ERSKINE PARK
LINK ROAD
LOCKWOOD ROAD
DISCHARGE POINT G
DP1168407
DP1168407
DP1168407
EXISTING CATCHMENT AREA No.7 = 21.4ha
TRANSGRID EASEMENT
NORTH-SOUTH LINK ROAD
BIO-RETENTION BASIN No.1
WATER NSW PIPELINE
ROAD No.1
BIO-RETENTION BASIN No.1A
LOT 1A
ROAD No.2
EXISTING CATCHMENT AREA No.1 = 13.35ha
TRANSGRID EASEMENT
LOT 1C
LOT 1B
DISCHARGE POINT A
LINK ROAD

100mm on Original

Bar Scales

0 50 100 150 200 250

1 : 3000 @ A1

Issue	Description	Date
A1	ISSUED FOR SSD APPROVAL	14-03-17

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 250	15-272-C3056.dwg	
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		Designed	MM
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

Civil Engineers and Project Managers
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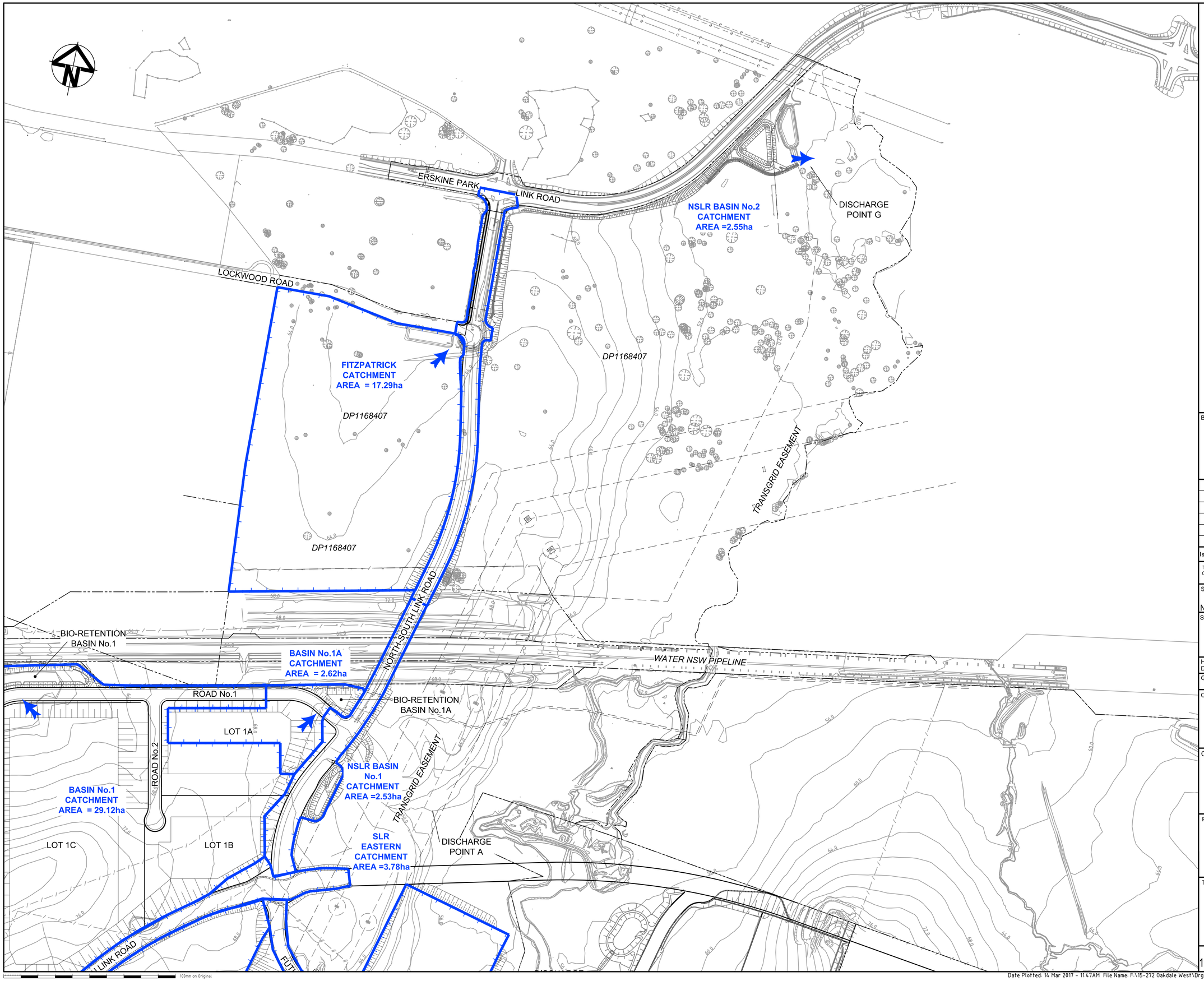
Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
STORMWATER DRAINAGE CATCHMENT PLAN (PRE-DEVELOPED)

Drawing No.	Project No.	Issue
15-272-C3056	15-272	A1

Date Plotted: 14 Mar 2017 - 11:47AM File Name: F:\15-272 Oakdale West\Drgs\Civil\Final\3000_WNSLR Package\15-272-C3056.dwg V1



Bar Scales

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Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION — A1

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Grid	MGA	Approved	AM

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Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
STORMWATER DRAINAGE CATCHMENT PLAN (POST-DEVELOPED)

Drawing No.	Project No.	Issue
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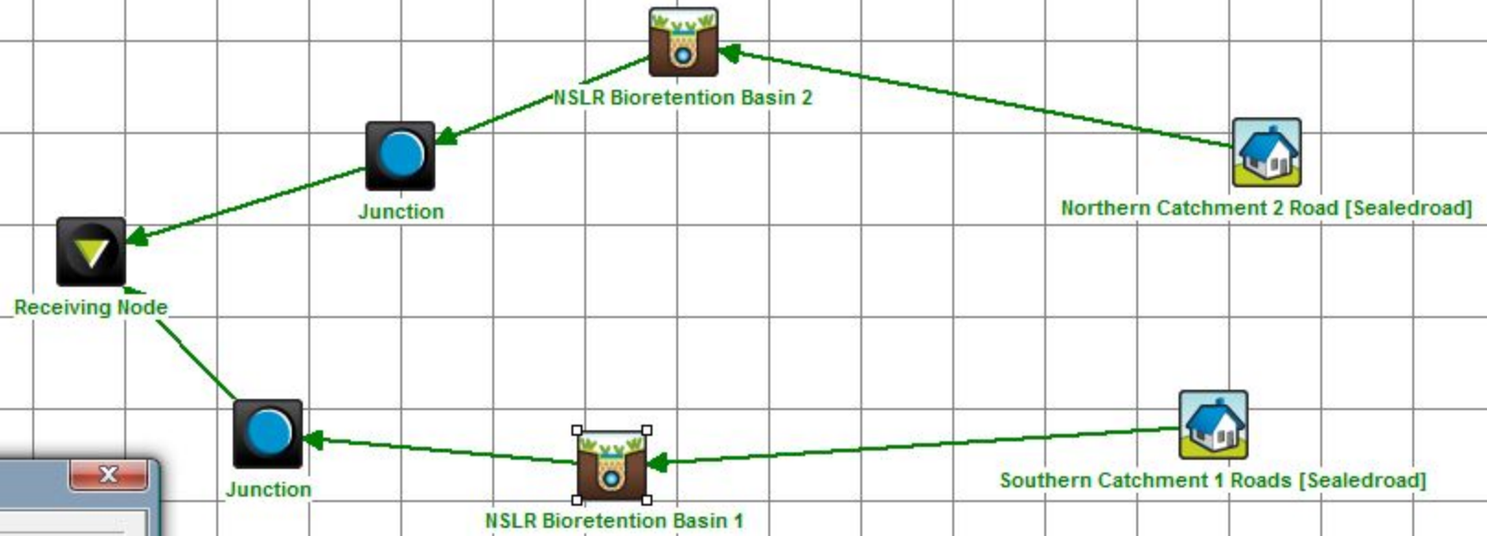
Date Plotted: 14 Mar 2017 - 11:47AM File Name: F:\15-272 Oakdale West\Drgs\Civil\Final\3000_WNSLR Package\15-272-C3057.dwg V1

Appendix C – MUSIC Model and Results

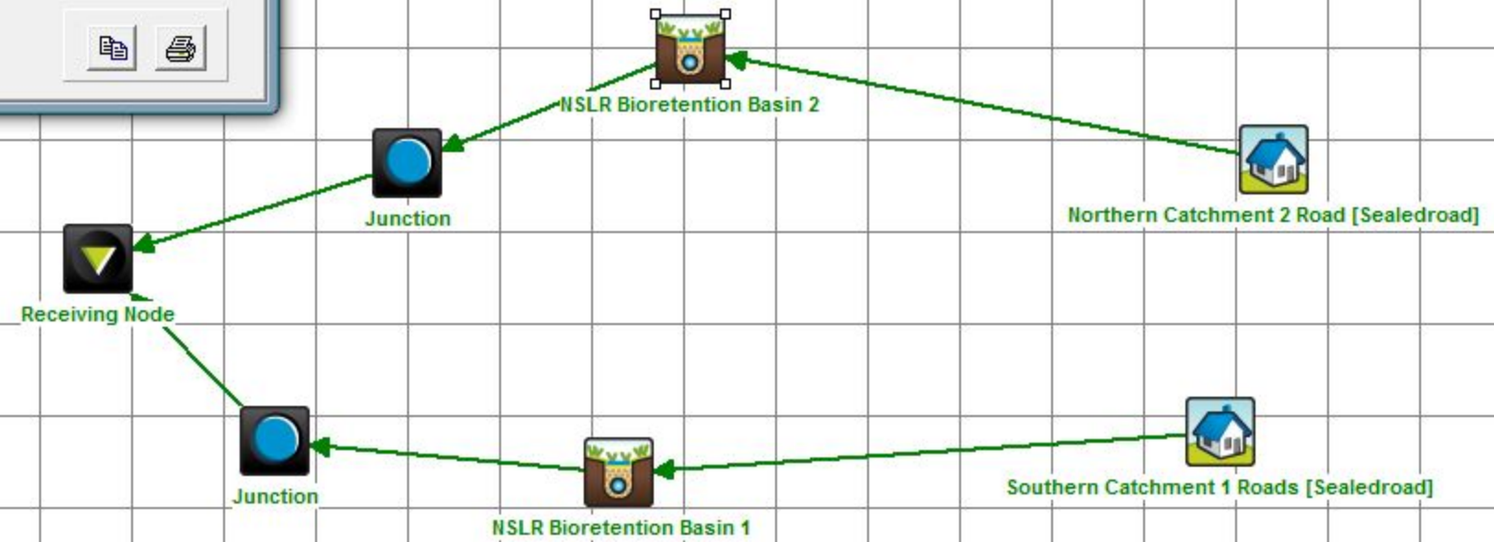


Treatment Train Effectiveness - NSLR Bioretention Basin 1

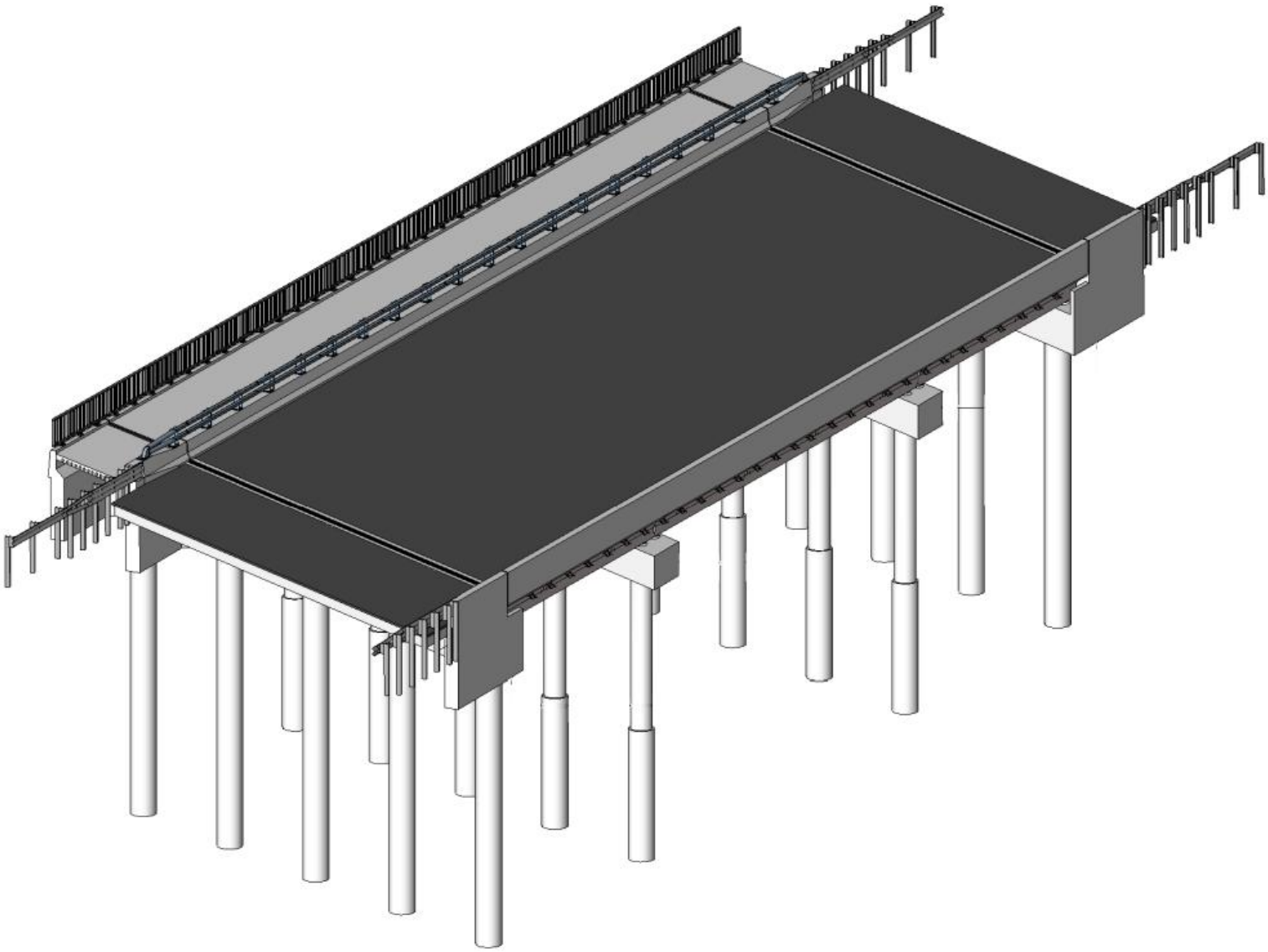
	Sources	Residual Load	% Reduction
Flow (ML/yr)	13.7	13.2	3.8
Total Suspended Solids (kg/yr)	4920	696	85.9
Total Phosphorus (kg/yr)	8.08	2.02	75
Total Nitrogen (kg/yr)	32.6	16.1	50.7
Gross Pollutants (kg/yr)	399	2.82	99.3

Treatment Train Effectiveness - NSLR Bioretention Basin 2

	Sources	Residual Load	% Reduction
Flow (ML/yr)	13.8	13.3	3.9
Total Suspended Solids (kg/yr)	4850	649	86.6
Total Phosphorus (kg/yr)	8.22	2.01	75.5
Total Nitrogen (kg/yr)	33.1	16	51.6
Gross Pollutants (kg/yr)	402	2.9	99.3



Appendix D – GHD Concept Bridge Design Report



AT&L

Oakdale West Estate - NSLR Bridge
Concept Design Report for SSDA

October 2016

Table of Contents

Appendices

Disclaimer

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1. Introduction

1.1 Project Overview

Goodman is developing the North South Link Road (NSLR) as part of a State Significant Development (SSD) for Oakdale West Estate. AT&L (Civil Engineers) engaged GHD Pty Ltd on 2nd April 2016 to prepare a concept bridge design for inclusion into the SSD application submission.

The project will involve construction of twin bridges (side by side) across the Warragamba to Prospect pipelines (owned and operated by Water NSW), which contains dual carriageways (2 lanes in each direction); northbound and southbound which forms part of the NSLR route within the Oakdale West Estate development.

1.2 Purpose and Scope of Report

The purpose of this report is to document the review and assessment of the NSLR Bridge concept design.

1.3 Site Locality

The project is located approximately 530 m south of Lockwood Road in Erskine Park, NSW. The road bridges form part of the NSLR connecting the proposed Southern Link Road in the south to Erskine Park Link Road (EPLR) in the north. The bridges traverse over two water supply lines (Warragamba to Prospect) which are located within the Water NSW corridor. The location of the proposed bridges are shown on Figure 1.

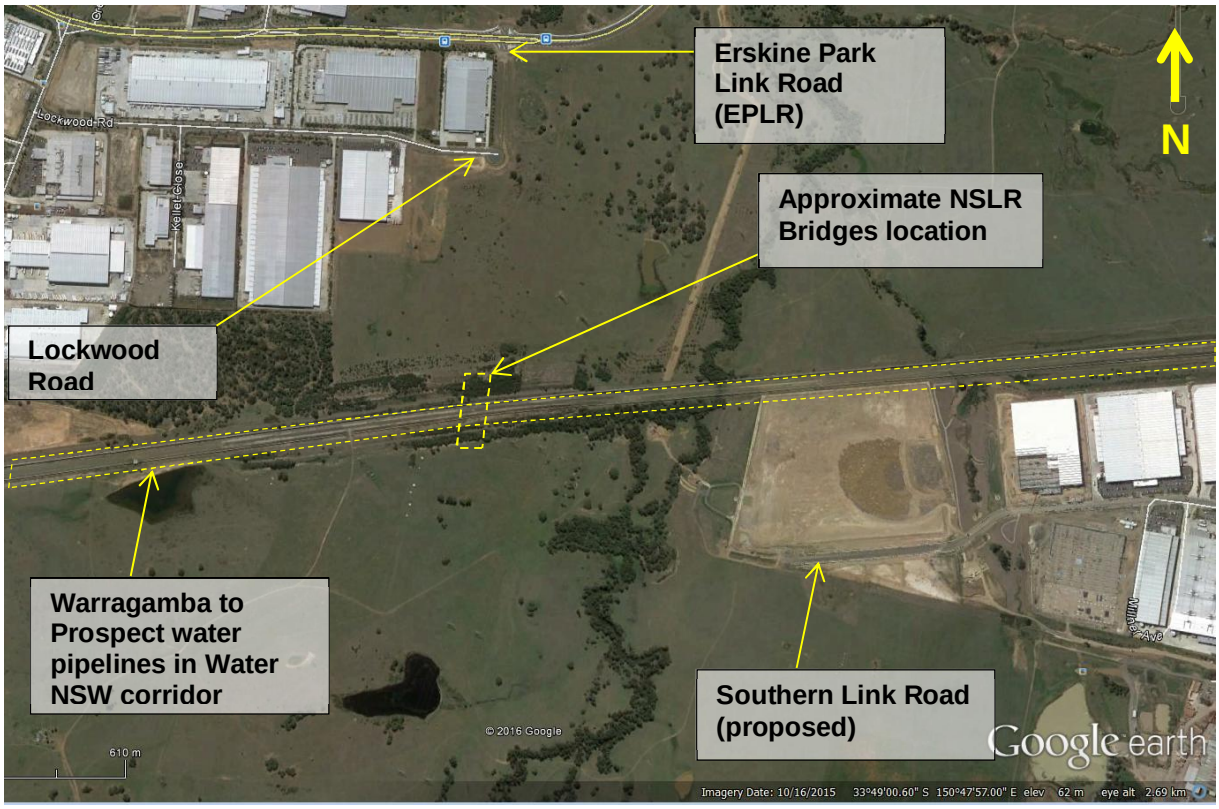


Figure 1 NSLR Bridges Location Plan

2. Bridge Concept Design

2.1 Concept Options

Prior to commencement of the concept design, three concept options were presented to AT&L (and Goodman) for review and selection of the preferred option to proceed to concept design. The options are as follows:

1. **Option 1:**
   5 span bridge with a total deck length of 89 m. Spans were of equal length at 17.8 m and consist of 700 mm deep Prestressed concrete (PSC) planks.
2. **Option 2:**
   3 span bridge with a total deck length of 61.8 m. Span lengths are 2 x 23 m and 1 x 15 m. The deck consists of 1000 mm deep super-T girders.
3. **Option 3:**
   4 span bridge with a total deck length of 90 m. End spans are 20 m and interior spans are 25 m. The deck consists of 1200 mm deep super-T girders.

All options have the same substructure which consists of 3 columns and 3 piles per pier. Due to limited geotechnical information at the proposed bridge site, the length of the piles is to be determined subsequent to a geotechnical investigation.

AT&L and Goodman have selected to proceed with Option 2 for the following reasons:

- More cost effective compared with the other two options. The overall length is shorter and has less spans, therefore has less piers to construct.
- Clearances between the piles and the existing Water NSW pipelines are outside the 5 m radius zone stipulated in the requirements of Water NSW, therefore foregoes the requirement of undertaking further structure stability analysis of excavation effects on the pipelines.

Sketches detailing Option 2 are attached in Appendix A.

2.2 Bridge Alignment

An alignment of the NSLR has been provided by AT&L. It is envisaged that the bridges will be designed to suit the road alignment in order to minimise any changes to the road levels at the interchanges near each bridge abutment.

The skew of the bridge is 26° spanning over the Water NSW corridor and there is no horizontal curve of the road within the proposed extents of the bridges.

The longitudinal fall is 1% in the southbound direction.

2.3 Design Standards

The design of the bridge will be carried out in accordance with the design documents listed below.

- AS 5100 Bridge Design Set
- AS/RMS 5100.5 – 2004 Concrete Interim Standard (November 2012)
- AS 3600 Concrete Structures
- AS 2159 Pile Design and Installation
- AS 1170-2002 Structural Design Actions

- AS 4678 Earth Retaining Structures
- Bridge Technical Direction Manual – RMS
- RMS Structural Drafting and Detailing Manual

2.4 Bridge Details

2.4.1 Superstructure

The proposed NSLR Bridge superstructure shall consist of the following:

- Extent of the bridge deck will be from CH 797.327 m to CH 859.100 m. Overall bridge deck length is 61.8 m.
- 3 span bridge; 2 x 23 m spans and 1 x 15 m span.
- The bridge deck shall consist of 18 x 1000 mm deep super-T girders (RMS Type 2) per bridge. Girders are precast prestressed concrete units.
- Bridge decks shall have a cross-fall of 3%.
- 3.68 m wide pedestrian shared path on each bridge.
- A 200 mm thick topping slab will be cast on top of the girders and overlaid with a 75 mm thick layer of asphaltic concrete (AC).
- Traffic barriers will be reinforced concrete and steel railing will be fixed to the top of the barriers. As the bridges span over the Water NSW pipelines which are significant pieces of infrastructure, the barriers shall be of medium performance.
- Drainage scuppers will be located at 3-5 m spacing on the east side of the southbound carriageway and west side of the northbound carriageway.
- Approach slabs shall be 200 mm thick and 6 m in length at each end of the bridges.
- In accordance with AS5100, minimum vertical height clearance under bridges for access roads is 5.3 m. This satisfies Water NSW's requirement of 4.6 m. To achieve this clearance, the existing access roads will be regraded and the two access roads on each side of the corridor will be realigned as well.

2.4.2 Substructure

- Bridge piers will consist of 3 x 1000 mm diameter columns that transition into piles. The columns will have a height of approximately from 5 m to 6 m (due to 3% cross-fall in the bridge decks).
- Piles will be 1200 mm diameter.
- Abutments will consist of a headstock beam supported on piles.
- Wing walls will be constructed on both sides of the abutments.
- Reinforced soil walls will be constructed at each abutment.
- The substructure configuration will be confirmed once a geotechnical investigation has been undertaken.

2.4.3 Miscellaneous

- Provisions for the following utilities have been made:
    - 300 mm diameter water main on the northbound bridge.
    - 6 - 9 electrical conduits at each bridge.

    - 4 telecommunication conduits at each bridge.
    - 1 conduit for lighting at each bridge.
    - 150 mm diameter drainage pipe at each bridge.
- Provisions for lighting on the bridges will be at a nominal spacing of 20 m.
- Anti-throw screen to be installed on both bridges.

3. Construction Issues

Construction issues that have been identified to potentially have an effect on the proposed works are as follows:

- As the bridges traverse over the Water NSW corridor, it is a requirement for any construction work to not damage or disturb the pipelines. This may be in the form of an encasement of the pipelines underneath the entire width of the bridges.
- Regrading and/or realignment of the access roads cannot occur concurrently as it is a requirement of Water NSW to maintain vehicle access for regular maintenance procedures of the pipelines. As a solution, only 1 access road can be regraded and/or realigned at any one time.

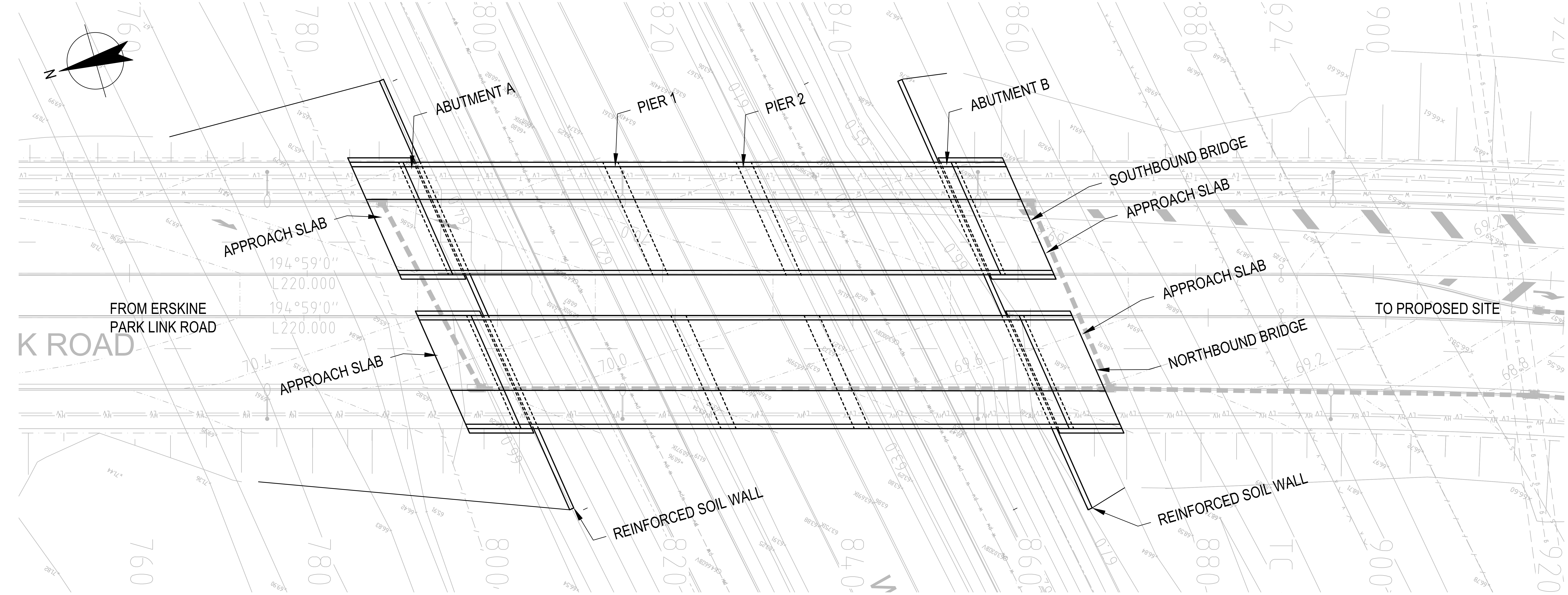
4. Work, Health and Safety during Design and Construction

A preliminary Safety in Design (SiD) risk assessment has been developed and shown in the table below:

Design Ref	Design Life Cycle Stage	Hazards What could cause injury or ill health, damage to property or damage to the environment	Risk What could go wrong and what might happen as a result	Existing Control Measures	Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)
Material	Investigation and Design	Material deterioration over time.	Reduced structural strength and affect operation safety and reliability	Structure material selected is concrete precast units. All concrete elements will be designed in accordance with AS5100 durability requirements. Concrete slump and test core samples will be taken prior to concrete pour and strength will be verified under laboratory conditions.	NA – Existing control measure sufficient.
Structural	Investigation and Design	Underground services	Hitting and damage to underground services	Dial Before You Dig plans.	Verify location of services on site prior to construction.
Structural	Investigation and Design	Vehicle falling onto Water NSW pipelines	Damage to pipelines	Medium performance traffic barriers for high containment.	NA - Existing control measure sufficient.
Construction	Setup, Construction and Commissioning	Fauna and flora.	Affect habitat of flora and fauna.	REF is prepared for this project by Goodman Group.	NA - Existing control measure sufficient.
Construction	Setup, Construction and Commissioning	Manual handling of large construction materials and equipment.	Injury from weight handling.	N/A	Ensure construction personnel are appropriately trained in the use of specified equipment, complete manual handling training courses and attend construction site induction. Ensure that lifting equipment are tested and follow relevant safety protocol during operation.
Construction	Maintenance	Personnel walking along bridge structure during construction.	Fall from structure and result in injury	N/A	Ensure construction personnel to have fall arrest or fall prevention systems in place prior to undertaking work on the bridge decks and in other areas where working at heights is applicable.
Construction	Setup, Construction and Commissioning	Falling objects and construction debris.	Objects or debris damaging passing Water NSW maintenance vehicles.	NA	Prior to construction, consultation must be sought between contractor and Water NSW on safety protocols when Water NSW maintenance vehicles require to pass through construction zone.

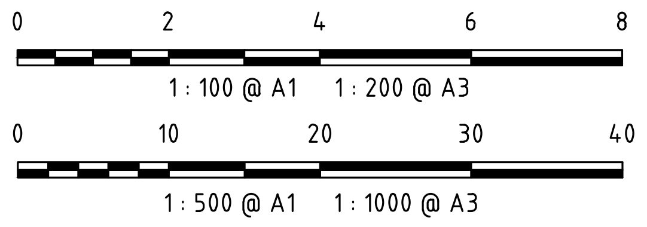
Appendix A – Concept Design Drawings

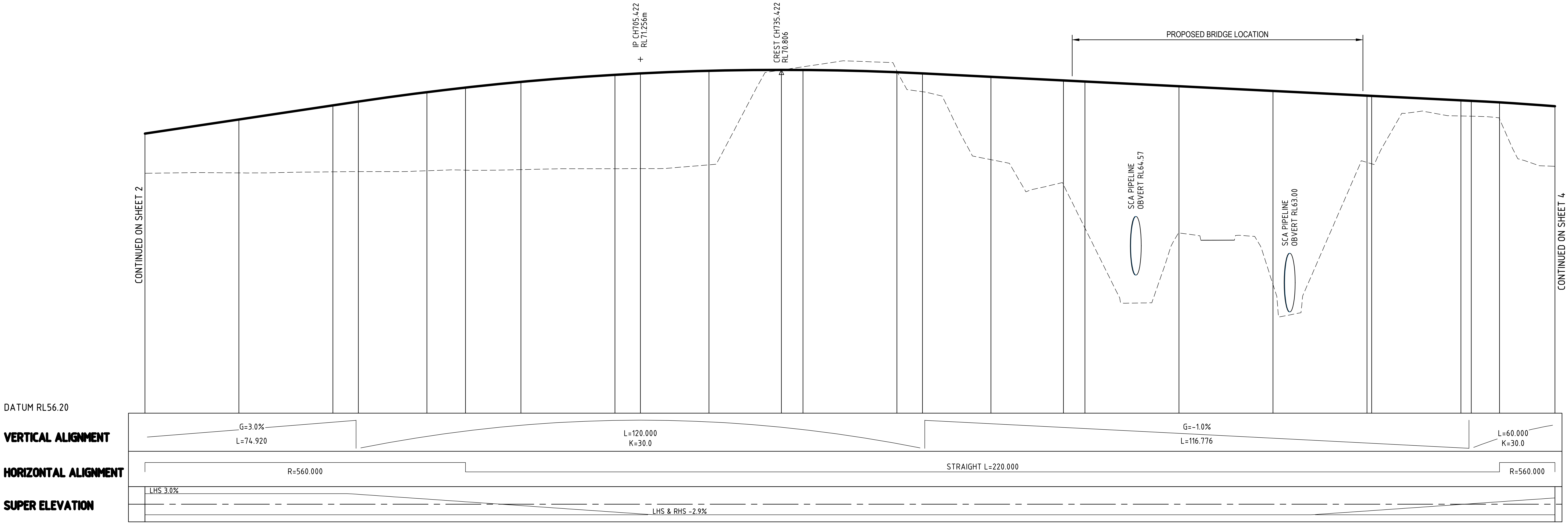
Appendices



LEGEND

▬	EXISTING BOUNDARY
—	EXISTING EASEMENT
60.0	EXISTING CONTOUR
—	PROPOSED BOUNDARY
65.0	PROPOSED CONTOUR
▬	PROPOSED KERB AND GUTTER
▬	PROPOSED STORMWATER PIPE
▬	PROPOSED KERB INLET PIT
◁	PROPOSED HEADWALL





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EXISTING LEVELS	66.404	66.422	66.468	66.478	66.512	66.536	66.561	66.602	66.603	66.765	70.799	70.936	70.755	69.877	66.985	65.913	64.073	63.866	61.676	66.855	66.809	68.844	68.833	68.715	66.704
STATION	600.000	620.000	640.000	645.422	660.000	668.207	680.000	700.000	705.422	720.000	735.422	740.000	760.000	765.422	780.000	795.427	800.000	820.000	840.000	860.000	861.000	880.000	882.198	888.207	900.000

LONGITUDINAL SECTION ALONG CONTROL MC02
HOR 1:500
VER 1:100

PRELIMINARY

rev	description	app'd	date
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A	ISSUE FOR INFORMATION	B. C.	06/05/16

AT&L
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scale NTS for A1 job no. 21-25472
date 06/05/2016 rev no. 0
approved (PD) SK001

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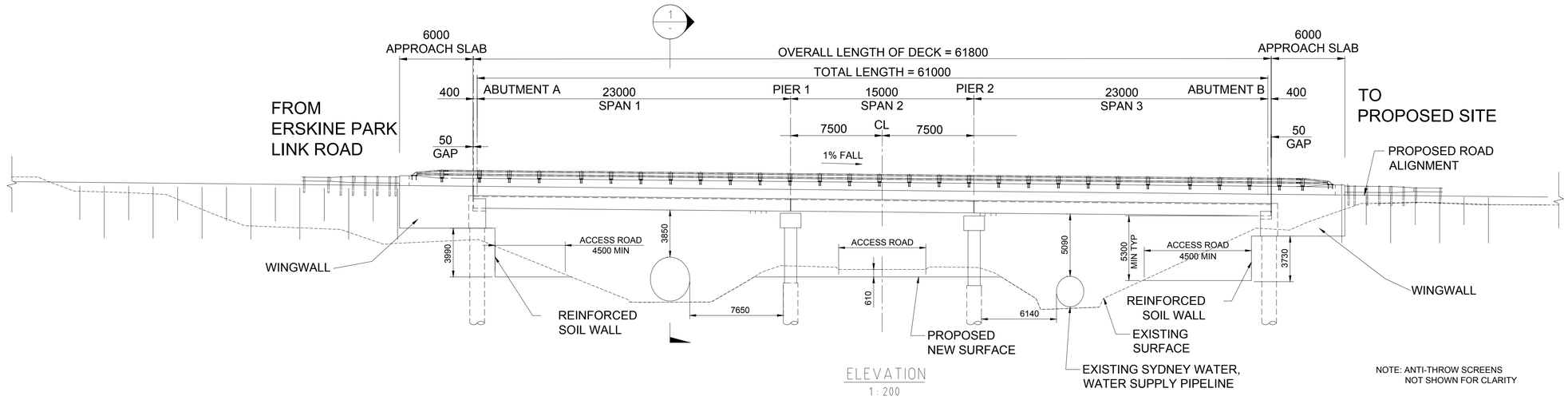

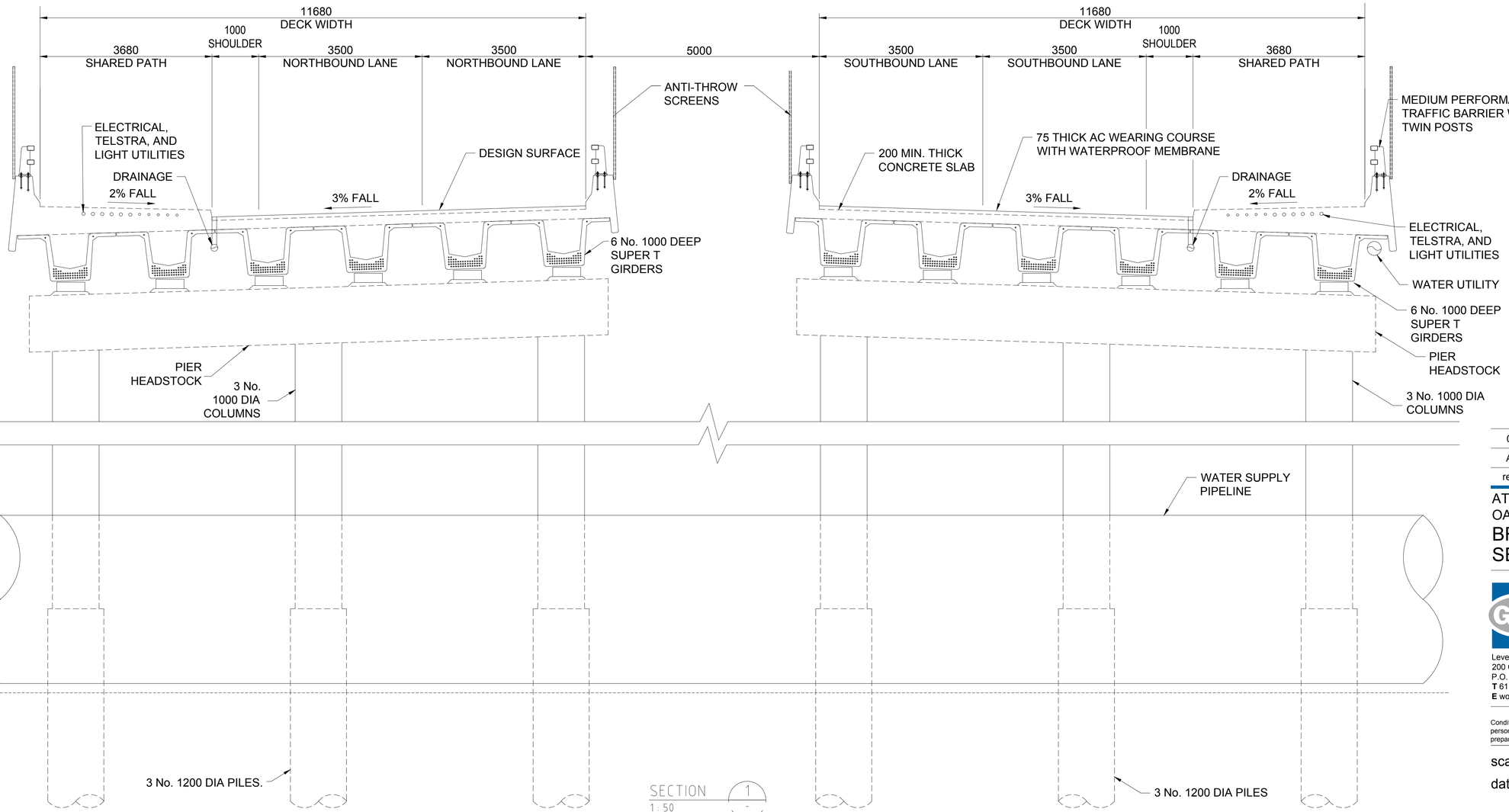

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A	ISSUE FOR INFORMATION	B. C.	06/05/16

AT&L

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scale NTS for A1 job no. 21-25472

date 06/05/16 rev no. 0

approved (PD) SK002

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Version: 1, Version Date: 11/06/2020

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Rev 0	Kevin Su	Stephen Xu		Greg Bowyer		5/10/2016

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