

Sedgman Yeats

ABN 99 282 106 832 – ACN 125 910 849

Head Office

Level 2, 2 Gardner Close
Milton QLD 4065
AUSTRALIA

Ph: +61 7 3124 4500

Fax: +61 7 5503 1672

Postal Address

PO Box 1801
Milton BC QLD 4064

Email: info@yeats.com.au

Web: www.sedgmanyats.com.au



Cullen Avenue, Eagle Farm

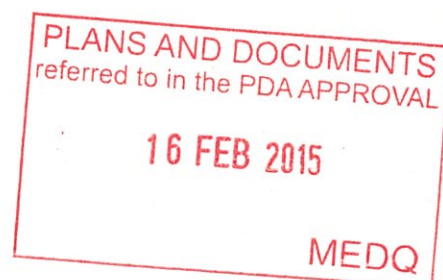
Site Based Stormwater Management Plan

Temporary Carpark

66 Cullen Avenue, Eagle Farm

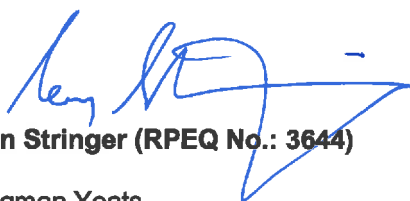
Document #: YBC0180_SBSMP Cullen Avenue_R01

Revision: R01 - September 2014



RPEQ Notice

This document has been reviewed and approved by the following appropriately qualified and experienced Registered Professional Engineer of Queensland (RPEQ)



Sean Stringer (RPEQ No.: 3644)

Sedgman Yeats
Level 2, 2 Gardner Close
Milton Qld 4064

Ph: 07 3124 4500
Fax: 07 5503 1672

www.sedgmanyeats.com.au

Revision Status

Revision Number	Author	Description	Date	Approved By
01	D.V.	Original Issue	10-Oct-2014	SS

Distribution

Company Name	Contact Name	Revision	Date
Northshore Corporation Pty KLtd	Angus Campbell	01	10-Oct-2014

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1 Introduction

1.1 Background

The following Site Based Stormwater Management Plan (SBSMP) has been prepared for a proposed temporary carpark located at 66 Cullen Avenue West, Eagle Farm, being Lots 802, 1093 & 1094 on SL8401 and Lot 94 on RP228156, within the local authority of the Brisbane City Council (BCC).

1.2 Scope

This plan addresses the proposed stormwater management strategy, including:

- Pre and post development flows for various Average Recurrence Interval (ARI) design events;
- Nomination of the legal point of discharge;
- Details of the stormwater quality treatment system;
- Maintenance schedules and techniques for each stormwater quality improvement devices; and
- Sediment and erosion control plan.

1.3 Proposed Development

The proposal is for a temporary carpark facility to be developed at 66 Cullen Avenue West, Eagle Farm. The site is currently a disused train loading and storage yard and as such will require a small amount of clean up works to accommodate the temporary carpark. The proposal includes the removal of all “over growth” from the site, provision of a hardstand extension in the western corner of the site and line marking to delineate carparking locations.

Refer to Appendix A for the proposed development layout.

1.4 Site Description

1.4.1 Location

Street Address:	66 Cullen Street West, Eagle Farm
RP Description:	Lots 802, 1093 & 1094 on SL8401 and Lot 94 on RP228156
Total Site Area:	5.009 Ha
Proposed Use:	Temporary Carpark
Local Authority:	Brisbane City Council (BCC)

Refer to Figure 1.1 for the site location.

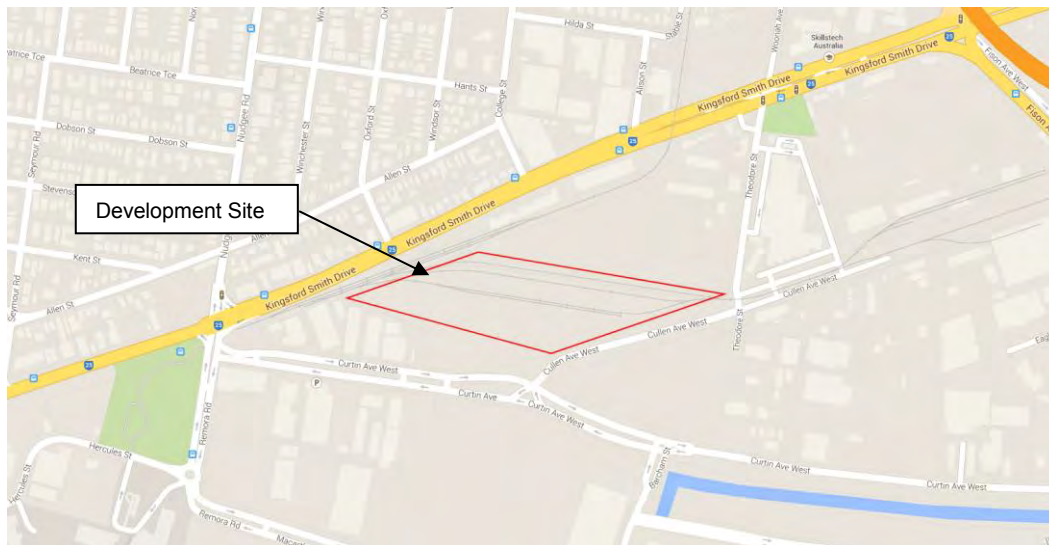


Figure 1.1 Site Location (Source: Nearmap)



Figure 1.2 Site Location - Aerial (Source: Nearmap)

1.4.2 Topography

The development site is currently a disused rail loading and storage yard with hardstand surrounds and a small area of grassed surfaces with no tress. There is an existing tidal drainage swale located along the southern boundary of the site. The development site grades from the northern boundary toward the drainage easement with the site reaching a maximum RL of approximately 5.4m, and a minimum RL of approximately 1.1m.

Refer to Figure 1.2 for existing aerial view.

Refer to Appendix B for the topographic survey of the site.

1.4.3 Existing Drainage System

Stormwater runoff from the site is currently directed to existing field inlet pits which ultimately drain to the drainage easement to the south, for the existing hardstand surfaces. The minor flows from the grassed area and the major flows from site are directed to the drainage easement via overland flow. The drainage easement drains via a tidal movement, mangrove channel to the Brisbane river approximately 1.5km to the east.

2 Stormwater Quantity

2.1 Hydrologic Objectives

Hydrologic objectives for the site have been set in accordance with specification set out by Economic Development Queensland and the Queensland Urban Drainage Manual 2008 (QUDM), including but not limited to:

- Post-development flows, up to and including the 100 year ARI
- No adverse impact on adjoining or downstream properties;
- The proposed development shall ensure that all stormwater is directed to a legal point of discharge;
- Major System Design standard 100 year ARI; and
- Minor System Design standard 10 year ARI.

2.2 Pre-development Hydrology

The hydrology of the site has been assessed using the Rational Method, in accordance with BCCSDG and QUDM Section 4. The various input parameters required for the pre-developed rational method calculations are summarised below with detailed calculations in Appendix D:

IFD Data:	BCCSDG Section 3.3.6 (Table B2.3)
Total Catchment Area:	5.09 Ha
Development Category:	Commercial and industrial (BCCSDG Table B2.2)
Fraction Impervious (f_i):	0.85 (calculated from architectural plans)
10 Year Co-efficient of runoff (C_{10}):	0.87 (BCCSDG Table B2.2)
Frequency Factors (F_y):	QUDM Table 4.05.2
Time of Concentration (T_c):	5.0 minutes (QUDM Table 4.06.2)

Table 2.1 Pre-development Peak Discharge Summary

Catch Name	Catch Area (Ha)	Impervious Area (Ha)	Q2 (m^3/s)	Q10 (m^3/s)	Q20 (m^3/s)	Q50 (m^3/s)	Q100 (m^3/s)
Site Total	5.090	4.326	1.594	2.641	3.177	4.062	4.512

2.2.1 Post-development Hydrology

As discussed previously, it is proposed to construct a temporary carpark facility over the existing site. In accordance with Table B2.2 of the BCC SDG, the actual fraction impervious for the proposed development was calculated from the supplied architectural plans. This was then utilised to determine the 10 year co-efficient of runoff (C_{10}), in accordance with the BCC Subdivision and Development Guideline Table B2.2.

The various input parameters required for the post-developed rational method calculations are summarised below with detailed calculations in Appendix D.

IFD Data:	BCCSDG Section 3.3.6 (Table B2.3)
Total Catchment Area:	5.09 Ha
Development Category:	Commercial and industrial (BCCSDG Table B2.2)
Fraction Impervious (f_i):	1.0 (calculated from architectural plans)
10 Year Co-efficient of runoff (C_{10}):	0.88 (BCCSDG Table B2.2)
Frequency Factors (F_y):	QUDM Table 4.05.2
Time of Concentration (T_c):	5.0 minutes (QUDM Table 4.06.2)

Table 2.2 Post-development Peak Discharge Summary

Catch Name	Catch Area (Ha)	Impervious Area (Ha)	Q2 (m^3/s)	Q10 (m^3/s)	Q20 (m^3/s)	Q50 (m^3/s)	Q100 (m^3/s)
Site Total	5.090	5.090	1.612	2.671	3.214	4.062	4.512

A comparison of Tables 2.1 and 2.2 shows a very minor increase in peak discharge, within the minor storm events, from the subject site in the post-developed scenario. The site is located at the lower end of the catchment and also experiences flooding at times. Therefore we believe that the implementation of stormwater detention devices is unwarranted as any detained water could lead to a further flood risk for the subject site and the neighbouring properties. Therefore, we can conclude that no formal mitigation measures are required for the post-developed scenario.

2.3 Legal Point of Discharge

The Legal Point of Discharge for the site has been taken as the existing tidal flow drainage channel to the south of the development. This is considered to be in accordance with BCC subdivision and Development Guidelines, processes set out by Economic Development Queensland.

3 Water Quality Objectives

3.1 Relevant Water Quality Objectives

The subject site is located within a tidal flow area and as such it is expected that the salt water will provide some water quality assistance to the discharge from site. The site is proposed to be only used as a temporary carparking facility providing short and long term parking options. The majority of the site is to be maintained in its current hydrological condition which does not include water quality devices. Due to these reasons it is believed the provision of Stormwater Quality Improvement devices, either bio-retention basin or proprietary devices, are **not** warranted, and therefore have not been proposed, for a development such as a temporary carpark.

Although formal quality improvement devices have been deemed unnecessary for the development is proposed to provide best management stormwater quality methods to the post developed site.

3.1.1 Pollutant Identification - Construction Phase

The following table identifies the pollutants which are to be controlled and mitigation strategies employed in order to achieve the water quality objectives during the construction phase for the proposed development.

Table 3.1 Pollutant identification and Mitigation Strategies during Construction

Target Pollutants	Target Pollutant Examples	Mitigation Strategies
Litter	Paper, construction packaging, food packaging, cement bags, off-cuts	Education through site inductions, provision of refuse bins and regular removal of collected refuse
Sediment	Unprotected exposed soils and stockpiles during earthworks and building	Sediment and Erosion Controls. Refer Section 4, below
Hydrocarbons	Fuel and oils spills, leaks from construction equipment	Provision of a vehicle storage area for contractors.
Toxic Materials	Cement slurry, asphalt prime, solvents, cleaning agents, wash waters (eg. From tile works)	Provision of onsite wash facilities which do not allow runoff to enter Council's stormwater system
pH altering substances	Acid Sulphate Soils (ASS), cement slurry and wash waters	If Acid Sulphate Soils are detected a management plan will be required. Provision of onsite wash facilities which do not allow runoff to enter Council's stormwater system

3.1.2 Pollutant Identification – Operational Phase

The following table identifies the pollutants which will be required to be controlled and strategies employed in order to achieve the water quality objectives during the operational phase of the proposed development.

Table 3.2 Pollutant identification and Mitigation Strategies during Operation

Target Pollutants	Target Pollutant Examples	Mitigation Strategies
Litter	Paper, construction packaging, food packaging, cement bags, off-cuts	Education of owners and body corporate, provision of refuse bins and regular removal of refuse
Sediment	Unprotected exposed soils and stockpiles during construction	Provision of grassed buffer strips and landscaped areas
Nutrients	Nitrogen and Phosphates	Provision of grassed buffer strips and landscaped areas
Pathogens	Faecal coliforms, bacteria and viruses	Provision of a reticulated sewerage system and education in the proper removal of such waste (pets)
Heavy Metals	Associated with fine sediments	Provision of grassed buffer strips and landscaped areas
Surfactants	Detergents from car washing	Provision of a car wash area on site with appropriate drainage (if required)
Thermal Pollution	Heat produced from metal or concrete surfaces	Architectural features which reduce thermal pollution (covered concrete areas) (if required)

3.2 Summary

With the introduction of the strategies provided in Table 3.3 and 3.4 for the construction and operational phases of the development it is believed that BCC's water quality objectives will be achieved for the site. Due to this, the development has been deemed to satisfy the BCC subdivision and Development Guidelines for Water Quality.

4 Erosion and Sediment Management

The objective of Erosion and Sediment Management is to limit soil erosion and control sediment discharge from the proposed development by using suitable control devices during the four (4) primary phases, Pre-development, Bulk Earthworks, Construction and the Post-development.

Typical erosion and sediment control measures that will be incorporated into these development phases are highlighted in Section 4.2 and 4.3 respectively.

4.1 Erosion and Sediment Management during Development Phases

4.1.1 Pre-development

Prior to construction commencing, the following sediment and erosion control measures will be implemented to minimise disturbance and ensure water quality is maintained.

- Designation of transport routes to ensure minimal vegetation disturbance. Transport routes will have construction exits in accordance with IEAust Guidelines;
- Maximise vegetated open space areas to reduce soil disturbance and provide filter strip treatment for runoff;
- Construction entry/exit to be installed and will comprise of a designed gravel pad or placement of hardwood logs in accordance with the IEAust Guidelines;
- Install sediment fences around the proposed bulk earthworks site (along toe of batter alignment); and
- Install dust control fences adjacent to the proposed bulk earthworks site (along property boundary).

4.1.2 Bulk Earthworks

Filling during the bulk earthworks phase is to occur so as to direct runoff towards sediment and erosion controls. The following measures will be implemented:

- Construct chutes to control runoff over earthworks batters;
- Construction of temporary bund at the top of all earthwork batters to ensure runoff is directed to chutes and away from exposed batters;
- Sediment fences will be installed at all down slope areas of material stockpile bases; and
- All batters to be top-soiled and seeded immediately upon reaching finished earthworks levels.

4.1.3 Construction

The following measures will be undertaken to mitigate water quality impacts during construction phase:

- Sediment fences to be erected at the base of all batters and stockpiles to prevent sediment transportation off site;
- Grass filter strips to be placed along all road verges;
- Re-vegetation of all disturbed areas within two weeks of completion;
- All sediment control structures to be maintained in an effective manner and inspected after each storm event. No structure is to accumulate sediment above 40% of its capacity; and

- Regular monitoring of water quality to determine the effectiveness of the sediment and erosion control measures.

4.1.4 Post-development

Once construction is completed and the development has been certified “On-Maintenance” the following strategies will be implemented to limit soil erosion and control sediment discharge leaving the site:

- A monitoring program will be established for the stormwater treatment devices as outlined in stormwater management plan;
- All monitoring activities associated with the operation of the vegetated treatment areas, including weed inundation, erosion, vegetation density, determination and inappropriate access shall be included in the general monitoring of the landscaped areas;
- The Developer will be responsible for all monitoring activities associated with the operation of the trenches/swales during the maintenance period (minimum 12-months period or as otherwise advised by Council) with the Council responsible following the maintenance period; and
- A report shall be prepared for Council submission following the maintenance period containing all erosion & sediment monitoring results and a brief description of the same (including any incidences of non-compliance and corrective actions implemented).

4.2 Erosion Controls

The time of disturbance on-site should be kept to a minimum by ensuring that construction works immediately follow the earthworks phase. Consideration to staging works should be given to minimise the area of exposed works at any given time.

Areas that may be subject to concentrated flow and that have been cleared may require turfing to ensure gully erosion does not start.

Any overburden that is not to be taken off-site should be stockpiled nearby and covered to prevent the mobilization of any particles in to the drainage system.

The remaining exposed areas of the site are to be damped down as deemed necessary by the site supervisor to prevent dust. All batters are to have mulch or erosion control mats installed immediately after achieving final level.

Dust fencing is to be installed around the perimeter of earthworks to prevent wind velocities at ground level over the site.

The site is to be landscaped and re-vegetated in accordance with the Landscape Plan immediately after completion of construction activities to minimise the risk of erosion from exposed earthworks.

4.3 Sediment Controls

With reference to the IEAust Guidelines and Current Best Practice, there are seven (7) fundamental sediment control principles that have been identified for use during construction:

- Construction Exit
- Sediment Fences
- Buffer Zones
- Sediment Basins

- Sediment Barriers
- Turfed Filter Strips
- Check Dams

4.3.1 Construction Exit

A dedicated construction exit is to be located at the sites entry and exit point for vehicles. This exit will be established to facilitate the removal of soil, mud, dust and debris from the tyres of vehicles prior to leaving the construction site. The construction exit can comprise of a gravel pad designed or placement of hardwood logs, constructed and maintained in accordance with the IEAust Guidelines. Alternatively, a vibratory grid system can be hired or constructed. The advantages of the grid system include ease of movement and they can be used for several years.

4.3.2 Sediment Fences

Sediment fencing is to be established down slope of any exposed earthworks where there is a risk of contaminated water leaving the site prior to clearing and earthworks commencing. Sediment fencing may be required at regular spacing down the disturbed grade to limit rutting caused by concentration of sheet flow. Sediment fences shall be used to protect any temporary stockpile areas on an as-needs basis. Sediment collected from sediment barriers is to be regularly removed and either taken off site as part of the earthworks phase of the proposed development or stockpiled for use during re-vegetation.

4.3.3 Buffer Zones

Buffer zones consisting of the existing grassed areas down slope of all bulk earthworks and around the existing vegetated area to the east of the site are to be fenced off. Buffer zones are corridors of vegetation that separate disturbed land from adjacent receiving environments. No vegetation is to be removed from this area whilst construction is in progress as it aids in the slowing and filtering of runoff.

4.3.4 Sediment Basins

Sediment basins are to be constructed at the location of the proposed stormwater detention basins. The sediment basins are to be constructed as early as possible, and prior to bulk earthworks. The installation of a sediment basin does not negate the use of other sediment and erosion control measures detailed in this report. Sediment basins are to be designed, constructed and maintained in accordance with the IEAust Soil Erosion and Sediment Control Guidelines for Queensland Construction Sites.

4.3.5 Sediment Barriers

Sediment barriers are to be constructed around all stormwater drainage inlet pits where contaminated water may drain to. This will aid in ensuring sediments are settled out prior to flows entering the underground stormwater drainage system. Sediment barriers are to be gravel wrapped in geotextile 'sausage' or similar.

4.3.6 Turf Filter Strips

Turf filter strips approximately 600mm wide are to be placed on the top of the fill batters and adjacent to all paved areas where possible. These will act in conjunction with the sediment fences to further treat any overland flow from the site. Turf filter strips are to be constructed and maintained in accordance with the IEAust Guidelines.

4.3.7 Check Dams

Check dams are to be installed in the road pavement and are to be maintained until adequate pavement is installed. The primary purpose of a check dam is to control flow velocity in the road boxing until road pavement is installed. A secondary purpose is to entrap sediment in a similar way to sediment barriers.

4.4 Monitoring and Maintenance

The following monitoring and maintenance procedures are to be undertaken by the site supervisor during all phases of the development:

1. Inspections of Stormwater, Sediment and Erosion Controls are to be conducted at the end of each construction day and after each rainfall event (>25mm).
2. If any validated complaints or evidence of water quality deterioration is reported downstream of the site the following actions are to be taken:
 - Locate source of water quality deterioration.
 - Construct temporary controls to prevent continuing short term deterioration.
 - Repair existing controls, modify procedures or construct additional controls to prevent further deterioration.

5 Strategy Summary and Conclusions

A stormwater management strategy has been developed to manage potential impacts due to the proposed development located at 66 Cullen Avenue West, Eagle Farm. The stormwater management strategy has the following components:

- Generally maintaining the existing drainage regimes and drainage discharge locations;
- post-development storm flows discharging from the subject site;
- Implementation of typical erosion and sediment control devices during the four (4) primary phases of the proposed development.

It is considered that the development of the site, with the implementation of the stormwater management strategy developed in this report, will result in no significant worsening in drainage conditions upstream or downstream of the site.

6 References

Brisbane City Council Planning Scheme Policy 2014

DERM (2013) State Planning Policy

Institution of Engineers, Australia (2001) "Australian Rainfall and Runoff – A guide to flood estimation".

Neville Jones & Associates (2008) "Queensland Urban Drainage Design Manual (QUDM)", Edition 2.

Healthy Waterways 'Water Sensitive Urban Design – Technical Design Guidelines for South East Queensland – Version 1, June 2006

Queensland Government. 2013,. "State Planning Policy 2013" Version 1.

XP Software (2013) "XP-RAFTS – Runoff Analysis and Flow Training Simulation Program", Version 6.

MUSIC Modelling Guidelines for South-East Queensland – December 2009

Appendix A

Proposed Development

proposed carpark/temporary office

66 cullen avenue west, eagle farm



source: www.nearmap.com

proposed site works
Lot 94 RP 228156 & Lot 1093 SL 8401
Parish: Toombul
Ward: Hamilton

drawing schedule

SD.0001	cover page
SD.1001	proposed site plan
SD.2001	ground floor plan
SD.3001	elevations
SD.3002	elevations

DA ISSUE

A	02/10/14	DA issue
P3	29/09/14	DA issue
P2	24/09/14	preliminary DA issue
P1	23/09/14	preliminary DA issue

issue date revision





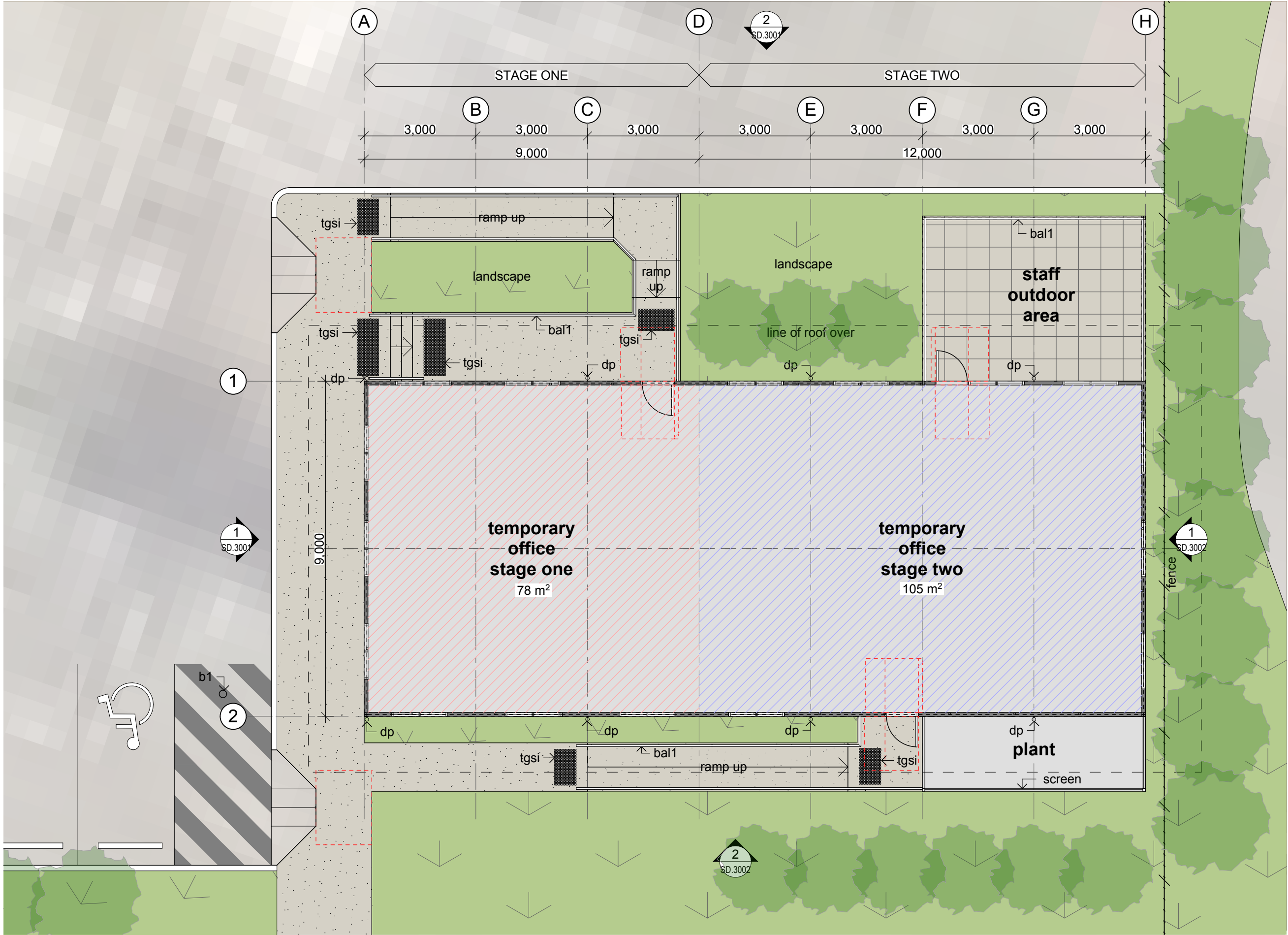
site info

site area	50,092m ²
GFA	
office	189m ²
total	189m ²
Carparks provided	
undercover - valet	841
open air - self park	1,098
Total provided	1,939
landscape provided	
approx. 3,099m ² (approx 6.2%)	

- (F) floodlight
BG boom gate

note: this drawing overlays traffic consultant information from mfy drawing 01_SK01B

DA ISSUE		
A	02/10/14	DA issue
P3	29/09/14	DA issue
P2	24/09/14	preliminary DA issue
P1	23/09/14	preliminary DA issue
issue	date	revision

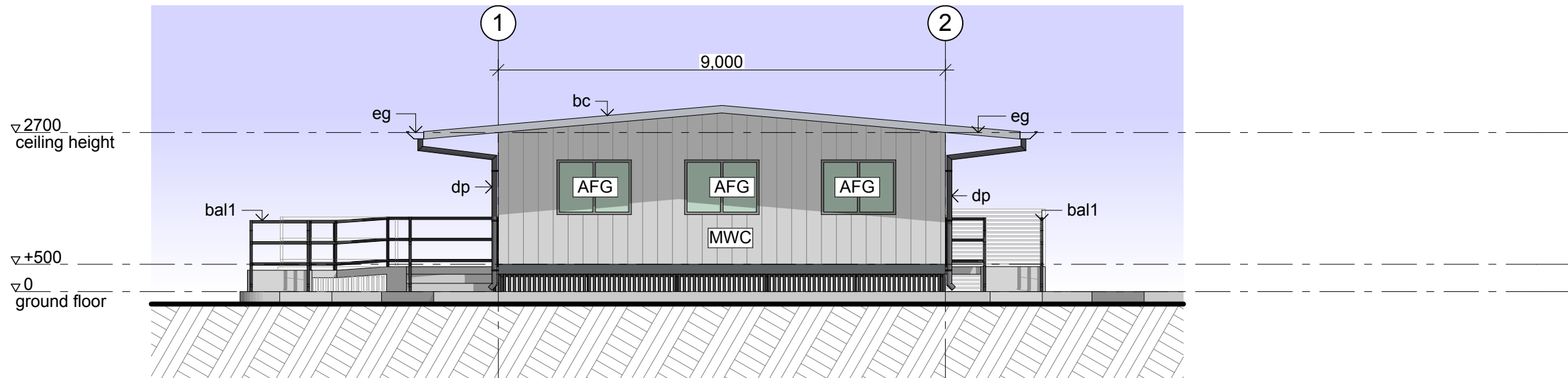


- materials**
- AFG aluminium framed glazing
 - MRS Trimdek Zincalume metal roof sheet
 - MWC Colorbond metal wall cladding
- fixtures**
- B1 bollard type 1
 - BAL1 balustrade type 1
 - BC barge capping
 - BG box gutter
 - COL column to structural engineer's specification
 - DP downpipe warehouse eaves gutter
 - EG eaves gutter
 - FFL finished floor level
 - FSL finished slab level
 - RL relative level
 - TGSI tactile indicators
 - (F) floodlight

DA ISSUE

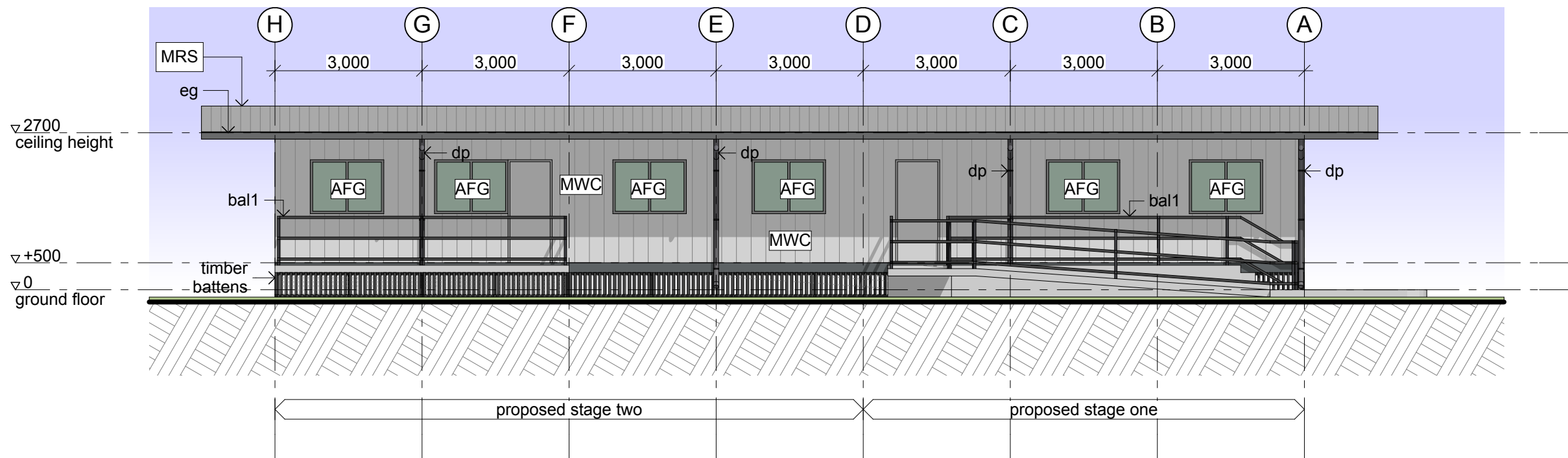
issue	date	revision
A	02/10/14	DA issue
P3	29/09/14	DA issue
P2	24/09/14	preliminary DA issue
P1	23/09/14	preliminary DA issue





1 west elevation
SCALE 1:100

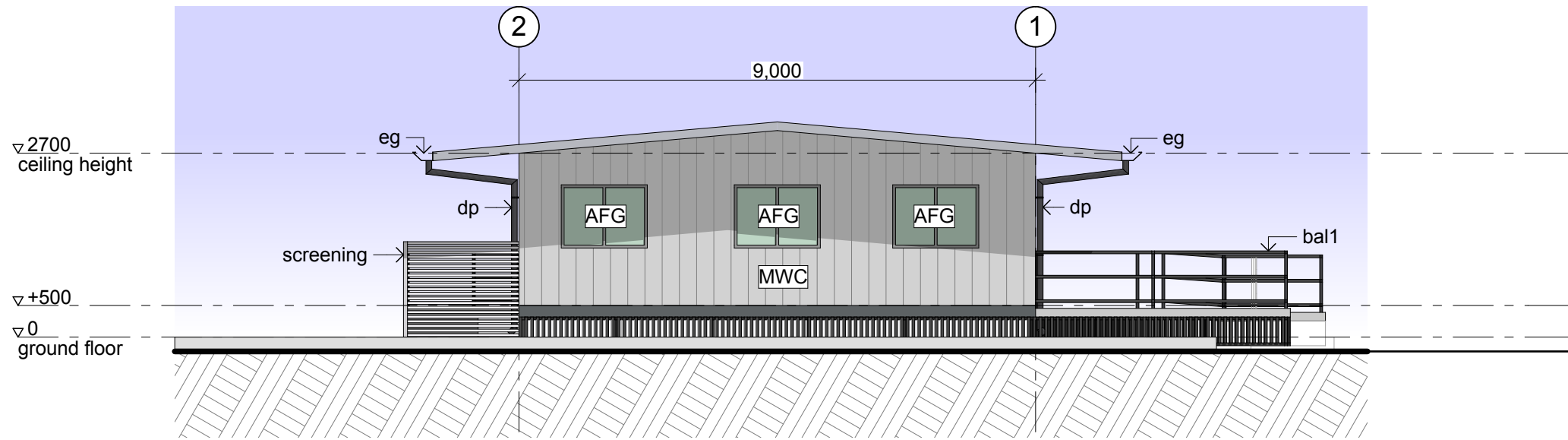
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 - FFL finished floor level
 - FSL finished slab level
 - RL relative level
 - TGSI tactile indicators
 - (F) floodlight



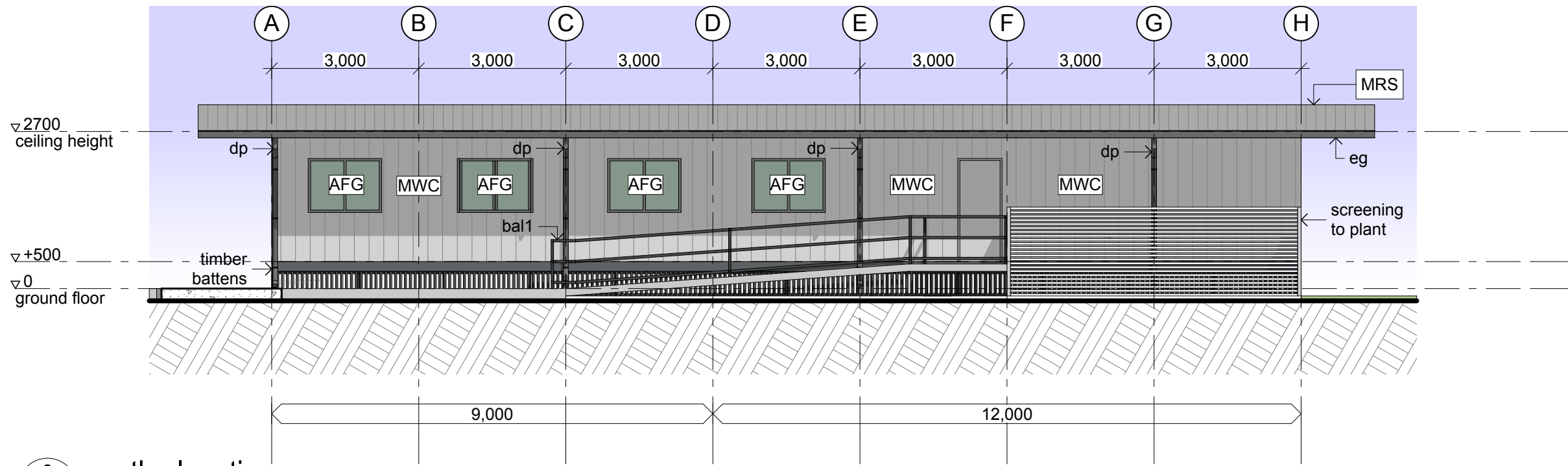
2 south elevation
SCALE 1:100

DA ISSUE

issue	date	revision
A	02/10/14	DA issue
P3	29/09/14	DA issue
P2	24/09/14	preliminary DA issue
P1	23/09/14	preliminary DA issue



1 east elevation
SCALE 1:100



2 north elevation
SCALE 1:100

- materials**
- AFG aluminium framed glazing
 - MRS Trimdek Zincalume metal roof sheet
 - MWC Colorbond metal wall cladding
- fixtures**
- B1 bollard type 1
 - BAL1 balustrade type 1
 - BC barge capping
 - BG box gutter
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 - FSL finished slab level
 - RL relative level
 - TGSI tactile indicators
 - (F) floodlight

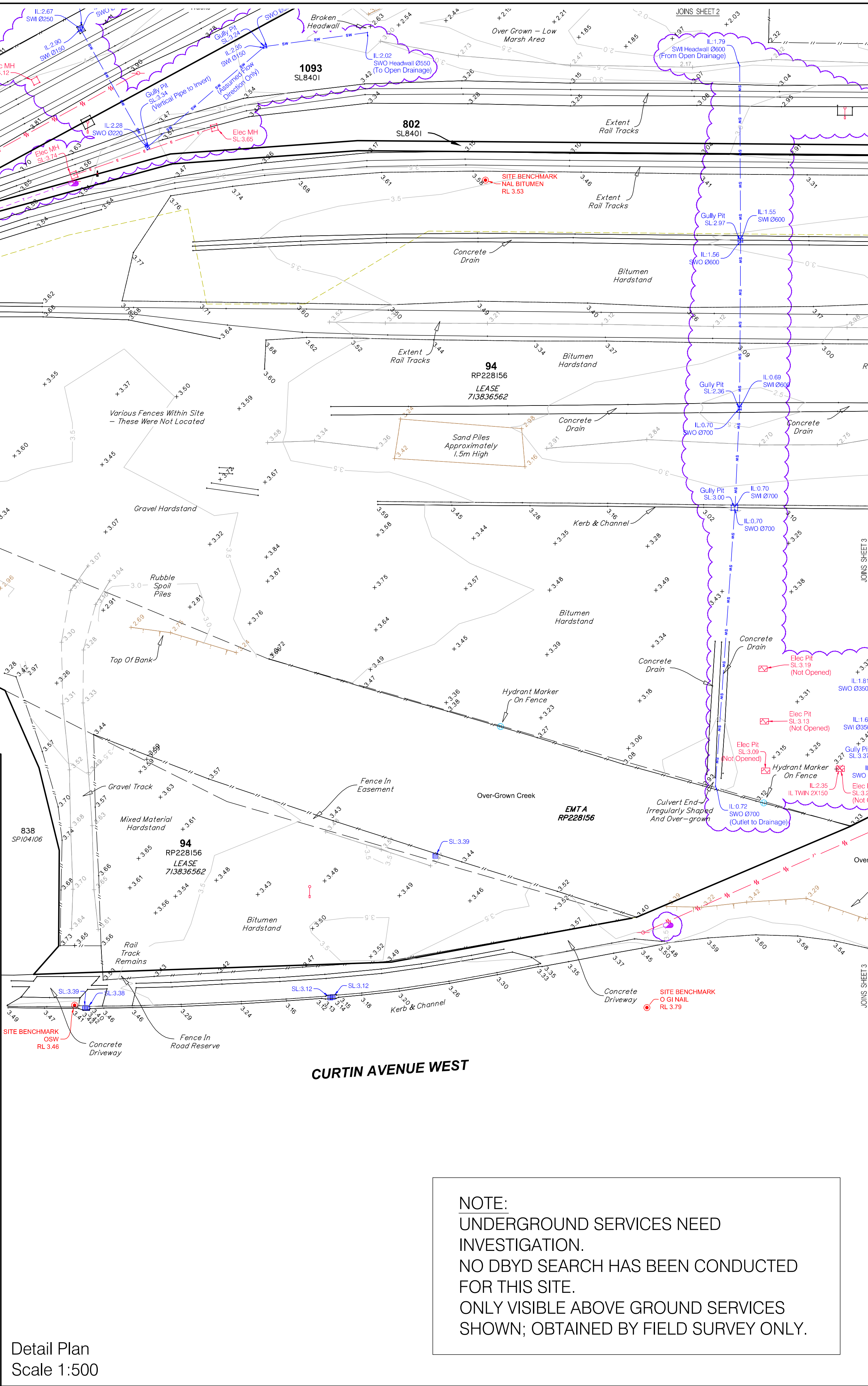
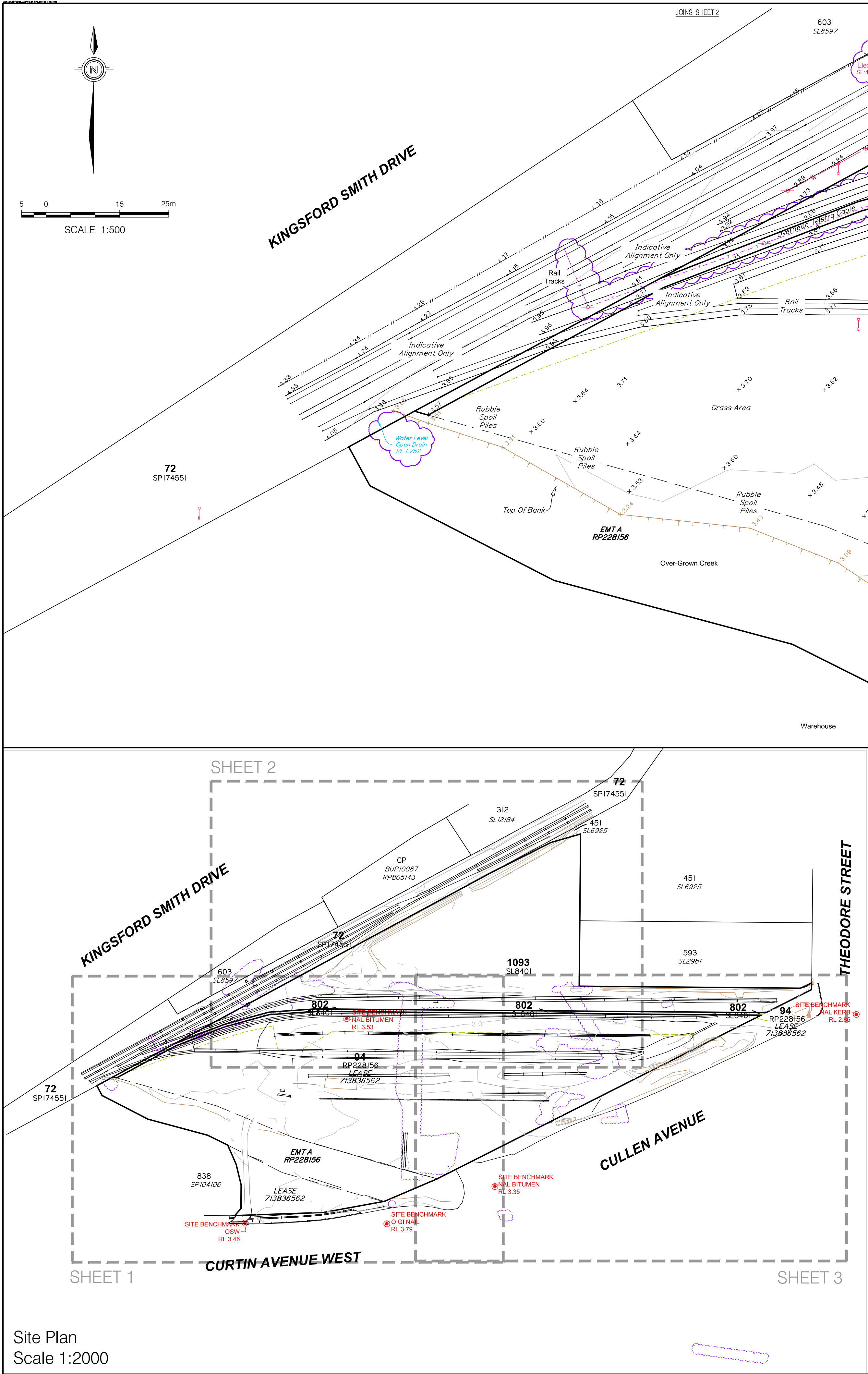
DA ISSUE

A	02/10/14	DA issue
P3	29/09/14	DA issue
P2	24/09/14	preliminary DA issue
P1	23/09/14	preliminary DA issue

issue date revision

Appendix B

Topographic Survey



CLIENT

NORTHSHORE CORPORATION

PROJECT

PART DETAIL SURVEY
OF
Lot 72 on SP174551,
Lot 1093 on SL8401,
Lot 802 on SL8401 and
Lot 94 on RP228156

NOTES

The title boundaries shown hereon were not marked at the time of survey and have been determined by plan dimensions only and not by field survey.

Services shown hereon have been located where possible by field survey. If not able to be so located, services have been plotted from the records of relevant authorities where available and have been noted accordingly on the plan. Where such records do not exist or are inadequate a notation has been made hereon.

Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

Areas in purple revision cloud surveyed on 12/09/2014.

001A/A1

MEA

16/09/2014

NEW SERVICES DETAIL SURVEY ADDED

001A/A0

RJL

01/11/2013

ORIG. ISSUE

SYM

CODE

DESCRIPTION

AP

AUSTRALIA POST

BH

BORE HOLE

BM

BENCHMARK

EBX

ELECTRICAL BOX

ECM

ELEC CABLE MARKER

ELP

ELEC/LIGHT POLE

EM

ELECTRICAL PIT

EP

ELECTRICITY POLE

ESP

ELECTRICITY STAY POLE

FH

FIRE HYDRANT

FHP

FIRE HYDRANT PILLAR

FP

FLAG POLE

GMH

GAS MANHOLE

GMK

GAS MARKER

GP

GUIDE POST

GS

GUIDE SIGN

GT

GULLY TRAP

GV

GAS VALVE

HB

HOSE BOX/REEL

HM

HYDRANT MARKER

MHU

MANHOLE UNKNOWN

PLM

PALM TREE

PIL

TELECOM PILLAR

PKM

PARKING METER

PSM

PERM. SURVEY MARK

SEV

SEWERAGE VENT

SHB

SHRUB

SYM

CODE

DESCRIPTION

SGN

SIGNS

SIO

INSPECTION OPENING

SM

SEWERAGE MANHOLE

SN

STREET NAME SIGN

SPR

SPRINKLER

SPR

TREE

SSV

STOP/SUICE VALVE

STN

SURVEY STATION

SW

STORMWTR. MANHOLE

TAP

TAP

TE

TELECOM PIT

TM

TELECOM MANHOLE

TOH

TRANSFORMER O/H/HEAD

TP

TELEPHONE POLE

TRL

TRAFFIC LIGHTS

TRP

TRAFFIC PIT

WAV

WATER AIR VALVE

WCU

WATER END CAP

WM

WATER METER

WMH

WATER MANHOLE

WPR

WATER REDUCER

WRV

WATER REFLEX VALVE

WSP

WATER SAMPLE POINT

WSV

WATER SCOUR VALVE

WTE

WATER TEE JUNCTION

WV

WATER VALVE

WVM

WATER VALVE MARKER

DRAINAGE PIPE U/G

DRAIN

ELECT. CABLE A/G

ELEC. CABLE U/G

GAS PIPE

FENCE LINE

SEWERAGE PIPE

TELSTRA CABLE

WATER PIPE

SW

SW

SW

SW

SW

SW

SW

SW

BRISBANE OFFICE
Level 3 - Kings Row 4
40 McDougall Street
Milton QLD 4064
PO Box 3816
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(07) 3842 1000
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info@landpartners.com.au
www.landpartners.com.au

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FS 535063

HEIGHT DATUM
AHD D

LOCAL AUTHORITY
B.C.COUNCIL

HEIGHT ORIGIN
PSM44053 RL 4.367

SCALE
1:500 (A1)

MERIDIAN
RP228156

CONTOUR INTERVAL
0.5 Metre

CO-ORD SYSTEM
LOCAL

SURVEYOR
VARIOUS

DATE OF SURVEY
12/09/2014

CCAD FILE
657100A0 & 6571100A0

DRAWN
MEA

DATE
16/09/2014

AUTOCAD FILE
6571100A2

CHECKED
CMJ

DATE
16/09/2014

ARCHIVE FILE
6571100A2

APPROVED
LHS

DATE
16/09/2014

PLAN NUMBER

SHEET 1 OF 3

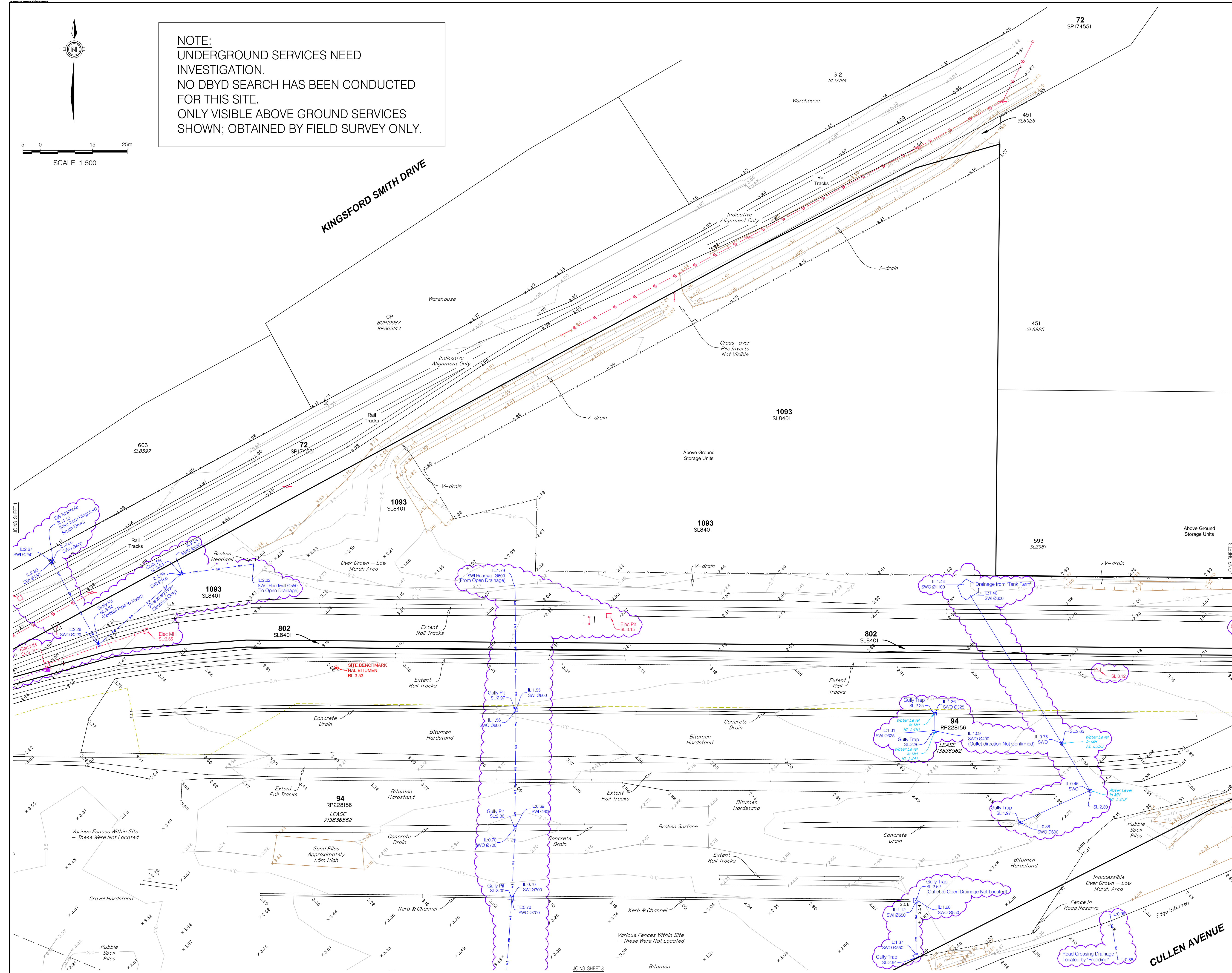
REVISION

BRLS6571.100-001

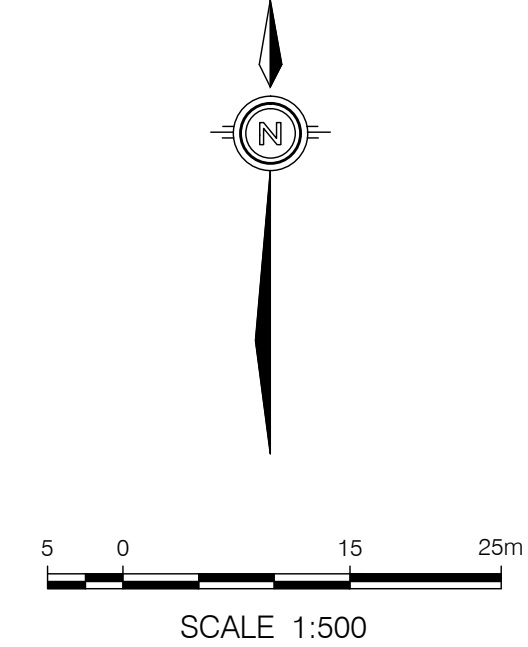
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NOTE:
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CLIENT

NORTHSHORE CORPORATION

PROJECT

PART DETAIL SURVEY
OF
Lot 72 on SP174551,
Lot 1093 on SL8401,
Lot 802 on SL8401 and
Lot 94 on RP228156

NOTES

The title boundaries shown hereon were not marked at the time of survey and have been determined by plan dimensions only and not by field survey.

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Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

Areas in purple revision cloud surveyed on 12/09/2014.

001A/A1	MEA	16/09/2014	NEW SERVICES DETAIL SURVEY ADDED
001A/A0	RJL	01/11/2013	ORIG. ISSUE

SYM	CODE	DESCRIPTION	SYM	CODE	DESCRIPTION
AP		AUSTRALIA POST	SGN		SIGNS
BH		BORE HOLE	SIO		INSPECTION OPENING
BM		BENCHMARK	SM		SEWERAGE MANHOLE
EBX		ELECTRICAL BOX	SN		STREET NAME SIGN
ECM		ELEC CABLE MARKER	SPR		SPRINKLER
ELP		ELEC/LIGHT POLE	SPR		TREE
EM		ELECTRICAL PIT	SSV		STOP/SUICE VALVE
EP		ELECTRICITY POLE	STN		SURVEY STATION
ESP		ELECTRICITY STAY POLE	SW		STORMWTR. MANHOLE
FH		FIRE HYDRANT	TAP		TAP
FHP		FIRE HYDRANT PILLAR	TE		TELECOM PIT
FP		FLAG POLE	TM		TELECOM MANHOLE
GMH		GAS MANHOLE	TOH		TRANSFORMER O/H/HEAD
GMMK		GAS MARKER	TP		TELEPHONE POLE
GP		GUIDE POST	TRL		TRAFFIC LIGHTS
GS		GUIDE SIGN	TRP		TRAFFIC PIT
GT		GULLY TRAP	WAV		WATER AIR VALVE
GV		GAS VALVE	WCU		WATER END CAP
HB		HOSE BOX/REEL	WM		WATER METER
HM		HYDRANT MARKER	WMH		WATER MANHOLE
MHU		MANHOLE UNKNOWN	WPR		WATER REDUCER
PLM		PALM TREE	WRV		WATER REFLUX VALVE
PIL		TELECOM PILLAR	WSP		WATER SAMPLE POINT
PKM		PARKING METER	WSV		WATER SCOUR VALVE
PSM		PERM. SURVEY MARK	WTE		WATER TEE JUNCTION
SEV		SEWERAGE VENT	WV		WATER VALVE
SHB		SHRUB	WVM		WATER VALVE MARKER

Symbols shown are indicative only. The symbol size and orientation does not necessarily represent the real size or orientation of the feature.

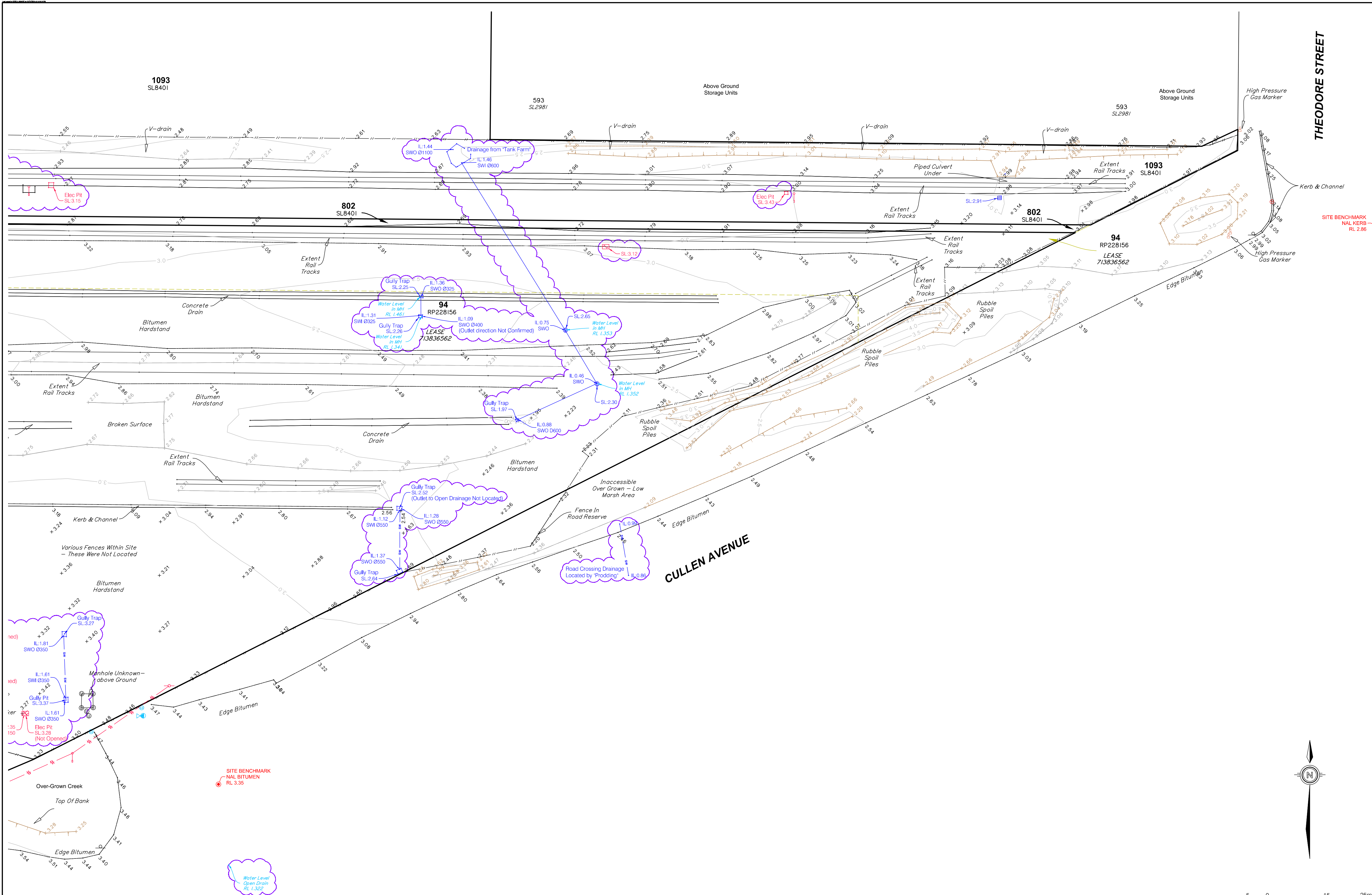
DRAINAGE PIPE U/G	SW
DRAIN	SW
ELECT. CABLE A/G	SW
ELEC. CABLE U/G	SW
GAS PIPE	SW
FENCE LINE	SW
SEWERAGE PIPE	SW
TELSTRA CABLE	SW
WATER PIPE	SW

Brisbane Office
Level 3 - Kings Row 4
40 McDougall Street
Milton QLD 4064
PO Box 3816
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(07) 3842 1000
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FS 53063

HEIGHT DATUM AHD D	LOCAL AUTHORITY B.C.COUNCIL
HEIGHT ORIGIN PSM44053 RL 4.367	SCALE 1:500 (A1)
MERIDIAN RP228156	CONTOUR INTERVAL 0.5 Metre
COORD SYSTEM LOCAL	SURVEYOR VARIOUS
CO-ORD SYSTEM LOCAL	DATE OF SURVEY 12/09/2014
CCAD FILE 6571100A0 & 6571100A0	DRAWN MEA
AUTOCAD FILE 6571100A2	DATE 16/09/2014
ARCHIVE FILE 6571100A2	CHECKED CMJ
PLAN NUMBER BRLS6571.100-001	APPROVED LHS
	DATE 16/09/2014
	REVISION A



CLIENT

NORTHSHORE CORPORATION

PROJECT

PART DETAIL SURVEY
OF
Lot 72 on SP174551,
Lot 1093 on SL8401,
Lot 802 on SL8401 and
Lot 94 on RP228156

NOTES

The title boundaries shown hereon were not marked at the time of survey and have been determined by plan dimensions only and not by field survey.

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Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

Areas in purple revision cloud surveyed on 12/09/2014.

001A/A1	MEA	16/09/2014	NEW SERVICES DETAIL SURVEY ADDED
001A/A0	RJL	01/11/2013	ORIG. ISSUE

SYM	CODE	DESCRIPTION	SYM	CODE	DESCRIPTION
AP	AP	AUSTRALIA POST	SGN	SGN	SIGNS
BH	BH	BORE HOLE	SIO	SIO	INSPECTION OPENING
BM	BM	BENCHMARK	SM	SM	SEWERAGE MANHOLE
EBX	EBX	ELECTRICAL BOX	SN	SN	STREET NAME SIGN
ECM	ECM	ELEC CABLE MARKER	SPR	SPR	SPRINKLER
ELP	ELP	ELEC/LIGHT POLE	SPR	SPR	TREE
EM	EM	ELECTRICAL PIT	SSV	SSV	STOP/SLUICE VALVE
EP	EP	ELECTRICITY POLE	STN	STN	SURVEY STATION
ESP	ESP	ELECTRICITY STAY POLE	SW	SW	STORMWTR. MANHOLE
FH	FH	FIRE HYDRANT	TAP	TAP	TAP
FHP	FHP	FIRE HYDRANT PILLAR	TE	TE	TELECOM PIT
FP	FP	FLAG POLE	TM	TM	TELECOM MANHOLE
GMH	GMH	GAS MANHOLE	TOH	TOH	TRANSFORMER O'HEAD
GMK	GMK	GAS MARKER	TP	TP	TELEPHONE POLE
GP	GP	GUIDE POST	TRL	TRL	TRAFFIC LIGHTS
GS	GS	GUIDE SIGN	TRP	TRP	TRAFFIC PIT
GT	GT	GULLY TRAP	WAV	WAV	WATER AIR VALVE
GV	GV	GAS VALVE	WCU	WCU	WATER END CAP
HB	HB	HOSE BOX/REEL	WM	WM	WATER METER
HM	HM	HYDRANT MARKER	WMH	WMH	WATER MANHOLE
MHU	MHU	MANHOLE UNKNOWN	WPR	WPR	WATER REDUCER
PLM	PLM	PALM TREE	WRV	WRV	WATER REFLEX VALVE
PIL	PIL	TELECOM PILLAR	WSP	WSP	WATER SAMPLE POINT
PKM	PKM	PARKING METER	WSV	WSV	WATER SCOUR VALVE
PSM	PSM	PERM. SURVEY MARK	WTE	WTE	WATER TEE JUNCTION
SEV	SEV	SEWERAGE VENT	WV	WV	WATER VALVE
SHB	SHB	SHRUB	WVM	WVM	WATER VALVE MARKER

Symbols shown are indicative only. The symbol size and orientation do not necessarily represent the real size or orientation of the feature.

DRAINAGE PIPE U/G	SW	SW	SW	SW	SW
DRAIN	O	O	O	O	O
ELECT. CABLE A/G	E	E	E	E	E
ELEC. CABLE U/G	E	E	E	E	E
GAS PIPE	GAS	GAS	GAS	GAS	GAS
FENCE LINE	F	F	F	F	F
SEWERAGE PIPE	S	S	S	S	S
TELSTRA CABLE	T	T	T	T	T
WATER PIPE	W	W	W	W	W



LANDPARTNERS
built environment consultants

Brisbane Office
Level 3 - Kings Row 4
40 McDougall Street
Milton QLD 4064
PO Box 3816
South Brisbane BC QLD 4101

(07) 3842 1000
(07) 3842 1001
e info@landpartners.com.au
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FS 535063

HEIGHT DATUM
AHD D

LOCAL AUTHORITY
B.C.COUNCIL

HEIGHT ORIGIN
PSM44053 RL 4.367

SCALE
1:500 (A1)

MERIDIAN
RP228156

CONTOUR INTERVAL
0.5 Metre

CO-ORD SYSTEM
LOCAL

SURVEYOR
VARIOUS

DATE OF SURVEY
12/09/2014

CCAD FILE
657100A0 & 6571100A0

DRAWN
MEA

DATE
16/09/2014

AUTOCAD FILE
6571100A2

CHECKED
CMJ

DATE
16/09/2014

ARCHIVE FILE
6571100A2

APPROVED
LHS

DATE
16/09/2014

PLAN NUMBER
BRLS6571.100-001

SHEET 3 OF 3
REVISION
A

Tidal Water Levels Taken at
11:00am Friday 12/09/14

NOTE:
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Appendix C

Rational Method Output

RATIONAL METHOD CALCULATIONS

Project:	66 Cullen Avenue West, Eagle Farm
Date:	26-Sep-14
Designed:	Darius vearncombe
Comments:	Pre Developed Catchment



PARAMETERS

VALUE

Catchment Name	Catch A
Catchment Size	5.09 ha
C10 Coefficient of Runoff	0.87

Total Time of Concentration

QUDM, Standard inlet time Section 4.06

Total time of Conentration (**tc**)

5.0 mins

Rational Method for Peak Catchment flow

$Q = 0.00278 \times C \times I \times A$

ARI	Rainfall Intensity (mm/h)	Rainfall Depth (mm)	Fy	Coefficient of Runoff	Discharge (m ³ /s)
3 month					0.586
1	119.11	9.93	0.80	0.70	1.172
2	152.47	12.71	0.85	0.74	1.594
5	191.70	15.97	0.95	0.83	2.240
10	214.71	17.89	1.00	0.87	2.641
20	245.98	20.50	1.05	0.91	3.177
50	287.32	23.94	1.15	1.00	4.062
100	319.10	26.59	1.20	1.00	4.512

RATIONAL METHOD CALCULATIONS

Project:	66 Cullen Avenue West, Eagle Farm
Date:	26-Sep-14
Designed:	Darius vearncombe
Comments:	Post Developed Catchment



PARAMETERS

VALUE

Catchment Name	Catch A
Catchment Size	5.09 ha
C10 Coefficient of Runoff	0.88

Total Time of Concentration

QUDM, Standard inlet time Section 4.06

Total time of Conentration (**tc**)

5.0 mins

Rational Method for Peak Catchment flow

$Q = 0.00278 \times C \times I \times A$

ARI	Rainfall Intensity (mm/h)	Rainfall Depth (mm)	Fy	Coefficient of Runoff	Discharge (m ³ /s)
3 month					0.593
1	119.11	9.93	0.80	0.70	1.186
2	152.47	12.71	0.85	0.75	1.612
5	191.70	15.97	0.95	0.84	2.266
10	214.71	17.89	1.00	0.88	2.671
20	245.98	20.50	1.05	0.92	3.214
50	287.32	23.94	1.15	1.00	4.062
100	319.10	26.59	1.20	1.00	4.512

Appendix D

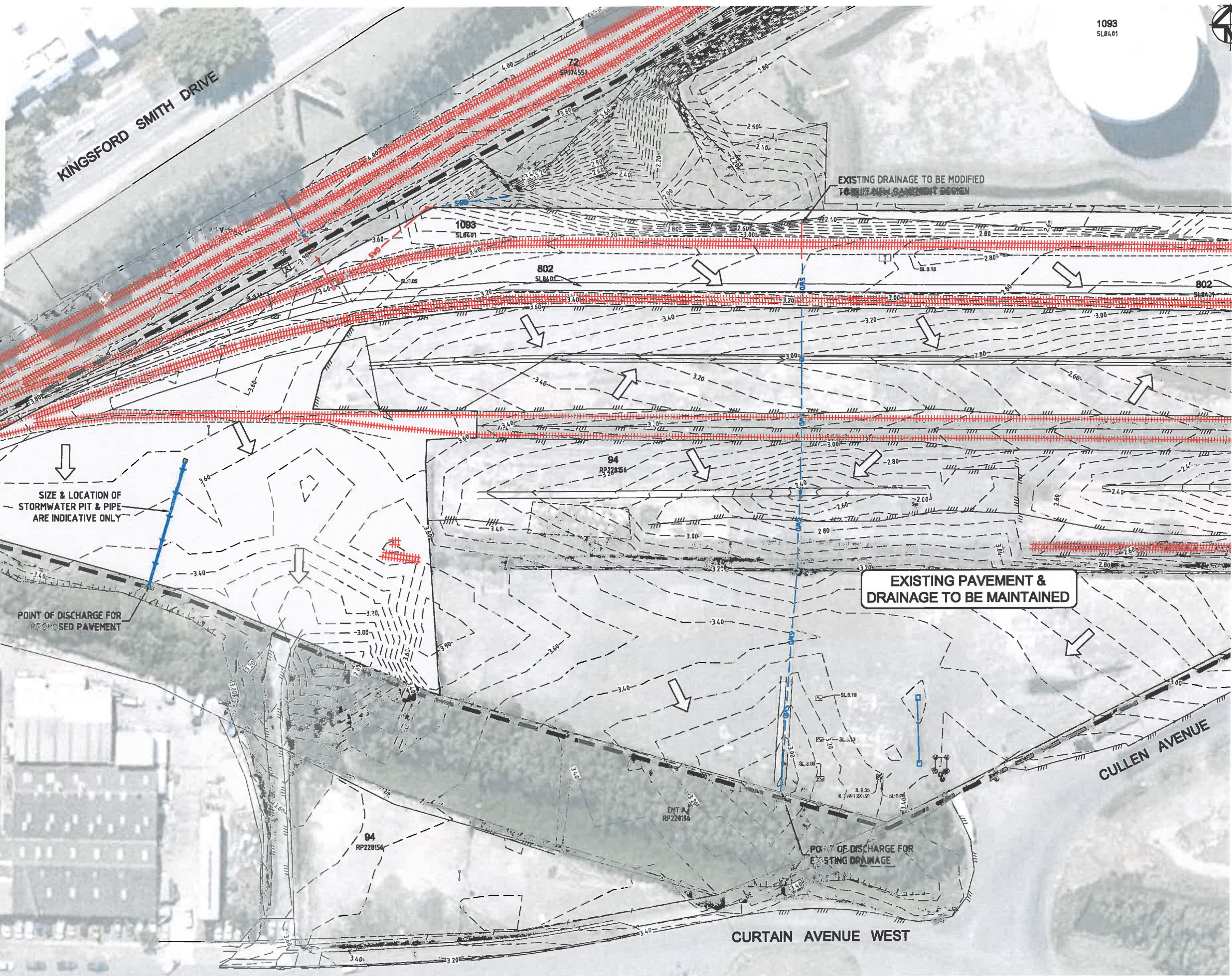
Stormwater Management Layout

LEGEND

- PROPOSED NEW PAVEMENT
- PROPOSED STORMWATER DRAINAGE
- EXISTING OVERLAND FLOW DIRECTION
- EXISTING EDGE OF BITUMEN
- EXISTING RAIL TRACK
- EXISTING DRAINAGE
- EXISTING ELECTRICAL - UNDER GROUND
- EXISTING ELECTRICAL - ABOVE GROUND
- EXISTING TOP OF BATTER
- EXISTING TOE OF BATTER
- EXISTING FENCE
- EXISTING CONTOURS (0.1m)
- SITE BOUNDARY

NOTE

ALL EXISTING RAIL TRACKS
WITHIN THE SITE TO BE REMOVED
& REPLACED WITH BITUMEN



1093
SL84.01



FOR CONTINUATION REFER TO SHEET 2

REV	DESCRIPTION	DRAWN	DATE
A	ORIGINAL ISSUE	JH	25/09/16

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SCALE (AT ORIGINAL SHEET SIZE)

SCALE 10 0 10 20 1500

ORIGINAL SHEET SIZE A1

CLIENT



NORTHSHORE CORPORATION

PROJECT

STORMWATER MANAGEMENT PLAN

66 CULLEN AVENUE

EAGLE FARM,

STAGE / PHASE FOR APPROVAL FOR CONSTRUCTION ONCE STAMPED AND APPROVED BY COUNCIL

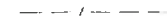
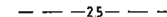


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YEATS

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TITLE					
STORMWATER MANAGEMENT PLAN					
SHEET 1 OF 2					
TASK	BY	INITIAL	DATE	APPROVED	REVISION
REVIEW	SS		25/09/16		
DESIGN	DV		25/09/16		
DRAWN	JH		25/09/16		
DRAWING NUMBER YBC0180-SWMP-001					REVISION A

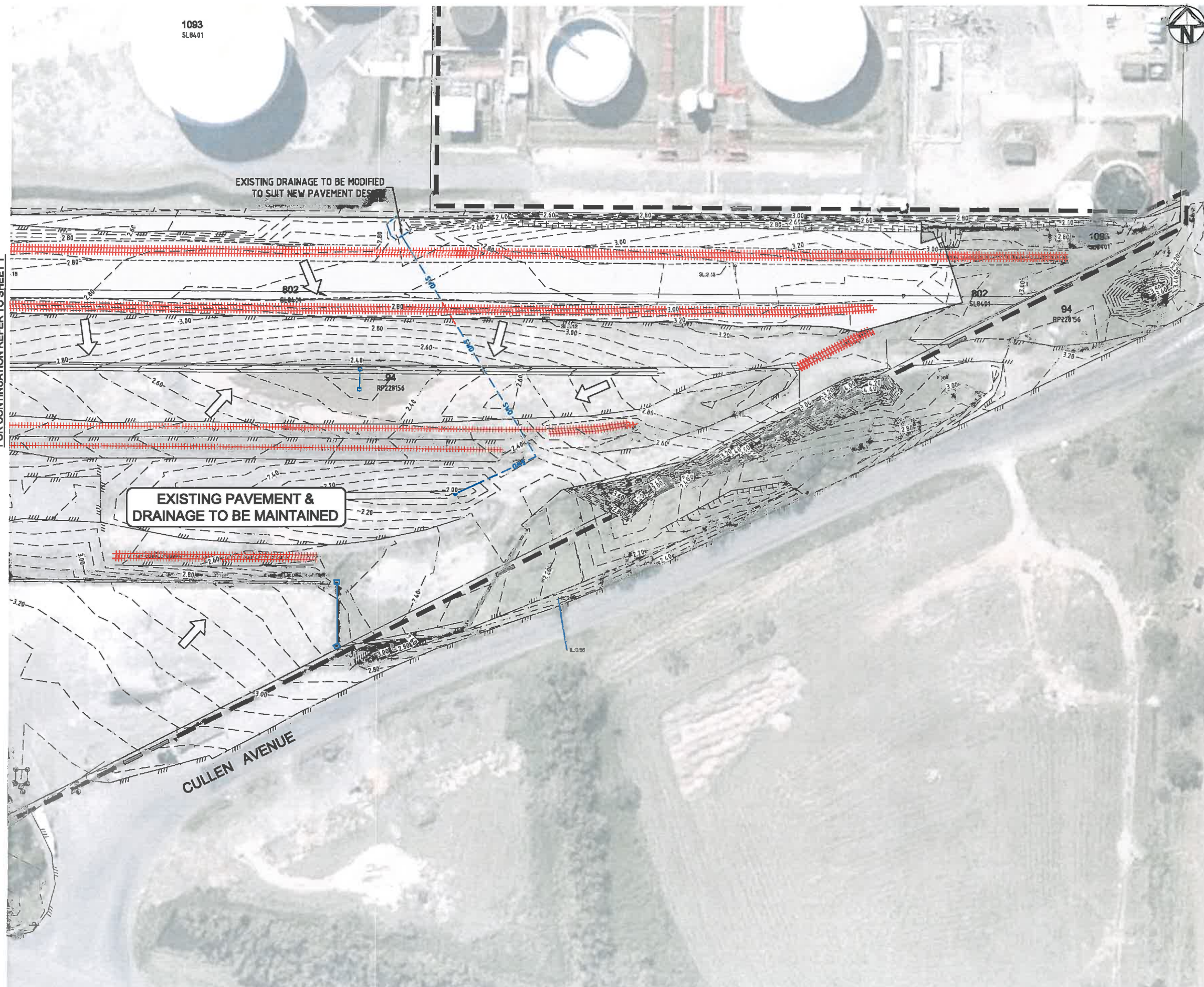
LEGEND

-  PROPOSED NEW PAVEMENT
-  PROPOSED STORMWATER DRAINAGE
-  EXISTING OVERLAND FLOW DIRECTION
-  EXISTING EDGE OF BITUMEN
-  EXISTING RAIL TRACK
-  EXISTING DRAINAGE
-  EXISTING ELECTRICAL - UNDER GROUND
-  EXISTING ELECTRICAL - ABOVE GROUND
-  EXISTING TOP OF BATTER
-  EXISTING TOE OF BATTER
-  EXISTING FENCE
-  EXISTING CONTOURS (0.1m)
-  SITE BOUNDARY

NOTE

ALL EXISTING RAIL TRACKS
WITHIN THE SITE TO BE REMOVED
& REPLACED WITH BITUMEN

FOR CONTINUATION REFER TO SHEET 1



REV	DESCRIPTION	DRAWN	DATE
A	ORIGINAL ISSUE	JH	25/09/16

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SCALE (AT ORIGINAL SHEET SIZE)	ORIGINAL SHEET SIZE
SCALE 	A1

CLIENT



PROJECT

STORMWATER MANAGEMENT PLAN
66 CULLEN AVENUE
EAGLE FARM,

STAGE / PHASE **FOR APPROVAL** FOR CONSTRUCTION ONCE STAMPED AND APPROVED BY COUNCIL



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T 07 3124 4500 F 07 5503 1672 info@yeats.com.au www.yeats.com.au

TITLE					
STORMWATER MANAGEMENT PLAN					
SHEET 2 OF 2					
TASK	BY	INITIAL	DATE	APPROVED	REVISION
REVIEW	SS		25/09/16		
DESIGN	DV		25/09/16		
DRAWN	JH		25/09/16		
DRAWING NUMBER YBC0180-SWMP-002					REVISION A

Appendix E

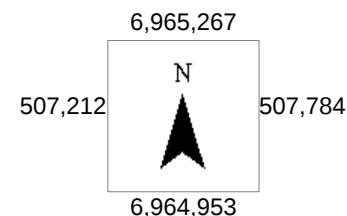
Ebimap Extracts



Date : Sep 10, 2014
User : sedgmanyeads#891534

Scale = 1:1,499
Metres 20 40 60

Location :



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2005 Aerial Imagery (c) 2005 QASCO
2005 DigitalGlobe QuickBird Satellite Imagery (c) 2005 DigitalGlobe
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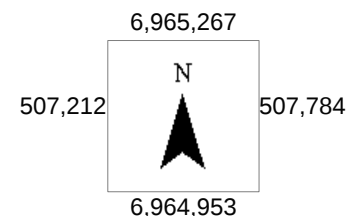


Date : Sep 10, 2014
User : sedgmanyeads#891534

Scale = 1:1,499

Metres	20	40	60
--------	----	----	----

Location :



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Appendix F

Erosion Hazard Assessment