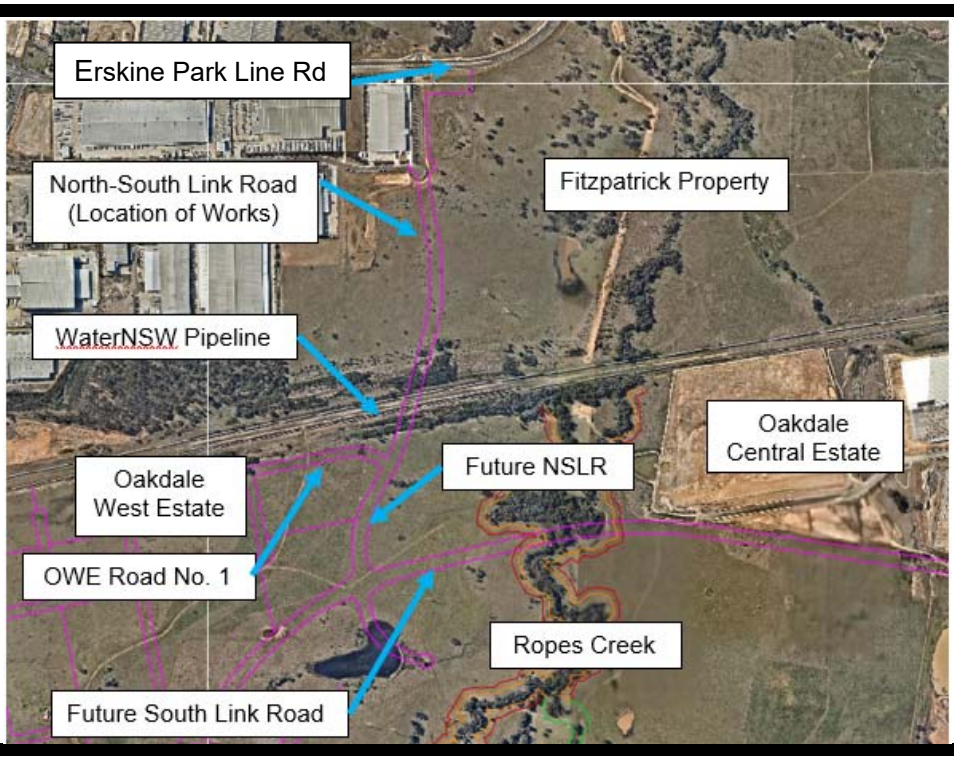
Oakdale West Development

North-South Link Road



Road Design Report

Report no: 15-272-R002 **Revision:** 02 **Date:** March 2017

Document information

Level 7, 153 Walker Street, North Sydney

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Document author	Andrew Tweedie

Issue	Description	Date
01	Draft Issue	14-07-16
02	SSD Application	14-03-17

Finalisation signatures

The design described in this report is considered to have been finalised.

Signature	**Date**
Andrew Tweedie Senior Civil Engineer	14-03-17
Mark Marsic Lead Designer (Road)	14-03-17
Anthony McLandsborough Director	14-03-17

Notes: The finalisation signatures shown above do not provide evidence of approval to the design. Approval signatures are shown on the title sheet of the design plans.

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Abbreviations

OWE	Oakdale West Estate
NSLR	North South Link Road
GPS	Goodman Property Services (Aust) Pty Ltd
SWC	Sydney Water Corporation
RMS	Roads and Martine Service
EPLR	Erskine Park Link Road
PCC	Penrith City Council

1 Introduction

1.1 Scope of Report

Objective of Report

The objective of this design report is to outline the design criteria used for the Engineering design of all components of the North-South Link Road (NSLR) and compare to the requirements of the Roads and Maritime Services (RMS) Design Guidelines and the Penrith City Council Development Control Plans (DCP).

This report should be read in conjunction with Civil Engineering drawings prepared by AT&L titled Oakdale West 3000- Series North-South Link Road Civil Works Package. Refer to Appendix A for a list of all these drawings.

Summary

This report generally discusses the design philosophy behind the following components of the design of the NSLR.

- Road Design
- Stormwater Management
- Services

1.2 Project Objectives

The project specific objectives for the design are:

- To provide the primary road connections for the Oakdale West Estate (OWE) with the Erskine Park Link Road (EPLR) to the north.

The project will also meet the following objectives that are common to road design projects:

- Develop a cost-effective solution.
- Provide appropriate levels of safety for road users.
- Minimise land acquisition.
- Minimise disruption to adjacent property owners/ authorities including Transgrid, WaterNSW, Goodman Property Services (GPS) and Fitzpatrick Property

2 Existing Site Conditions

2.1 Locality

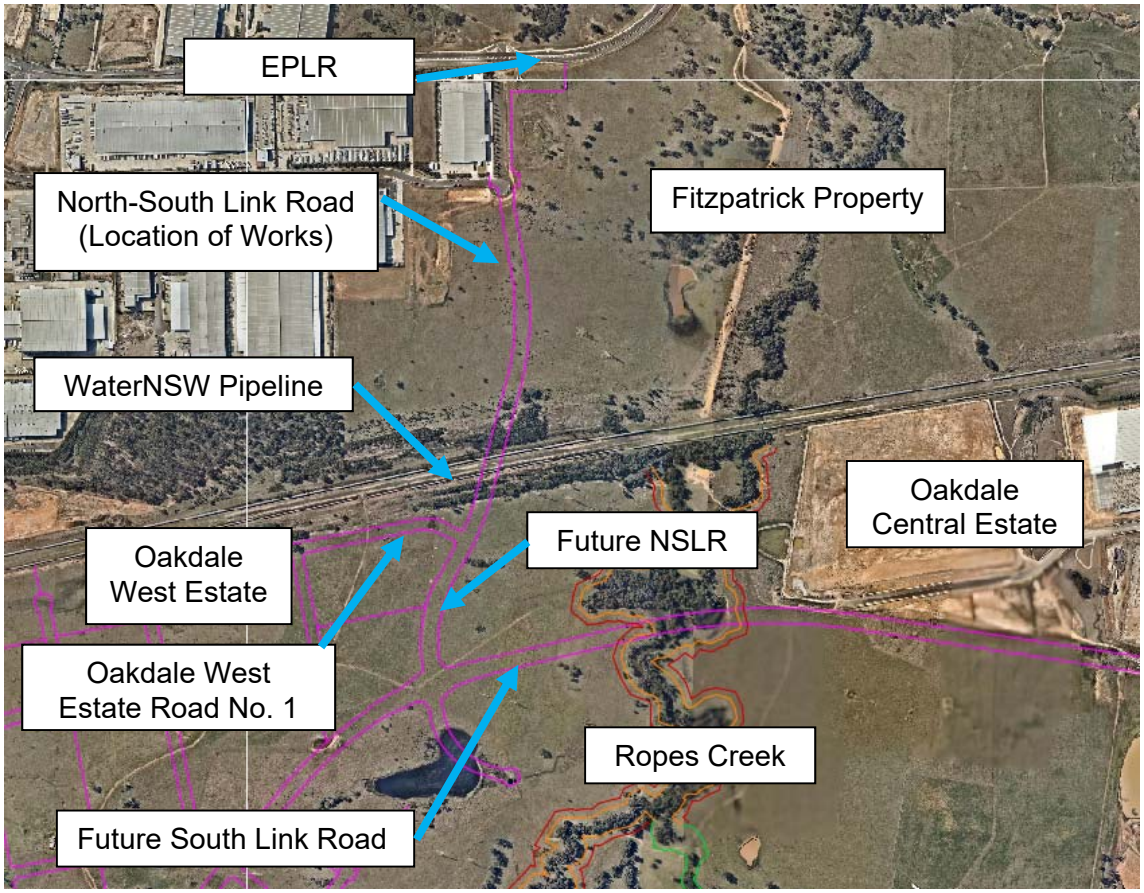


Figure 1 - Locality Sketch

The proposed NSLR is approximately 1km long and situated on vacant land between the intersection of EPLR to the north and the intersection of Road No.1 of the proposed OWE to the South.

It should be noted the site is currently zoned within General Industrial with the land surrounding the road being developed progressively for Industrial purposes.

Refer to Drawing 15-272-C3003 within Appendix A for General Arrangement Plan indicating route of proposed road.

The works are located in the LGA of Penrith City Council (PCC).

2.2 Site Photos

	Site photo of proposed North-South Link Road location at approx. CH800 looking south over WaterNSW Pipeline.
	Site photo of proposed North-South Link Road location at approx. CH780 looking north.

	Site photo of proposed North-South Link Road location at approx. CH400 looking north.
	Site photo of proposed North-South Link Road location at approx. CH60 looking south.

	Site photo of proposed North-South Link Road location at approx. CH40 looking north onto the intersection of Lenore Drive.
	Site photo of proposed North-South Link Road location at approx. CH220 looking south onto the turn head and swale of Lockwood Road.

	Site photo of proposed North-South Link Road location at approx. CH280 looking north onto the turn head and swale of Lockwood Road.
	Site photo of grass swale along Lenore Drive.

	Site photo of basin along Lenore Drive.

2.3 Utility Information

Existing services which are located within the boundary of the proposed NSLR Link Road are as follows:

- WaterNSW pipeline which runs under the proposed road
- Overhead transmission cables

3 Design Planning

3.1 Design Parameters

The design parameters used are listed below, in order of priority:

1. Austroads Guides to Road Design.
2. Published RMS Supplements to Austroad Guidelines.
3. Australian Standards referenced in the Austroads Guides to Road Design.
4. Published RMS Supplements to Australian Standards.

3.2 Road Function

The NSLR will provide a link between the OWE and the RMS state road, EPLR. The NSLR will connect the north east corner of OWE and cross over the WaterNSW Pipeline via a proposed bridge and connect into the EPLR approximately 1km to the north. A large majority of vehicles that will use the proposed road will be heavy vehicles including B-Doubles and semi-trailers.

Refer to Civil Drawings within Appendix A for location and extent of North South Link Road.

3.3 Proposed Road Classification

The proposed NSLR is envisaged to be classified by RMS as a Regional Road under the control of RMS in the future. PCC may control the road until such time RMS take ownership.

The acquisition of land for the proposed road will be dedicated as a public road reserve to PCC.

3.4 Design Speed

The design speed for the proposed NSLR is 100km/hr and will be signposted at 80km/hr.

The final location of advisory speed signs along the road will be subject to requirements and negotiations with RMS.

Traffic modelling will specifically look at each of the intersections and tie-ins that are affected by the proposed works.

3.5 Minimum Curve Radius

The minimum curve radius is governed by the proposed design speed. The minimum curve radius will be based on a design speed of 100km/h and will be designed to conform to the relevant design standards, where possible.

If required, superelevation will be used if smaller curve radii are required.

Final minimum curve radii will be determined during the detailed design stage.

3.6 Design Vehicles

Design Parameter	Design Vehicle	Purpose
Design Heavy Vehicle	B-Double	Turning Path
Design Light Vehicle	Car	Stopping Site Distance

Table 1 - Design Vehicles

The choice of design heavy vehicle was influenced by the high level of heavy vehicle usage that is expected for the NSLR.

4 Road Design

4.1 Horizontal and Vertical Geometry

The NSLR has generally been designed to meet Austroads requirements and Australian standards to accommodate B-double truck movements.

The North-South Link Road has been designed as such:

- 30.0m wide road reserve
- 2x 8.0m wide Carriageway comprising of
    - 2x3.5m wide traffic lanes
    - 2x4.5m wide traffic lanes adjacent kerb
- 5.0m raised median
- 4.5m wide verge
    - 2.5m wide footpath along the western carriageway complying with RMS requirements

Refer to Figure 2 below indicating a typical road section and Civil drawings within Appendix A.

Design Parameter	Value adopted in the current design	Within guideline limits*	Reason for use of values that are outside guideline limits
Left carriageway (northbound)	8.0m	Y	N/A
Right carriageway (southbound)	8.0m	Y	N/A
Median	5.0m	Y	N/A
Left Verge (western side)	4.5m	Y	N/A
Right Verge (eastern side)	4.5m	Y	N/A

Table 2 - Road Scape Allocation

*refer Austroads Guides to Road Design Part 3, Table 4.3

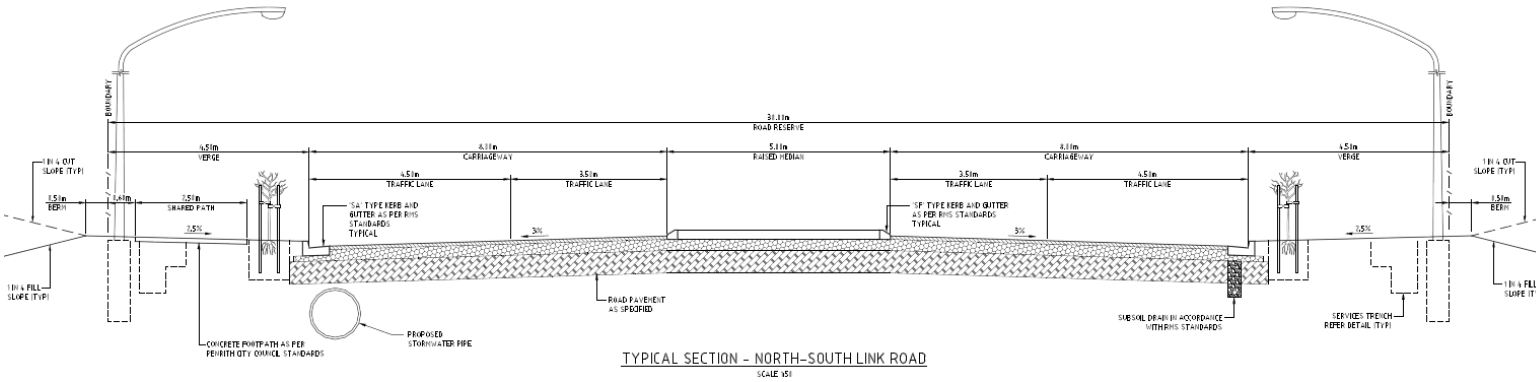


Figure 2 - North-South Link Road - Typical Section

4.1.1 Lane Widths

The proposed North-South Link Road will be a dual carriageway consisting of a 4.5m kerbside lane and a 3.5m median side lane.

4.1.2 Median Type

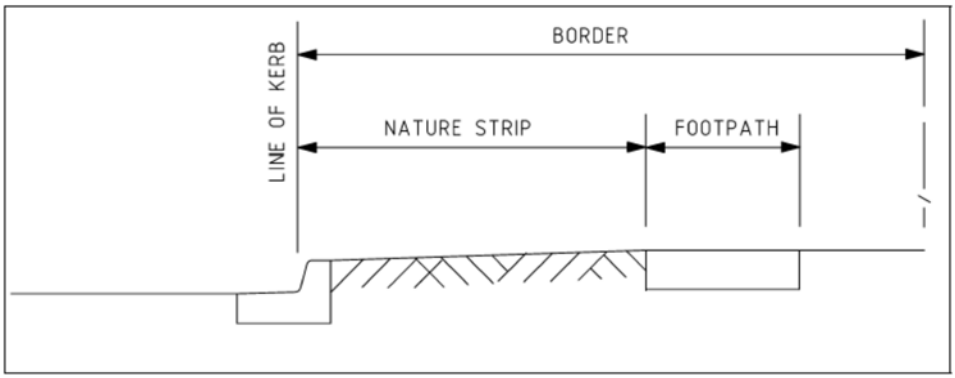
The proposed median will be a 5.0m wide raised concrete median.

4.1.3 Allocation of road space for utilities, pedestrians and bicycles

A sufficiently wide verge of 4.50m has been allowed along the eastern and western side of the proposed road. It is proposed to provide a 2.5m wide shared footpath as per Penrith City Council standards along the western side of the road.

The verge in all areas is wide enough to include the proposed shared footpath and for the inclusion of all proposed services.

As per the Austroads Guides to Road Design, the verge width is referred as a 'Border'. The 'Border' is described in the figure below:



Source: VicRoads (2002b).

Figure 3 – Austroads Guides to Road Design - Border Diagram

4.1.4 Allocation of Road Space for Landscaping

Minimal landscaping works can occur within the verges where no pedestrian/cycle paths are constructed. No formal landscaping, other than the installation of turf and 3m high trees at 20m centres is proposed within the road reserve where no footpath are located.

4.1.5 Crossfall

Nominal crossfall along the proposed NSLR will generally be at 3.0%. Superelevation lengths with be at 3.0% maximum, which suits the proposed curve radii.

4.1.6 Staging

During detailed design, it may be deemed to only construct half of road between the OWE site and the Lockwood intersection due to the funding arrangements agreed between Goodman and the Department of Planning.

Concept design has been prepared for this interim arrangement and is located in Appendix A

4.2 Horizontal Curves and Alignment

4.2.1 Horizontal Sight Distance

The horizontal alignment has been designed to be within the acceptable sight distant. Any proposal for planting of the median will need to be assessed for sight distance requirements, particularly on the inside of horizontal curves. It should be noted the current project scope does not propose planting other than turf and 3m high trees.

Horizontal sight distances will comply with the Austroads Guides to Road Design and the RMS Supplement to the Austroads Guidelines, with reference to Section 5.4.

4.2.2 Superelevation Transitions

Superelevation Transition lengths will be designed in accordance with the Austroads Guides to Road Design and the RMS Supplement to the Austroads Guidelines.

4.2.3 Vertical Sight Distance/Stopping Distance

Vertical stopping sight distance along the proposed NSLR will comply with the Austroads Guides to Road Design and the RMS Supplement to the Austroads Guidelines.

4.3 Pavement

The final pavement will be designed in accordance with Austroads guidelines/specifications and in consultation with RMS. It is envisaged that the pavement will be a semi-rigid pavement.

4.4 Cut and Fill Batter Slopes

The proposed NSLR has been designed so that the final pavement levels will batter back to the surrounding existing surface levels at a nominal 4:1 (H:V) slope and 8:1 within the Transgrid easement. All batters are intended to be outside the road reserve.

The table below summarises the desirable and maximum batter slopes, as per the Austroads Guides to Road Design.

Table 4.12: Typical design batter slopes

	Cut		Fill	
	Desirable	Maximum	Desirable	Maximum
Earth batter	3:1	2:1	6:1	4:1 (2)
Rock batter	0.5:1	0.25:1 (1)	–	–
Median	10:1	6:1 (2)	10:1	6:1 (2)

1. May be steeper if geotechnical conditions permit.
2. Steeper slopes may be considered in combination with safety barriers to protect errant vehicles; however consideration should be given to safe maintenance practices and the surfacing treatment adopted.

Figure 4 - Austroads Guides to Road Design - Batter Slopes

5 Stormwater Management

5.1 Existing Site Stormwater Drainage

Currently the site comprises of farmland and is classified as a 'greenfield' site with an entire coverage of pervious areas.

Generally, the entire length of the North South Link Road is located on an existing ridge line with the Water NSW pipeline splitting the catchment in a north/south direction.

To the south of the Water NSW pipeline all overland flows drains to the south east into the existing Ropes Creek to the south.

North of the Water NSW pipeline to the proposed EPLR intersection, the road alignment is located on a ridge line. Overland flow currently sheds to the north west into the existing sediment basin south of Lockwood Road and north east into a low lying area to the south of EPLR.

Refer to Drawing 15-272-C3056 within Appendix A for the existing stormwater catchment plan for the length of the NSLR.

5.2 Proposed Stormwater Details

The main objective for the stormwater drainage design for the proposed NSLR is to ensure the quality of the water discharging into Ropes Creek meets the pollutant reduction treatment rates as specified within the RMS WSUD guidelines.

All stormwater generated within the road reserve is proposed to be collected via pits and pipes and connect into bio-retention basins. All basins will have a diversion pit for low and high flows, an outlet structure and overland flow weir system to drain into the adjacent Ropes Creek to the east. Scour protection will be provided on these outlet structures to minimise the effects of erosion on the creek.

Refer to the Civil Drawings within Appendix A for layout and details for the proposed stormwater network along the length of the road.

5.3 Council and RMS Requirements and Recommendations

All road reserve stormwater drainage for the proposed NSLR is designed to comply with the following:

- RMS Water Sensitive Urban Design Guidelines – March 2016
- Austroads – Guide to Road Design Part 5: Drainage – General and Hydrology Considerations
- Austroads – Guide to Road Design Part 5A: Drainage – Road Surface, Networks, Basins and Subsurface
- Penrith City Council Design Guidelines for Engineering Works

A summary of the design requirements adopted is listed below:

- Precinct based basins will serve the road reserve as bio-retention basins

- All stormwater drainage within the NSLR and bio-retention basins will be dedicated to RMS.
- All bio-retention basins have been designed with a 3.0m wide sprayed seal access road along the berm to ensure maintenance vehicles can access the entire exterior of the basin
- WSUD to achieve target reductions:
    - 80% Total Suspended Solids (TSS)
    - 45% Total Phosphorus (TP)
    - 45% Total Nitrogen (TN)
    - Retention of litter greater than 50mm for flows up to 25% of the 1 year ARI peak flow
    - Retention of sediment courser than 0.125mm for flows up to 25% of the 1 year ARI peak flow
    - In areas with concentrated hydrocarbon deposition, no visible oils for flows up to 25% of the 1 year ARI peak flow

5.3.1 Modelling Software

DRAINs modelling software has been used to calculate the Hydraulic Grade Line (HGL) of the road stormwater pipes. DRAINs is a computer program used for designing and analyzing urban stormwater drainage systems and catchments. It is widely accepted by Council and RMS across NSW as the basis for stormwater design and has been confirmed by Penrith City Council and RMS as the preferred stormwater software analysis package..

MUSIC modelling software has been used to evaluate pollutant loads from each developed lot. For a detailed description of the MUSIC modelling refer to Section 5.6.1 of this report. MUSIC data files and output results are attached in Appendix C.

5.3.2 Hydrology

- Pipe drainage shall be designed to accommodate the 20-year ARI storm event.
- The combined piped and overland flow paths shall be designed to accommodate the 100-year ARI storm event.
- Where trapped low points are unavoidable and potential for flooding private property is a concern, an overland flowpath capable of carrying the total 100-year ARI storm event shall be provided. Alternatively, the pipe and inlet system may be upgrade to accommodate the 100 year ARI storm event.
- Rainfall intensities shall be as per the Intensity-Frequency-Duration table in accordance with the Australian Rainfall and Runoff (AR&R) volume 2.
- Times of concentration for each sub catchment shall be determined using the kinematic wave equation.

- Runoff coefficients shall be calculated in accordance with AR&R. The fraction impervious shall be determined from analysis of the sub catchments.
- Flow width in gutter shall not exceed 2.5m for the minor design storm event.
- Velocity depth ratios shall not exceed 0.4 for all storms up to and including the 100 year ARI event.
- Inlet pits to be spaced so that flow width shall not exceed 80l/sec
- Bypass from any pit on grade shall not exceed 15% of the total flow at the pit
- Blockage factors of 20% and 50% shall be adopted for pits on grade and at sags respectively.

5.3.3 Hydrology

- A hydraulic grade line HGL design method shall be adopted for all road pipe drainage design. The HGL shall be shown on all drainage long sections.
- The minimum pipe size shall be 375mm diameter RCP.
- Maximum spacing between pits shall not exceed 75m.
- The minimum pipe grade shall be 0.5%.
- All pipes shall be Rubber Ring Jointed unless noted otherwise.
- The minimum cover over pipes shall be 450mm in grassed areas and 600mm within carriageways.
- Where minimum cover cannot be achieved due to physical constraints the pipe class shall be suitably increased.
- All trafficable shall be Reinforced Concrete Pipes or Fibre Reinforced Cement equivalent.
- The pipe friction coefficients to adopted shall be:

Materials	Mannings – n	Colebrook-White – k	Min. Pipe Class
RCP	0.012	0.6	3
FRC	0.01	0.15	3

Table 3 - Pipe Details

- All pipes classes shall be designed for the ultimate service loads and where applicable, construction loads will be designed for.
- Pipes discharging to the overland flow path shall adopt a minimum tailwater level equivalent to respective overland flow level.

- Pit Loss coefficients shall be calculated in accordance with Missouri Charts.
- A minimum 150mm freeboard shall be maintained between pit HGL and pit surface levels.
- Overland flowpaths shall maintain a minimum of 300mm freeboard to all habitable floor levels.
- Pits deeper than 1.2m shall contain step irons at 300 mm centres.

5.4 Stormwater Catchments

A Stormwater Catchment Plan for each Catchment and flow paths into the bio-retention basins are shown in Appendix B. As indicated in the Catchment Plan both of the basins are bio-retention basins designed to treat the nutrients within the stormwater flows to RMS treatment rates. These treatment rates are from the RMS – Water Sensitive Urban Design Guidelines.

5.5 Overland Flows

Overland flows within the access roads, carparks and hardstanding areas have been designed to be safely conveyed within the road carriageway to comply with flow widths and velocities within the Austroads – Guide to Road Design.

5.6 Water Sensitive Urban Design (WSUD)

Water Sensitive Urban Design encompasses all aspects of urban water cycle management, including water supply, wastewater and stormwater management. WSUD is intended to minimise the impacts of development upon the water cycle and achieve more sustainable forms of urban development.

The WSUD strategy, MUSIC Model and subsequent WSUD designs prepared by AT & L are based upon requirements within the RMS – Water Sensitive Urban Design Guidelines.

All stormwater runoff from catchments A and B as mentioned in Section 5.5 is proposed to drain into Bio-Retention basins for the water to be treated and discharged at rates acceptable to Penrith City Council and RMS. A summary of the Basin parameters is indicated in Table 13 and details and cross sections included on the Civil drawings.

Discharge from the basins will be controlled via a rock lined swale that will intersect the existing creek system. These discharge swales will be generally designed and documented to meet the OoW Guidelines for outlet structures on waterfront land.

Refer to attached Civil Drawings list in Appendix A.

5.6.1 WSUD Modelling – MUSIC Model

The MUSIC Model for Urban Stormwater Improvement Conceptualisation (MUSIC, Version 5.00.10) was used to evaluate pollutant loads from each of the proposed

lots for Post-development (treated) conditions based on the proposed site development.

A conceptual view of the MUSIC model used in this report can be found in Appendix C.

Pluviograph data (6 minute rainfall intensity and evapotranspiration) for Horsley Park (Station 067119) was used in the MUSIC model.

5.6.2 Catchment Areas and MUSIC Parameters

All road catchment areas were assumed to 90% impervious.

MUSIC model input parameters for these catchments including rainfall-runoff, base flow concentration and stormflow concentration parameters were selected as per the Penrith City Council Water Sensitive Urban Technical Guidelines June 2015 document. The parameters used for the various catchment areas can be seen in tables 4, 5 and 6.

Parameter	Unit	Figure
Rainfall Threshold	mm/day	1.40
Soil Storage Capacity	Mm	105
Initial Storage	% of Capacity	30
Field Capacity	Mm	70
Infiltration Capacity Coefficient	a	150
Infiltration Capacity Coefficient	b	3.5
Initial Depth (Ground Water)	mm	10
Daily Recharge Rate	%	25
Daily Baseflow Rate	%	10
Daily Seepage Rate	%	0.00

Table 4 - Rainfall -Runoff Parameters - All Catchment Areas

Pollutant	Baseflow Concentration Parameter – Mean (log mg/L)	Baseflow Concentration Parameter – Std Dev (log mg/L)	Stormflow Concentration Parameters – Mean (log mg/L)	Stormflow Concentration Parameters – Std Dev (log mg/L)
TSS	1.200	0.170	2.150	0.320
Phosphorus	-0.850	0.190	-0.600	0.250
Nitrogen	0.110	0.120	0.300	0.190

Table 5 - Base Flow / Stormwater Concentration Parameters - Pervious Areas

Pollutant	Baseflow Concentration Parameter – Mean (log mg/L)	Baseflow Concentration Parameter – Std Dev (log mg/L)	Stormflow Concentration Parameters – Mean (log mg/L)	Stormflow Concentration Parameters – Std Dev (log mg/L)
TSS	0.000	0.00	2.430	0.320
Phosphorus	0.000	0.000	-0.300	0.250
Nitrogen	0.000	0.000	0.340	0.190

Table 6 - Base Flow / Stormwater Concentration Parameters - Road

MUSIC model parameters used for the Bio-retention basin were based off guidelines provided by FAWB – Stormwater Biofiltration Systems – Version 1, 2009, and were modified accordingly. Parameters used to model the bio-retention basin are shown in the table 7 below.

Parameter	Unit	Figure
Extended Detention Depth	m	0.30
Surface Area	m2	Varies
Filter Area	m2	Varies
Unlined Filter Media Perimeter	m	0.01
Saturated Hydraulic Conductivity	mm/hour	125
Filter Depth	m	0.50
TN Content of Filter Media	mg/kg	800
Orthophosphate Content of Filter Media	mg/kg	40.0
Exfiltration Rate	mm/hour	0.00
Base Lined	-	No
Vegetation Properties	-	Vegetated with Effective Nutrient Removal Plants

Overflow Weir Width	m	10.00
Underdrain Present	-	Yes
Submerged Zone	-	No

Table 7 - Bio-Retention Basin Parameters

5.6.3 Results

MUSIC modelling results presented as mean annual loads at the receiving node indicate that adopted target reductions are achieved, as shown in Tables 8 and 9.

Pollutant	Sources (Kg/yr)	Residual Load (Kg/yr)	Reduction (%)	RMS Target Reduction (%)
Total Suspended Solids	4,920	696	85.9	80
Total Phosphorus	8.08	2.02	75.0	45
Total Nitrogen	32.6	16.1	50.7	45

Table 8 - Pollutant Loads - NSLR Basin No. 1

Pollutant	Sources (Kg/yr)	Residual Load (Kg/yr)	Reduction (%)	RMS Target Reduction (%)
Total Suspended Solids	4,850	649	86.6	80
Total Phosphorus	8.22	2.01	75.5	45
Total Nitrogen	33.1	16.0	51.6	45

Table 9 - Pollutant Loads - NSLR Basin No. 2

5.7 Conclusion

As highlighted in the above section all stormwater drainage within the NSLR has been designed in accordance with the RMS Water Sensitive Urban Design Guideline, March 2016. This includes design of all pipework and WSUDs infrastructure. To summarise:

- WSUD to achieve target reductions:
    - 80% Total Suspended Solids (TSS)
    - 45% Total Phosphorus (TP)
    - 45% Total Nitrogen (TN)
    - Retention of litter greater than 50mm for flows up to 25% of the 1 year ARI peak flow
    - Retention of sediment courser than 0.125mm for flows up to 25% of the 1 year ARI peak flow
    - In areas with concentrated hydrocarbon deposition, no visible oils for flows up to 25% of the 1 year ARI peak flow

6 Services

6.1 Water Main

It is proposed to install water main sized in accordance with the Oakdale LASP along the eastern side verge of the NSLR.

6.2 Telecommunications

It is proposed to install telecommunication conduits and cables along the eastern side verge of the NSLR.

6.3 Electrical

It is proposed that low voltage power to be installed along the eastern and western side verge of the NSLR. It is also proposed to install high voltage power on the western side verge.

6.4 Street Lighting

It is proposed to install street lighting on both sides of the road. In accordance with PCC standard's. The lighting will be designed in accordance with AS1158.1 to a category V3 standard. (subject to PCC acceptance)

6.5 Tie In

6.5.1 Oakdale West Estate Road No. 1

The NSLR will connect at the south to Road No.1 of the OWE and a turn head will be provided. It should be noted that it is proposed that the NSLR will be extended to connect to the future Southern-Link Road however this is not part of this application.

6.5.2 EPLR

The intersection of NSLR and the EPLR will be upgraded to accommodate the proposed upgrade cross section and proposed turn lanes. The upgrade will include the installation of new signals at the intersection.

6.6 WaterNSW Pipeline

Due to the WaterNSW pipeline running under the NSLR it is proposed to provide adequate crossing over the existing WaterNSW pipeline by installing a 100m long bridge. The bridge will provide adequate clearance from the pipes and allow for the existing access track to be used/ maintained.

GHD have been engaged to prepare a concept bridge design report for the crossing

Through discussions with Water NSW, they identified their requirements and a provision has been made to satisfy Water NSW. Further consultation is required to ensure Water NSW are satisfied.

Refer to drawing GHD Report in Appendix E for proposed bridge crossing.

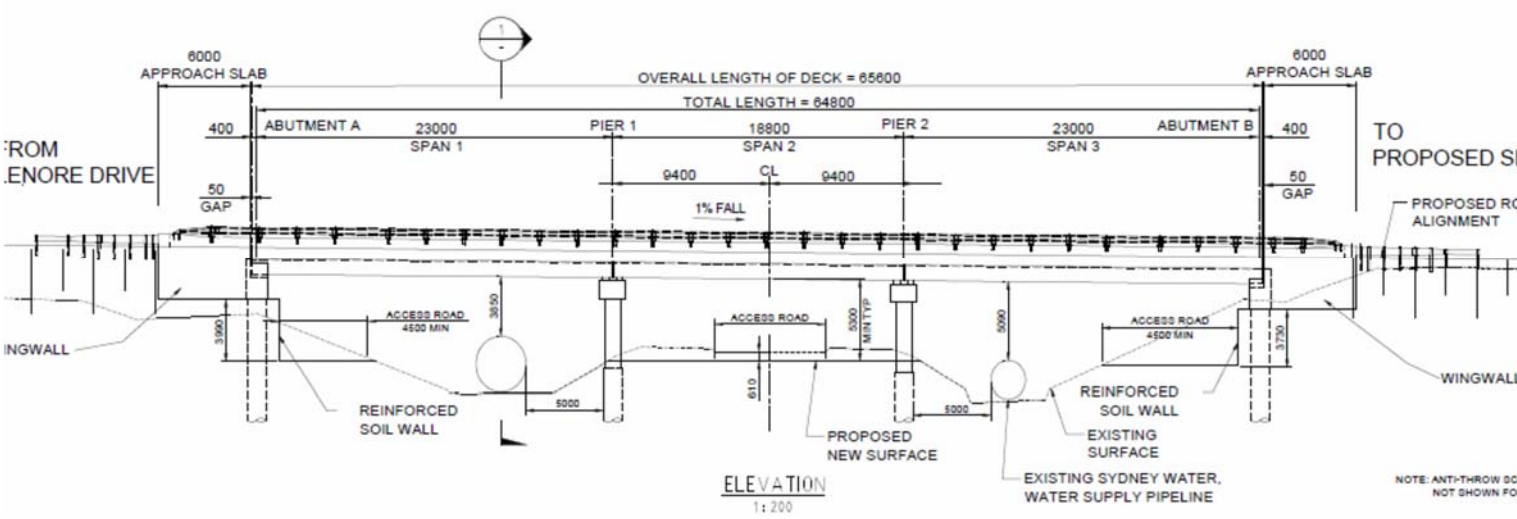


Figure 8 – WaterNSW pipeline bridge crossing

7 Finalisation

Once DA approval is approved, the following is required:

- Constructability Review.
- Road Safety Audit.
- Detailed Design including:
  - Civil Design.
  - Stormwater Design (based on DRAINS modelling)
  - Geotechnical Investigation.
  - Pavement Design.
  - Electrical Design.
  - Water Relocation design.
  - Bridge Design
- Detailed Cost Estimation.
- Design reviews.
- Submission to RM, Water NSW and PCC for approval.

8 Conclusion

The design to date has been prepared for inclusion in the development application giving due consideration to the existing stake holders, physical features on site, design constraints and relevant design guidelines.

It is concluded the design could be further advanced through to a Detailed Design/Construction documentation level, as further design will ensure with certainty that there will be no major unknown constraints.

Once complete, the road will operate at the intended design speed, safely and efficiently as a regional road.

The design is generally in accordance with the relevant RMS and Austroad Design Guidelines. Upon approval, detailed design shall be completed to comply with the relevant standards and to the satisfaction of RMS, PCC and WaterNSW, as well as any conditions of the approval.

NSLR will act as a link road between the RMS state controlled road, EPLR and the OWE. Future developments within the area will further utilise NSLR as a link road, providing access to additional local roads and other regional/state roads within the area.

Appendices

Appendix A – AT&L North-South Link Road Drawings

DRAWING LIST	
DRAWING No.	DRAWING TITLE
15-272-C3000	COVER SHEET
15-272-C3001	DRAWING LIST
15-272-C3002	GENERAL NOTES
15-272-C3003	GENERAL ARRANGEMENT PLAN
15-272-C3010	TYPICAL ROAD SECTIONS
15-272-C3011	TYPICAL SITE SECTIONS
15-272-C3020	ROADWORKS PLAN AND LONGITUDINAL SECTION SHEET 1 OF 5
15-272-C3021	ROADWORKS PLAN AND LONGITUDINAL SECTION SHEET 2 OF 5
15-272-C3022	ROADWORKS PLAN AND LONGITUDINAL SECTION SHEET 3 OF 5
15-272-C3023	ROADWORKS PLAN AND LONGITUDINAL SECTION SHEET 4 OF 5
15-272-C3024	ROADWORKS PLAN AND LONGITUDINAL SECTION SHEET 5 OF 5
15-272-C3030	ROAD LONGITUDINAL SECTIONS
15-272-C3040	BRIDGE ELEVATION AND TYPICAL SECTION
15-272-C3050	STORMWATER DRAINAGE PLAN SHEET 1 OF 6
15-272-C3051	STORMWATER DRAINAGE PLAN SHEET 2 OF 6
15-272-C3052	STORMWATER DRAINAGE PLAN SHEET 3 OF 6
15-272-C3053	STORMWATER DRAINAGE PLAN SHEET 4 OF 6
15-272-C3054	STORMWATER DRAINAGE PLAN SHEET 5 OF 6
15-272-C3055	STORMWATER DRAINAGE PLAN SHEET 6 OF 6
15-272-C3056	STORMWATER DRAINAGE CATCHMENT PLAN (PRE-DEVELOPED)
15-272-C3057	STORMWATER DRAINAGE CATCHMENT PLAN (POST-DEVELOPED)
15-272-C3060	BIO-BASIN No.1 DETAIL PLAN
15-272-C3061	BIO-BASIN No.2 DETAIL PLAN
15-272-C3070	PAVEMENT PLAN SHEET 1 OF 4
15-272-C3071	PAVEMENT PLAN SHEET 2 OF 4
15-272-C3072	PAVEMENT PLAN SHEET 3 OF 4
15-272-C3073	PAVEMENT PLAN SHEET 4 OF 4
15-272-C3080	OPTIONAL STAGED CONSTRUCTION PLANS SHEET 1 OF 2
15-272-C3081	OPTIONAL STAGED CONSTRUCTION PLANS SHEET 2 OF 2

Appendix B – Catchment Plan