11.
- Swan River Trust (2009). *Swan Canning Water Quality Improvement Plan*.

#### *Site Visit*

Inspections of the northern creekline within the project area were carried out on several occasions between June 2017 and October 2020. The inspections included creek morphology, water sampling, surrounding vegetation and fauna habitats. Figure 3 shows photographs of the creek and its fringing vegetation.

#### *Relevant stakeholders*

The owner of the lot surrounding the creekline, Tallangatta Beef Pty Ltd, is the proponent of the structure plan and is involved in the planning of the site.

## **Step 2: Biophysical criteria of the waterway**

#### *Riparian vegetation*

The riparian vegetation of the creekline within the property has been almost entirely removed by past clearing and grazing. What remains is mostly scattered mature Wandoo and Marri trees on the higher banks. At the eastern end a small copse of young Flooded Gum is present in a seepage zone to the south of the creekline. Apart from this there are a few scattered sedges in the lower part of the watercourse.

The condition of the fringing vegetation is Completely Degraded.

The riparian vegetation of the subject land, is mapped by Heddle *et al.* (1980) mostly as “Coonambidgee Complex: Low open-forest and low woodland of pricklybark-banksia ... to open woodland of marri-banksia”. The western end of the creekline is mapped as “Yanga Complex: Low open-forest of *Casuarina obesa*, *Actinostrobus* (now *Callitris*) *pyramidalis*, *Melaleuca* spp. (including *M. lateritia*, *M. hamulosa*, *M. preissiana* and *M. raphiophylla*) and *Eucalyptus rudis* in the lower-lying areas.” The eastern end of the creekline is mapped as “Reagan Complex: Low open-woodland of banksia-pricklybark to closed-heath, depending on the depth of soil.”

The Yanga Complex has been moderately heavily cleared since European settlement, with 17.75% of its original extent remaining and less than 2% formally protected. The Reagan and Coonambidgee Complexes are well represented, with 34% and 46% respectively of their pre-European extent remaining. The proportion held in reserves is 10.3% for the Coonambidgee Complex but only 3.8% for the Reagan Complex.

#### *Soils that support riparian vegetation*

The Geological Survey of Western Australia (GSWA, 1978) maps the creekline and its surrounds within the property as Qpa: Guildford Formation, with soils of pebbly silt (Mgs<sub>1</sub>). Upstream of the property the soils are mapped as Leederville Formation siltstone (ST<sub>1</sub>) and colluvial sand (S<sub>6</sub>). This soil mapping is supported by visual evidence in the eroded creek bed.

#### *Floodway and floodplain – 1 in 100 yr flood levels, peak flow and river hydrology*

Flows in the creekline are normally confined to the incised channel of the creek, although high flows may cause inundation of adjacent towards the western end.

Table 1 summarises estimated 100-year ARI (average recurrence interval) flows under current conditions in the northern creekline, calculated using the Rational Method (Institute of Engineers Australia, 1987) assuming a runoff coefficient of 0.3. The table also shows estimated water depths, widths and flow velocities in the creekline at the upstream, mid-point and downstream ends of the site, calculated with Manning’s open channel flow formula (Fang, 2002), using a roughness coefficient (Manning’s *n*) of 0.03.

**Table 1            100-year ARI Flows in Northern Creekline**

<i>Upstream Catchment (ha)</i>		360
<i>100-yr ARI Flow (m<sup>3</sup>/sec)</i>		7.04
<i>Water Depth (m)</i>	<i>Upstream</i>	0.7
	<i>Mid-point</i>	0.8
	<i>Downstream</i>	0.4
<i>Top Water Width (m)</i>	<i>Upstream</i>	4.6
	<i>Mid-point</i>	6.9
	<i>Downstream</i>	28
<i>Flow Velocity (m/sec)</i>	<i>Upstream</i>	3.5
	<i>Mid-point</i>	2.0
	<i>Downstream</i>	1.1

The flow calculations in Table 1 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 creek appears unlikely to overtop in a 100-year storm.

The calculations shown in Table 1 are preliminary and based on desktop estimates of channel morphology and catchment characteristics. They should not be used for design purposes.

#### *Soil types prone to erosion*

The creek channel appears stable to date, with little evidence of undercutting or erosion on bends. The base of the channel consists largely of rock (laterite or hardpan) and gravel, suggesting that further incision or erosion of the channel would be slow under normal conditions. The soils surrounding the creek channel are similar to those forming the channel, and would be similarly slow to erode.

Landgate aerial photography since 1965 shows no discernible change in the alignment of the watercourse. Table 1 above predicts that the flow velocity in the eastern part of the 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 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. However, given the relatively steep topography in the vicinity of the creekline, any scouring is likely to result in minor straightening of the watercourse rather than any major change in its alignment.

#### *Landforms and drainage lines important to watercourse function*

The bed of the creekline falls from an elevation of about 80m AHD at the eastern property boundary crossing to 53m AHD at the western boundary, at a gradient of about 1 in 60 (1.6%). For most of its length within the site the brook is contained within moderately steep (approx. 40% slope) banks about 3m high. At the western end the banks are much shallower, with the bed only about 0.5m deep within flat paddocks.

#### *Habitat areas*

The vegetation in and around the creekline within the property has been cleared apart from scattered mature trees. As a result the creek offers little useful fauna habitat apart from a seasonal water source. Some of the remaining mature trees in the paddocks near the creek contain hollows. Brook are a few isolated large flooded gums containing small hollows that might provide nesting sites for birds. A detailed hollow survey in October 2020 found five confirmed hollows, two of which were occupied by nesting corellas and Australian kestrels.

Kangaroos were observed in the paddocks near the creek. There is no cover within the property, so these were probably moving into the site to feed from vegetated areas to the east. There is no dense ground cover to provide habitat for quenda, and no evidence of quenda was observed.

*Adjacent land use with potential to affect the foreshore*

The current grazing land use on the subject land has had significant impacts on the creekline, including clearing of fringing vegetation, trampling and bank erosion. Cattle have historically had access to the creek, which has resulted in bank erosion, grazing of native vegetation, trampling and spread of weeds.

Development of the subject land as planned will benefit the creekline by removing the impact of cattle and enabling the re-establishment of native vegetation.

*Aboriginal Heritage Sites*

The DPLH has advised that the gazetted boundary of one Aboriginal heritage site, DAA 3525: Ellenbrook-Upper Swan, intersects the northern end of the Tallangatta property. Another registered site, DAA 20008: Gingin Brook Waugal Site, is mapped over part of Tallangatta but the gazetted boundary does not impinge on the project area. The results of the database search and the DPLH advice are attached in Appendix A1.

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 gazetted area. Planting and revegetation work within the creekline POS is not expected to require any approval under the Act.

**Step 3: Other factors***Fire Management*

The vegetation in the foreshore zone presents a low to moderate fire hazard due to the absence of understorey and middle storey vegetation. With the removal of cattle grazing there could be heavy growth of grasses and weeds, which could pose a high fire risk unless it were managed. Therefore, weed control, mowing of grasses and/or replacement with native low understorey species will be required to manage the fire hazard.

*Risks and consequences resulting from the proposed foreshore alignment*

The principal consequence of establishing a foreshore setback in this location will be the opportunity to undertake rehabilitation of the foreshore. This will improve the ecological value of the foreshore as well as providing increased social amenity.

The main risk in the proposed alignment is the possibility of flooding above the modelled 100 year flood level. However, the POS reserve at the western end, where overtopping is most likely to occur, extends, almost three times further from the creek than the predicted extent of flooding. Additionally, the affected area is also subject to shallow groundwater, which will necessitate filling of lots to provide clearance for buildings and effluent disposal. This will raise buildings and other structures out of reach of any floodwaters.



## Step 4: Finalisation of the alignment

### *Rationale for the alignment*

The key factors in the delineation of the foreshore setback are:

- Compliance with policy - The WAPC's Development Control Policy 2.3 specifies a default minimum setback of 30m from waterways. The proposed foreshore reserve extends between 30m and 150m from the creek.
- 100 year extent - The proposed foreshore reserve extends nearly three times the width of predicted inundation in a 100-year ARI storm.
- Vegetation - The creek surrounds support only scattered remnant trees. The densest concentrations of these are included within the foreshore reserve.
- Shoreline processes - The proposed foreshore reserve is more than sufficiently wide to accommodate any foreseeable variations in the alignment of the watercourse.
- Fire protection - Fire protection will be achieved by a combination of separation from the edge the foreshore reserve and control of revegetation height and density in the part of the foreshore reserve closest to development areas. The zoning of vegetation plantings within the foreshore reserve is shown on Figure 4. A detailed treatment of fire hazard and fire protection measures is presented in the Bushfire Management Plan (Appendix **Y** to the Structure Plan report).
- Aboriginal heritage - The registered Aboriginal mythological site no. 3525 impinges on the north-western corner of the project area, including the western part of the creekline and POS reserve. Establishment of the POS reserve will protect the part of the heritage site within its boundaries. Any earthworks outside of the POS area and within the registered site will require approval under Section 18 of the *Aboriginal Heritage Act 1945*.

### *Map of Foreshore Setback*

Figure 4 shows the proposed boundary of the foreshore reserve.

**FORESHORE TENURE AND MANAGEMENT**

The creekline and foreshore within the subject land are currently privately owned and zoned Agricultural Resource under the Shire of Chittering Town Planning Scheme (TPS). With the subdivision of the subject land, the river and foreshore reserve are expected to be ceded as Public Open Space to the Shire and rezoned accordingly.

The owners of the foreshore at the time of subdivision will manage the foreshore reserve for at least two years after the completion of subdivision adjacent to the reserve and revegetation works in the reserve. After two years the foreshore reserve will be handed over to the Shire of Chittering to be managed primarily for conservation.

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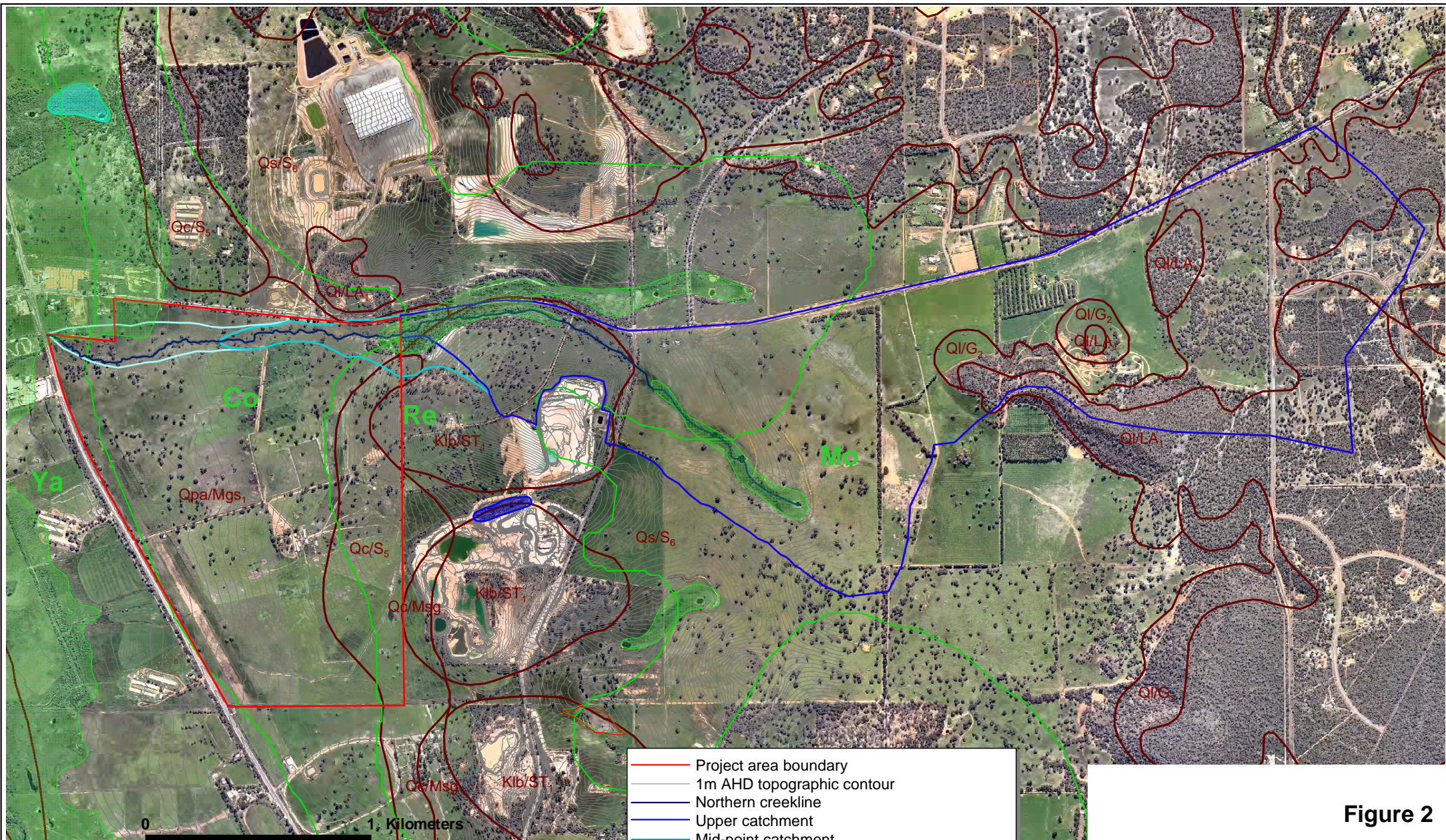
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# Figures



Figure 1  
AERIAL VIEW



Geological Units (GSWA)	
<b>Qpa/Mgs<sub>1</sub></b>	Guildford Formation pebbly silt
<b>Klb/ST<sub>1</sub></b>	Leederville Formation siltstone
<b>Qc/S<sub>5</sub></b>	Colluvial sand
<b>Qs/S<sub>6</sub></b>	Colluvial sand
<b>Qc/Msg</b>	Colluvial sandy silt
<b>Ql/G<sub>2</sub></b>	Lateritic gravel
<b>Ql/LA<sub>1</sub></b>	Laterite

Vegetation Complexes (Hedde <i>et al.</i> )	
<b>Ya</b>	Yanga
<b>Co</b>	Coonambidgee
<b>Re</b>	Reagan
<b>Mo</b>	Mogumber

	Project area boundary
	1m AHD topographic contour
	Northern creekline
	Upper catchment
	Mid-point catchment
	Lower catchment
	Wetlands (DBCA)
	Conservation
	Resource Enhancement
	Multiple Use
	Geological unit boundary (GSWA)
	Vegetation complex boundary (Hedde <i>et al.</i> )

Figure 2

## ENVIRONMENTAL FEATURES



1 Western end of creek at exit from site



2 Lower middle creekline



3 Upper middle creekline



4 Eastern end of creek near entrance to site



Figure 3

IEWS FROM GREAT NORTHERN HIGHWAY  
AND MUCHEA EAST ROAD

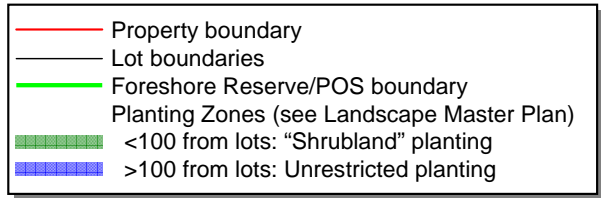


Figure 4

**FORESHORE RESERVE**



# **Appendix A1**

## **Aboriginal Heritage Sites 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](mailto: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](mailto: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:

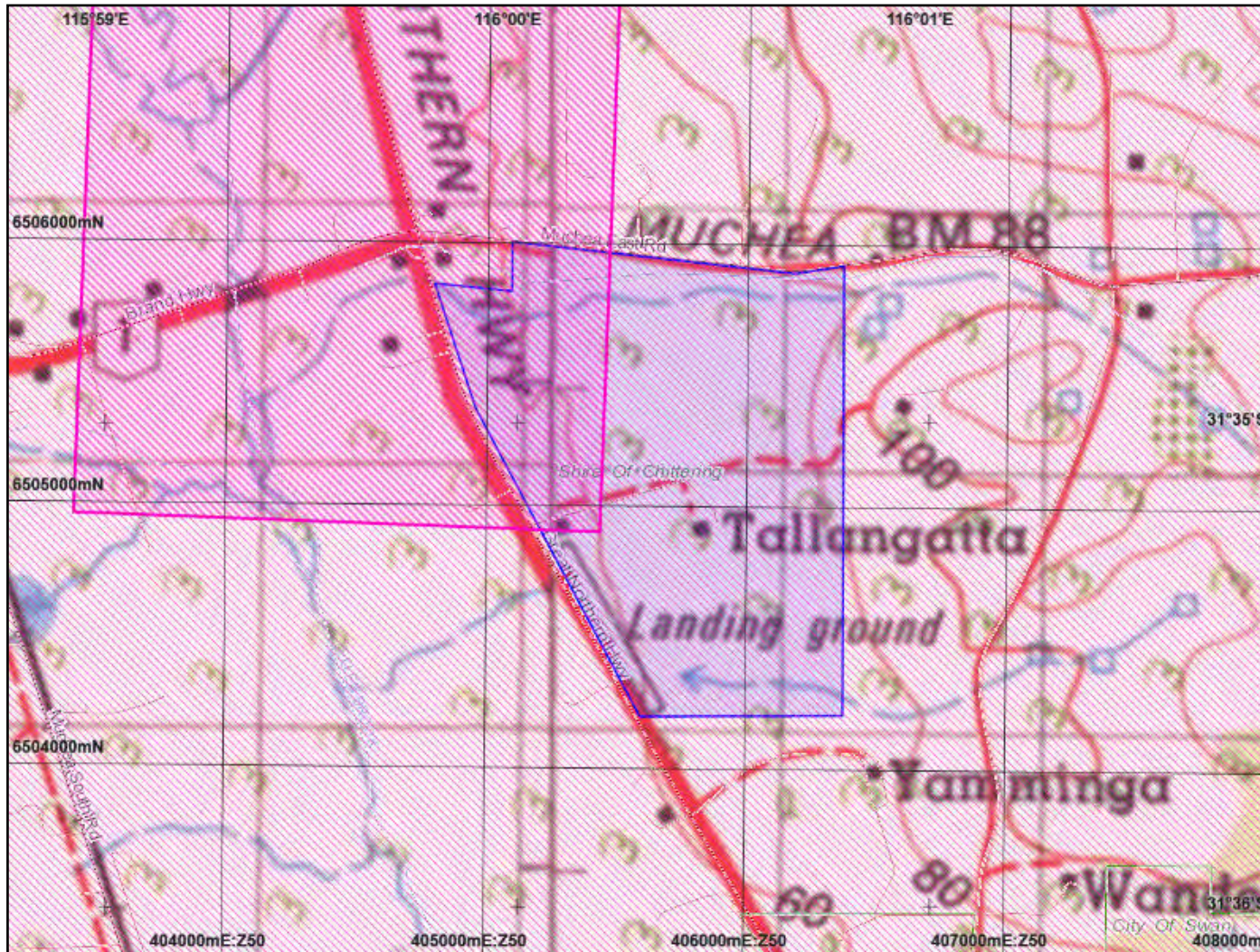
- o **File Restricted = No:** Availability of information (other than boundary) that the Department of Aboriginal Affairs holds in relation to the place is not restricted in any way.
- o **File Restricted = Yes:** Some of the information that the Department of Aboriginal Affairs holds in relation to 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 4km<sup>2</sup>) 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 Waggy 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](mailto:heritageenquiries@daa.wa.gov.au).

Yours sincerely

Tanya Butler  
**DIRECTOR HERITAGE OPERATIONS**

12 April 2017