

Riparian Corridor Assessment

Oakdale West



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Client: Goodman Property Services (Aust) Pty Limited

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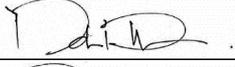
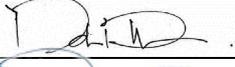
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Table of Contents

1.0	Introduction	6
1.1	Purpose of this report	6
1.2	Methodology	6
1.3	Site Location	6
1.4	Concept Masterplan	8
1.5	Planning	8
1.6	Flooding	8
1.7	Secretary's Environmental Assessment Requirements	12
2.0	Key Findings	13
2.1	NSW Office of Water Requirements	13
	2.1.1 Consultation	13
	2.1.2 Identification of Stream Orders	13
2.2	Watercourse Classification	14
2.3	Biodiversity Offset Strategy	14
2.4	Soils	18
2.5	Potential Impacts on Watercourses	18
3.0	References	19
Appendix A		21
	Biodiversity Assessment Report	21
Appendix B		23
	Biodiversity Offset Strategy	23
Appendix C		25
	Soils Reporting	25
Appendix D		27
	Communication with DPI Water re. drainage line in Oakdale West site.	27
Appendix E		29
	Communication with DPI Water re. 'flood-runner' north of Oakdale West site.	29

1.0 Introduction

1.1 Purpose of this report

AECOM was commissioned by Goodman Property Services (Aust) Limited to:

- Determine riparian corridor stream orders in accordance with NSW DPI Office of Water (DPI WATER) 'Guidelines for riparian corridors on waterfront land (July 2012)';
- Provide advice regarding the implications of the stream classification outcomes for a concept site plan being prepared for the Oakdale West precinct (hereafter the Precinct);
- Provide commentary on provisions for installation of drainage infrastructure within riparian corridors;
- Address the Secretary's Environmental Assessment Requirements (SEAR's);
- Facilitate soils reporting in support of the natural areas restoration process.

1.2 Methodology

The following Methodology has been used:

- Background document review, including:
 - Relevant DPI WATER guidelines;
 - Previous reporting and design documentation for the Precinct and Oakdale South Precinct;
 - 1:25,000 topographic mapping;
 - Aerial photography;
 - State Environmental Planning Policy (Western Sydney Employment Area) 2009 (hereafter SEPP WSEA);
 - Penrith Local Environment Plan 2010 – Land Zoning Maps – Sheets LZN_20 and LZN_21;
 - Broader Western Sydney Employment Area Biodiversity and Riparian Assessment;
 - Oakdale West Biodiversity Assessment Report, March 2017;
 - Oakdale West Biodiversity Offset Strategy, March 2017;
 - Bushfire Assessment for Oakdale Industrial Estate – West, September 2016;
- Site inspections were undertaken on 7 October 2015 and 15 February 2016;
- Provision of on-going advice at project team coordination meetings;
- Draft report preparation for Client review;
- Final report.

1.3 Site Location

The site is located in Western Sydney within the suburb of Kemps Creek as show in **Figure 1**. The Precinct is shown in **Figure 2**.

As indicated in **Figure 2**, Ropes Creek broadly defines the eastern boundary of the Precinct and is subject to a significant level of remnant riparian vegetation. A drainage line incorporates a remnant on-line farm dam near the eastern boundary of the Precinct.

A new regional link road (Western North-South Link Road [WNSLR]) is also proposed to run from the Precinct north to Lenore Drive as part of this application, as shown on **Figure 4**.

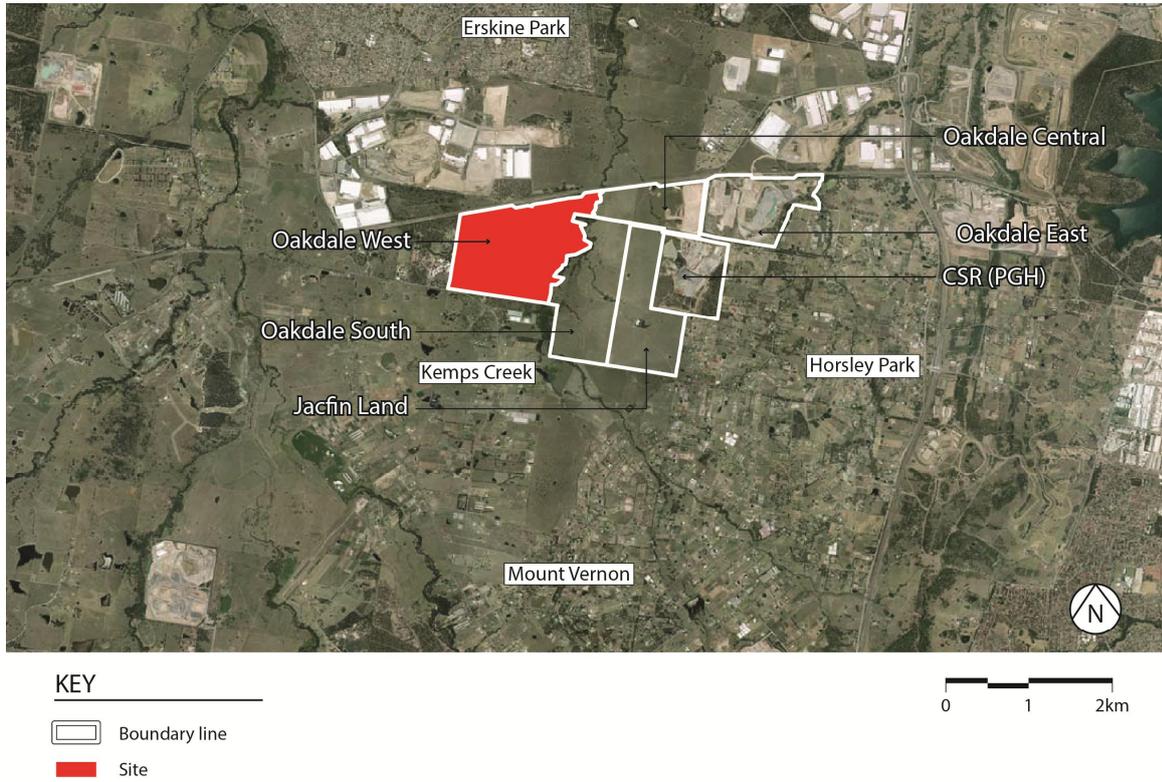


Figure 1 Regional Context

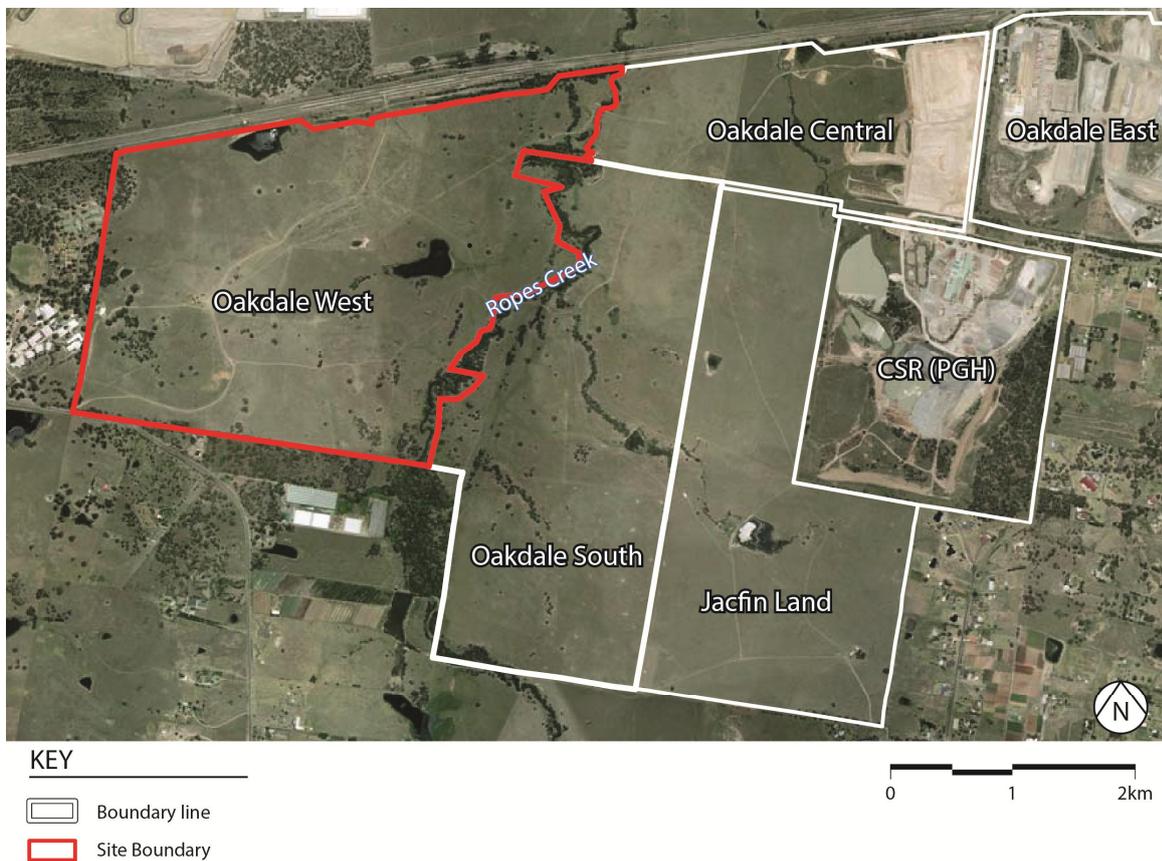


Figure 2 Site Plan

1.4 Concept Masterplan

The concept masterplan for the site is shown in **Figure 3** and **Figure 4**.

1.5 Planning

Figure 5 shows the Oakdale West concept master plan with an overlay of the SEPP WSEA land zoning map showing the extent of the E2 Conservation Zone. The objectives of this zone are:

- To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values.
- To prevent development that could destroy, damage or otherwise have an adverse effect on those values.

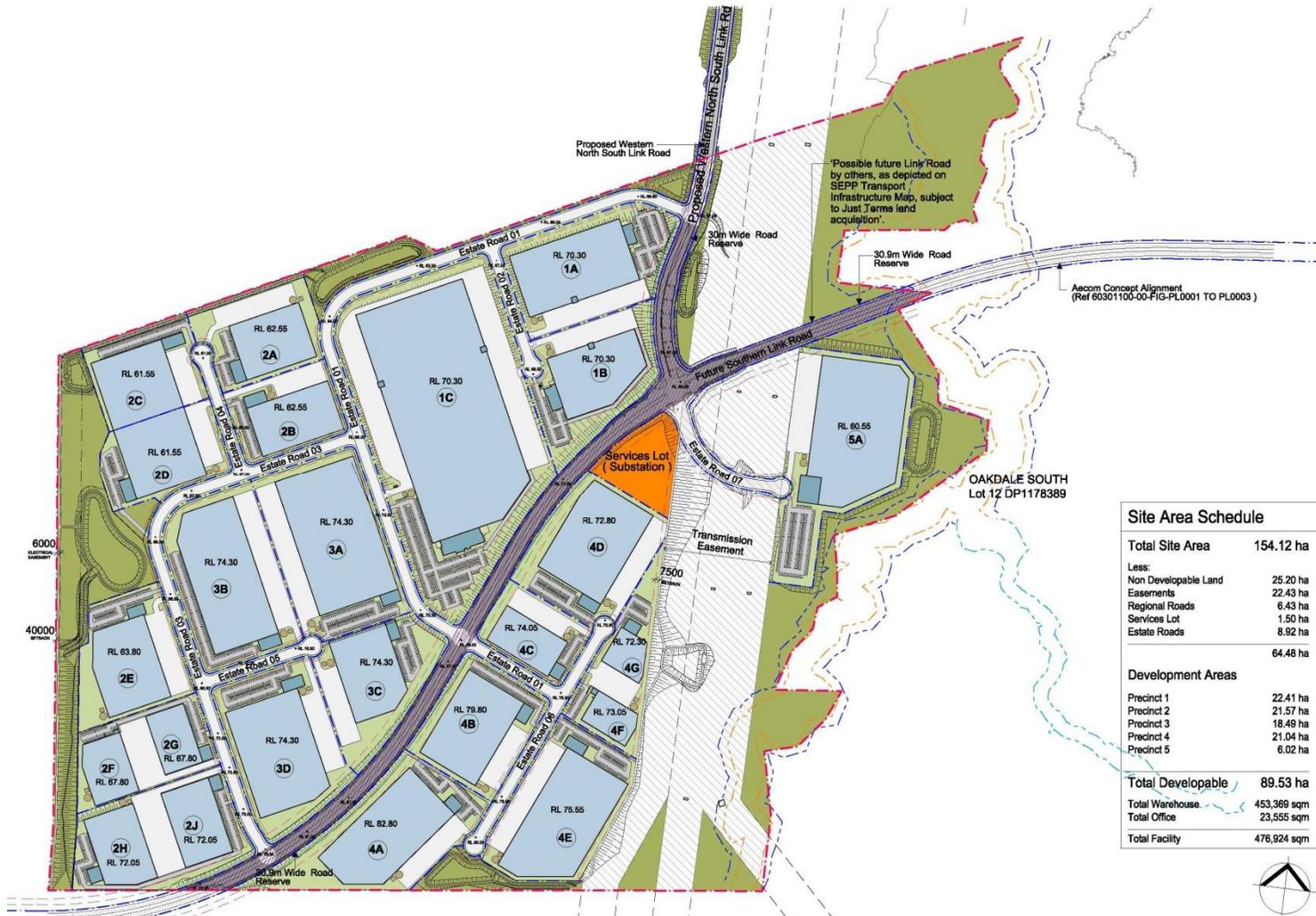
Development permitted with consent within this zone comprises:

- Artificial waterbodies – means an artificial body of water, including any constructed waterway, canal, inlet, bay, channel, dam, pond, lake or artificial wetland, but does not include a dry detention basin or other stormwater management construction that is only intended to hold water intermittently.
- Environment facilities – means a building or place that provides for recreational use or scientific study of natural systems, and includes walking tracks, seating, shelters, board walks, observation decks, bird hides or the like, and associated display structures.
- Environmental protection works – means works associated with the rehabilitation of land towards its natural state or any work to protect land from environmental degradation, and includes bush regeneration works, wetland protection works, erosion protection works, dune restoration works and the like.
- Flood mitigation works – means work designed and constructed for the express purpose of mitigating flood impacts. It involves the changing characteristics of flood behaviour to alter the level, location, volume, speed or timing of flood waters to mitigate flood impacts.
- Roads – means a public road or a private road within the meaning of The Roads Act 1993, and includes a classified road.

1.6 Flooding

Figure 5 shows the extent of both the E2 Environmental Conservation Zone and the existing 1:100 year ARI flood event. As can be seen from this figure, the extent of flooding effectively extends to all sections of the floodplain adjoining the proposed development. This flooding extent will have influenced the natural plant communities that would have once inhabited this now predominantly cleared area, identified as (refer to Biodiversity Assessment Report – Cumberland Ecology, March 2017):

- HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
- HN528: Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion.



Site Area Schedule	
Total Site Area	154.12 ha
Less:	
Non Developable Land	25.20 ha
Easements	22.43 ha
Regional Roads	6.43 ha
Services Lot	1.50 ha
Estate Roads	8.92 ha
	64.48 ha
Development Areas	
Precinct 1	22.41 ha
Precinct 2	21.57 ha
Precinct 3	18.49 ha
Precinct 4	21.04 ha
Precinct 5	6.02 ha
Total Developable	89.53 ha
Total Warehouse	453,369 sqm
Total Office	23,555 sqm
Total Facility	476,924 sqm

Figure 3 Oakdale West Concept Master Plan



Figure 4 Western North South Link Road



Figure 5 Overlay of SEPP WSEA and Penrith LEP 2010 E2 Conservation Zone with existing 1:100 year ARI flood event

1.7 Secretary's Environmental Assessment Requirements

This report addresses the following Secretary's Environmental Assessment Requirements:

Key Issue	Requirements	Key Documents/Output	Where addressed
Soils and Water	<p>A detailed description of all potential impacts on watercourses/riparian land (including watercourse realignments), existing riparian vegetation and the rehabilitation of riparian land, including a draft vegetation management plan.</p> <p>An assessment of the potential impacts on soil (including contamination, salinity and acid sulphate soil)</p>	<p>Riparian Corridor Assessment (this report)</p> <p>Biodiversity Offset Strategy</p> <p>Soil Assessment Report – as relevant to landscape restoration processes.</p>	<p>s.2.8</p> <p>Appendix B</p> <p>s.2.6</p> <p>Appendix C</p>
Consultation	<p>During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular you must consult with:</p> <ul style="list-style-type: none"> · Department of Primary Industries <p>The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.</p>	<p>Riparian Corridor Assessment (this report)</p>	<p>s.2.1.1</p> <p>Appendix D</p> <p>Appendix E</p>

2.0 Key Findings

2.1 NSW Office of Water Requirements

2.1.1 Consultation

Liaison was undertaken with DPI WATER (Gina Potter - Waterways Officer) with regard to:

- classification of watercourse types and associated riparian corridor widths for Oakdale South, Oakdale West and the property to the north of Oakdale West.
- 30 metre vegetated riparian zone to Ropes Creek
- removal of existing farm dam
- Biodiversity Offset planting
- drainage line running dam and into Ropes Creek
- requirements for discharged water from the western north-south link road (WNSLR).

Liaison was undertaken by phone and email on the following dates: October 2014, and 12th, 13th, 14th, 16th and 21st of October 2015.

Agreement was reached on all of the above issues.

2.1.2 Identification of Stream Orders

Stream orders were identified in accordance with DPI WATER guidelines, and subsequent discussion with DPI WATER. Three drainage lines were assessed as follows:

- The drainage line running west to east midway through the Oakdale West site (refer **Figure 7**). DPI WATER determined that this drainage line was not considered to be a watercourse for the purposes of the *Water Management Act 2000* (WM Act). Refer **Appendix D** for a record of communications.
- Ropes Creek, which comprises a 3rd order watercourse.
- The secondary channel or 'flood-runner' to the west of Ropes Creek into which the bio-retention basin, located at the northern end of the WNSLR, drains – refer **Figure 4**. It was determined that the flood-runner into which the basin would discharge is located 140m west of Ropes Creek, and this work is therefore not subject to the WM Act. Refer **Appendix E** for a record of communications.

Riparian corridor widths are shown in **Table 1**. The riparian corridor consists of:

- The channel which comprises the bed and banks of the watercourse (to the highest bank), and
- The vegetated riparian zone (refer **Figure 6**).

Table 1 Recommended Riparian Corridor Widths

Watercourse Type	Vegetated Riparian Zone* Width (each side of watercourse)	Total Riparian Corridor Width
3 rd order	30 metres	60m + Channel Width

Source: DPI WATER 'Guidelines for Riparian Corridors on Waterfront Land', July 2012

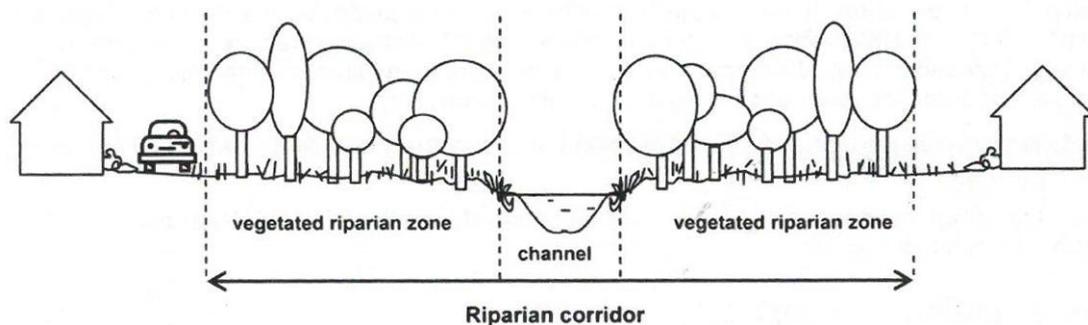


Figure 6 Sketch showing elements of the riparian corridor

Source: DPI WATER 'Guidelines for Riparian Corridors on Waterfront Land', July 2012

The riparian corridor should be maintained or rehabilitated with fully structured native vegetation.

2.2 Watercourse Classification

As can be seen from **Figure 7** and **Figure 8**, Ropes Creek is a 3rd order watercourse. As such, this watercourse needs to be retained with an average 30m vegetated riparian zone to each side of the channel as per **Table 1**. The following works and activities can be undertaken within this corridor, so long as they create minimal harm, and they relate to controlled approvals under the WM Act:

- riparian corridor off-setting for non-riparian corridor uses
- cycleways and paths
- detention basins within 50% of the outer vegetated riparian zone
- online detention basins
- stormwater outlet structures and essential services
- road crossings.

2.3 Biodiversity Offset Strategy

Four plant community types have been identified on the site as follows:

- HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
- HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
- HN529: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion
- HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion.

The remaining area of the Precinct is cleared and improved for agriculture and is dominated by exotic pasture grasses in the form of Low Diversity/Exotic Grassland. It is proposed to rehabilitate the remaining areas of Low Diversity/Exotic Grassland within the Oakdale West Offset Site back to functional woodland with species typical of the existing plant community types.

A Biodiversity Offset Strategy (BOS) has been prepared to establish a commitment to offsetting the impacts of the Project on threatened species, populations and communities. The BOS has been prepared to address the NSW Department of Planning and Environment (DP&E) issued Secretary's Environmental Assessment Requirements (SEARs) for the Project, which state that the impacts of the Project must be assessed in accordance with the NSW Office of Environment and Heritage Framework for Biodiversity Assessment under the NSW Biodiversity Offsets Policy for Major Projects.

A Biodiversity Offset Area will be established at Oakdale West to facilitate the majority of offsetting required under a BioBanking Agreement. The majority of the Biodiversity Offset Area (the offset area) is located adjacent to the

development site between the power easement and Ropes Creek to the east, with additional sections located to the west of the development site.

The offset area is situated so as to make use of land that holds the highest biodiversity values within lands adjacent to the development site. The majority of the eastern part of the offset area is located to the east of the proposed development site and includes both existing native vegetation and areas of exotic grassland within and adjacent to the Ropes Creek corridor.

Offsetting within this area includes a combination of regeneration and revegetation that will be implemented and managed in accordance with both:

- Prescribed management actions generated by the Framework for Biodiversity Assessment calculator
- DPI Water 'Guidelines for Vegetation Management Plans on Waterfront Land'

Three plant community types will be rehabilitated / restored within and adjacent to the Ropes Creek corridor as follows:

- HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
- HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
- HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion.

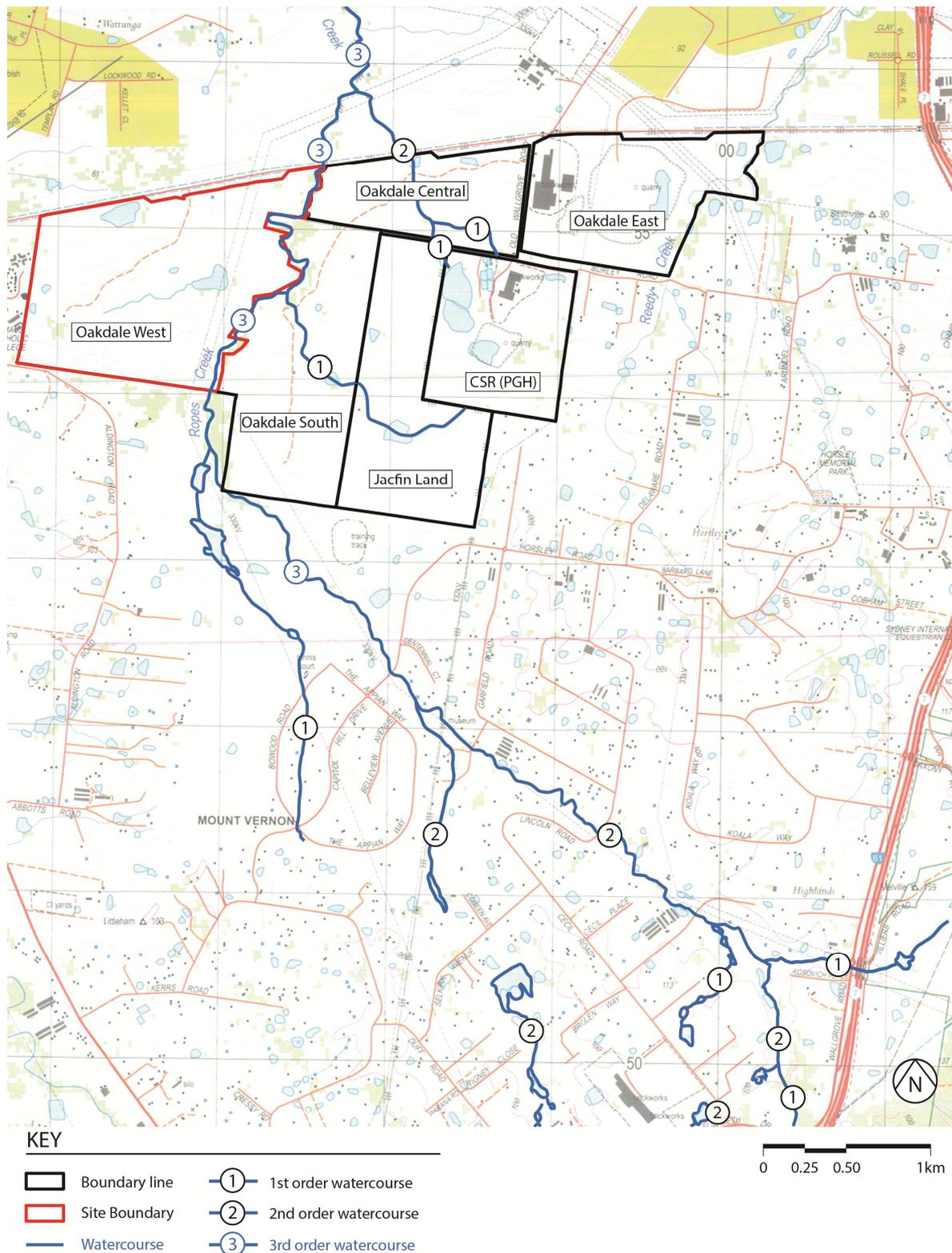


Figure 7 Map showing the stream order for the Oakdale West Precinct

Source: Prospect (9030-2N) 1:25,000 topographic map, September 2012



Figure 8 Plan showing riparian corridor widths for Oakdale West Precinct

2.4 Soils

Soils investigation has been undertaken for the site to characterise the physical and chemical properties of the soil profiles and of the alluvial deposits associated with the watercourses to facilitate the restoration of existing remnant riparian vegetation (refer to Appendix C).

In general, the soils along Ropes Creek are typical of Cumberland Plain landscape, which are acidic, sodic and magnesic. Specific issues identified as requiring mitigation were:

- Dispersion due to sodic and magnesic chemistry - an application of gypsum will help correct the cation balance and flush out these salts. This is particularly important along the creek line where dispersion and loss of soil could become problematic.
- Dispersion due to salinity - Dispersion due to Salinity– two locations were identified to have high salinity levels, which can cause dispersion as well as loss of vegetation. Gypsum applications and leaching the profile will aid with removing the salts.
- Very acidic pH - as vegetation develops it acidifies its soil by depleting it of calcium. To counteract the soils becoming even more severely acidic it is recommended that small lime additions be applied to allow vegetation to develop properly.
- Availability of aluminium - as a consequence of the strong acidity, aluminium has become available. Aluminium is toxic to plants however can be neutralised through the application of lime.
- High manganese levels - high manganese levels are indicative of waterlogging, which is further supported by the mottling which is apparent in most profiles.

2.5 Potential Impacts on Watercourses

The riparian corridor will be restored to the below EEC's as per the Biodiversity Offset Strategy:

- HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
- HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion.

The ecological integrity of these corridors will be substantially increased in response to implementation of the proposed biodiversity offsetting strategy.

These areas will then be the subject of in-perpetuity management in accordance with the provisions of Biodiversity Offset Strategy.

On the basis of the above, it is considered that the potential impacts on Ropes Creek will generally be limited to the initial works period with regard to inflow from the construction areas via stormwater management basins. Once the development reaches 80% completion the bio-retention basins will be brought online. This stormwater polishing measure will coincide with ongoing establishment of increased cover of remnant plant communities and associated reduced edge effects.

3.0 References

Australian Bushfire Protection Planners, September 2016. Bushfire Assessment for Oakdale Industrial Estate – West.

Cumberland Ecology, 2007. Ecological Assessment – Oakdale Concept Plan.

Cumberland Ecology, March 2017. Oakdale West Biodiversity Assessment Report.

Cumberland Ecology, March 2017. Oakdale West Biodiversity Offset Strategy.

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NSW Department of Planning & Infrastructure, June 2013. Broader Western Sydney Employment Area Biodiversity and Riparian Assessment (Exhibition Draft).

SESL Australia, August 2015. Ropes Creek Riparian Corridor Assessment (Soils).

SESL Australia, March 2016. Oakdale West Riparian Corridor, Ropes Creek Soil Investigation

Appendix A

Biodiversity Assessment Report

Cumberland Ecology, March, 2017

Appendix B

Biodiversity Offset Strategy

Cumberland Ecology, March 2017

Appendix C

Soils Reporting

SESL, March 2016

Appendix D

Communication with DPI Water re. drainage line in Oakdale West site.

13 October 2015

Appendix E

Communication with DPI Water re. 'flood-runner' north of Oakdale West site.

14 October 2015