Stormwater Summary

for

Lot 152 Raven Street, Kooragang

for EJE Architecture

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		Date
Prepared by	JC	30/04/2021
Checked by	BC	30/04/2021
Admin	BBR	30/04/2021

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1. Introduction

1.1. General

Northrop consulting Engineers have been engaged by Port of Newcastle (PoN) to provide design and advice relating to Stormwater and Civil design for the proposed Industrial Development at Lot 152 Raven Street, Kooragang.

This report has been prepared for submission to the Department of Planning, Industry and Environment as part of a Development Application and conveys the philosophy adopted by the proposed Stormwater Management Plan. The report should be read in conjunction with the engineering drawings provided in Appendix A.

1.2. Existing Site

The existing site is predominantly gravel and is currently used as a storage yard. It generally slopes from the north-west to its south-east corner and Lot 153. The site includes an existing sealed road that runs in Right of Way from the north-west to the south-east of the site. A weather station is located in the south-east corner of the site.

1.3. Post-Developed Site

The post-developed site includes a 3000m^2 warehouse while maintaining the Right of Way along its western boundary. In addition, two carparks, landscaping and hardstand areas have been included in the site plan.

It is noted that the developed site area does not account for the entire lot. A 1,650m^2 area is to be left undeveloped, which includes an access driveway and surrounding grassed areas, which are outside the existing gate (see Figure 1 below). This area is a Right of Way and will not be changed as part of the development. However, Northrop have noted the impact of the area in detention calculations, which are shown in this summary.

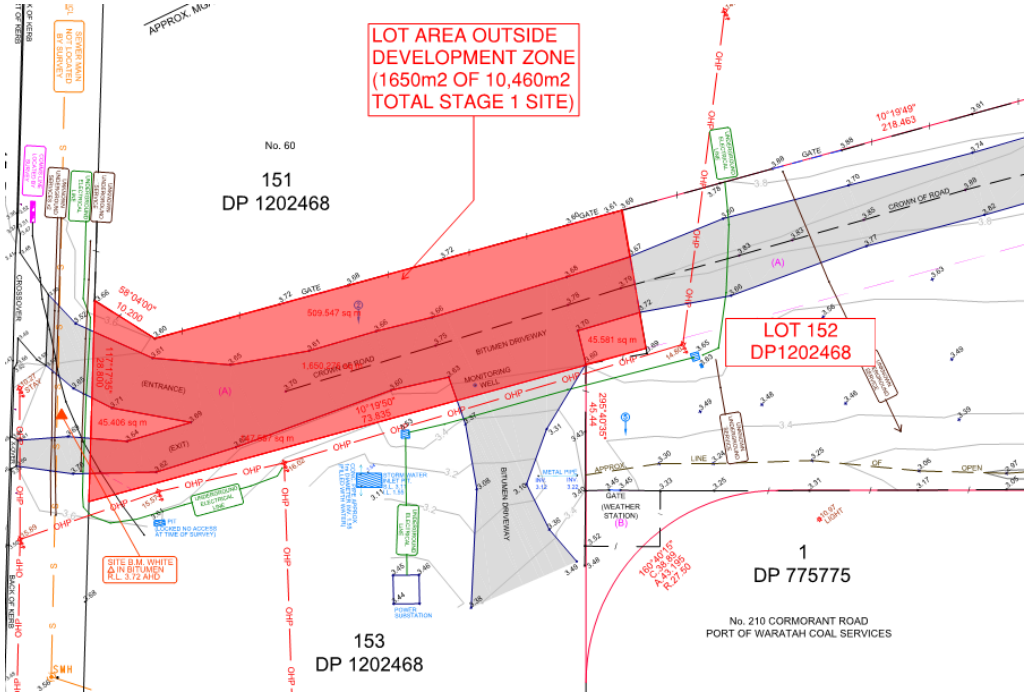

Figure 1 - Undeveloped Site Area

The total areas of each section are as follows:

- Total lot area = 10,460m^2
- Total developed site area = 8,810m^2
- Total site pervious area = 662m^2
- Total site impervious area = 8,148m^2
    - Roof = 3,357m^2
    - Carriageway = 2,869m^2
    - Hardstand = 1,922m^2

2. Stormwater Management Strategy

2.1. General Requirements

The stormwater management system adopted on site is to be generally in accordance with the following:

- CoN's 2012 Development Control Plan, in particular:
  - Section 7.06 Stormwater.
- CoN's 2019 Stormwater and Water Efficiency for Development Technical Manual.
- The relevant Australian Standards.
- NSW MUSIC Modelling Guidelines

2.2. Onsite Stormwater Detention

To minimise the potential impact of local and downstream flooding, onsite detention is to be provided. Roof water and most of the hardstand areas is to be collected and directed to an underground storage tank. The tank has been designed to ensure no net increase in peak flows during storm events up to the 1% Annual Exceedance Probability (AEP).

Modelling was undertaken using the computer software package DRAINS utilising the ILSAX hydrological method. A type 3 soil was assigned with a grassed depression storage of 5mm and impervious depression storage of 1mm. Rainfall data for the model was obtained from the Bureau of Meteorology using AR&R2019 intensity data.

Through runoff routing using DRAINS a detention tank with a minimum storage capacity of 186m^3 has been deduced. Results from the DRAINS model for the peak storm events have been summarised below in Table 1. We note the DRAINS model can be provided to upon request.

Table 1 - Peak Storm Event Site Discharge Flow Rates

AEP (%)	Outlet Flow Rate (m^3/s)		
	Pre-Developed Site Discharge (100% Pervious, No detention)	Developed Scenario Site Discharge (No detention)	Developed Scenario Site Discharge (186m^3 detention)
20	0.196	0.381	0.196
10	0.282	0.479	0.240
5	0.366	0.580	0.353
2	0.496	0.723	0.451
1	0.637	0.838	0.525

As summarised, the 186m^3 detention tank will effectively attenuate runoff up to the 1% AEP peak flow and is therefore considered to effectively mitigate the effects of the development on stormwater quantity in accordance with the intent of the DCP.

2.3. Water Quality

To achieve the pollutant reduction targets specified by NCC's DCP, a number of stormwater quality improvement devices were used, mainly:

- Rainwater reuse tanks: a total of 24kL of stormwater reuse is proposed, which will be utilized indoors for toilet flushing and externally for local irrigation.
- Gross pollutant trap (GPT): as per the NCC DCP, a GPT must be provided for all industrial developments. To satisfy this requirement and to assist in achieving the pollutant reduction targets, Northrop propose to install Humes' Humegard GPT or an equivalent device. This product will assist in the removal of gross pollutants, phosphorous, nitrogen and suspended solids from the stormwater runoff.
- Tertiary treatment device: to assist in the removal of suspended solids, nitrogen, phosphorus and other pollutants, 4 x Full-Height SPELFilters (or equivalent) are to be installed. It is proposed that the filters are installed within the detention tank. All flows up to the high-flow bypass flow rate are to be directed through the SPELFilters before exiting the tank.
- Bioretention Basin: a 20m^2 bioretention basin (raingarden) has been included in the carpark area upstream of the detention tank and GPT. Bioretention basins infiltrate stormwater through filter media to remove pollutants before discharging back into the stormwater system.
- Grass buffer: runoff from the impervious pathways on the north and east of the warehouse will be conveyed to a 1m wide grass buffer. This buffer will assist in the removal of coarse matter and attached pollutants.
- Pit filters: a minimum of 4 SPEL Stormsacks (or equivalent) are proposed to be installed to assist in capturing surface contaminants such as sediment, litter, oil and grease.

2.4. MUSIC Modelling

In accordance with NCC's DCP, stormwater quality was assessed using Newcastle's MUSICLink tool. Please see below for the MUSIC model diagram. The MUSICLink report is attached in Appendix B.

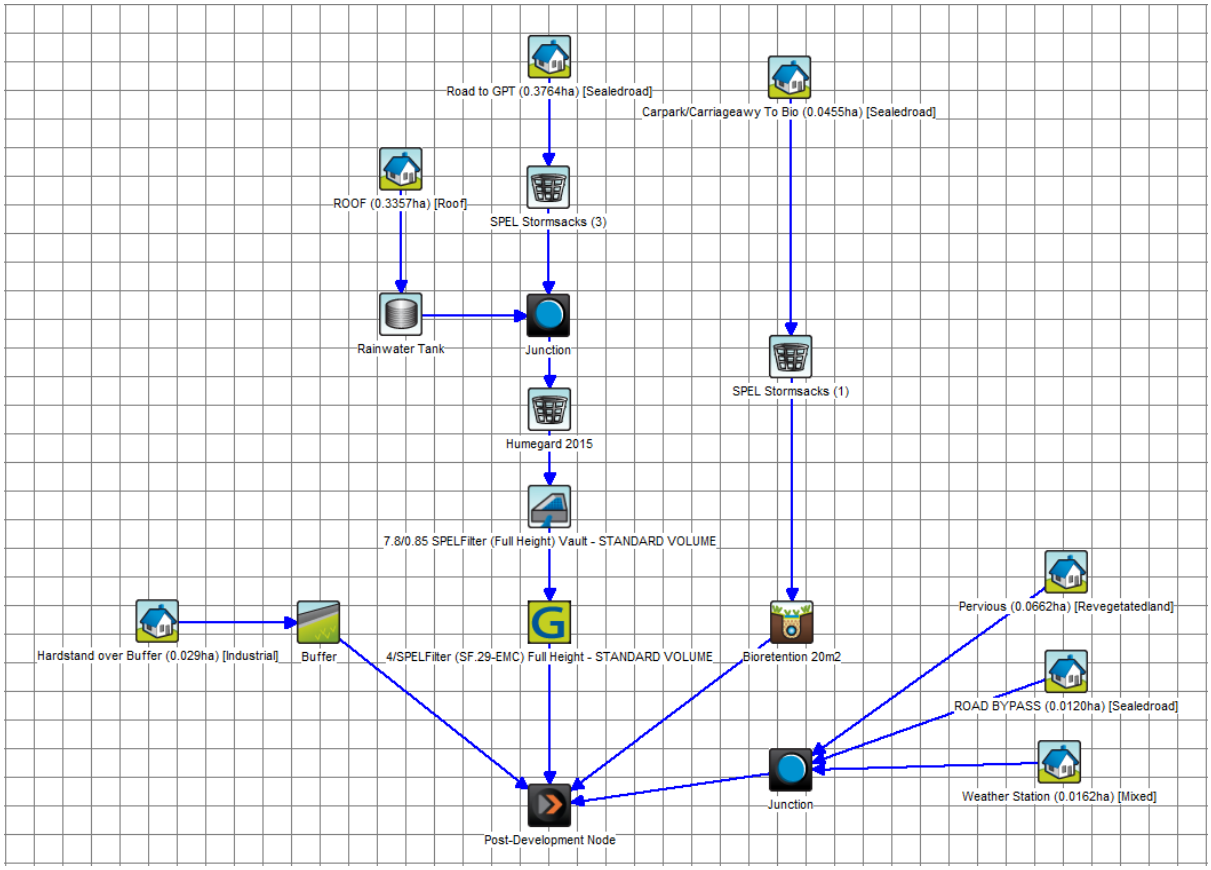

Figure 2 - MUSIC Model

The following table reflects the achieved pollutant reduction loads for the development.

Pollutant	Required Reduction (%)	Achieved Reduction (%)
Total Suspended Solids (TSS)	85	85.3
Total Phosphorous (TP)	65	69.8
Total Nitrogen (TN)	45	59.1
Gross Pollutants (GP)	90	93.6

Please note the undeveloped area (as mentioned on Page 2 of this report) is remaining unchanged and was not considered in this MUSIC report.

2.5. Legal Point of Connection for Stormwater Disposal

The new stormwater system for the developed site is proposed to connect into the existing stormwater system to the south of the development. This system discharges through a 1200mm pipe through Lot 151, before turning and discharging into the existing system in Raven Street. The connection includes a new easement through Lot 151 to facilitate this connection. This lot is currently owned by the Port of Newcastle (PoN). Considering that the development of Lot 152 is being undertaken by PoN, it is expected that consent on this matter can be achieved.

3. Conclusion

Northrop Consulting Engineers are satisfied that the proposed development satisfies the stormwater requirements of the NCC DCP.

Please feel free to contact the undersigned if you have any issues.

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Appendix A – Engineering Drawings

LOT 152 RAVEN STREET, KOORAGANG, NSW 2304

DEVELOPMENT APPLICATION
CIVIL ENGINEERING PACKAGE

IMAGE SOURCE : NEARMAPS

LOCALITY PLAN

DRAWING LIST

DWG No.	DRAWING TITLE
DA-C01.01	COVER SHEET, DRAWING LIST AND LOCALITY PLAN
DA-C02.01	EROSION AND SEDIMENT CONTROL PLAN
DA-C02.02	EROSION AND SEDIMENT CONTROL DETAILS
DA-C04.01	CIVIL WORKS PLAN - SHEET 1
DA-C04.02	CIVIL WORKS PLAN - SHEET 2
DA-C09.01	CIVIL DETAILS

DRAWN: B.DUGGAN DESIGNED: J.CARROLL JOB MANAGER: B.CLARK VERIFIER: B.CLARK

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REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR CLIENT REVIEW	JC	BC	BC	15.03.21
2	ISSUED FOR DA REVIEW	JC	BC	BC	30.04.21

CLIENT: PORT of NEWCASTLE

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PROJECT: LOT 152 RAVEN STREET KOORAGANG NSW 2304

DRAWING TITLE: CIVIL ENGINEERING PACKAGE

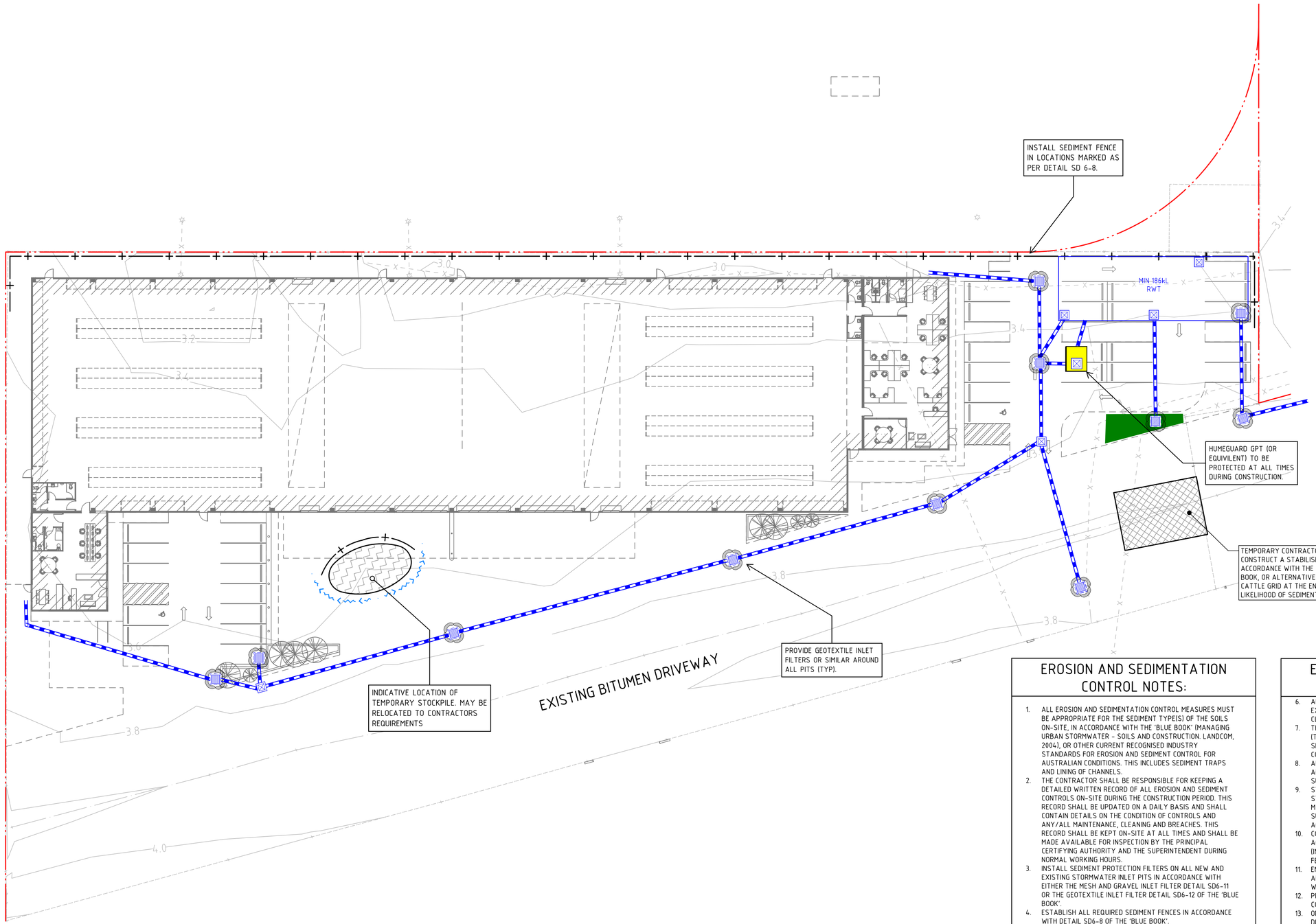
COVER SHEET, DRAWING LIST AND LOCALITY PLAN

JOB NUMBER: NL202347

DRAWING NUMBER: DA-C01.01

REVISION: 2

DRAWING SHEET SIZE = A1



LEGEND

- PROPOSED BOUNDARY LINE
- EXISTING BOUNDARY LINE
- EXISTING CONTOURS
- EXISTING SERVICE. REFER TO C04.01 FOR SERVICES
- PROPOSED GEOTEXTILE INLET FILTER OR EQUIVILENT.
- DIVERSION DRAIN (CLEAN)
- SEDIMENT FENCE
- STABILISED SITE ACCESS (GRATED)
- STOCKPILE
- PROPOSED MINIMUM 186kL DETENTION TANK
- PROPOSED STORMWATER PIPE (225mm UNO)
- PROPOSED ACCESS LID
- PROPOSED GRATED INLET PIT
- PROPOSED HUMEGARD GPT (OR EQUIVILENT)
- PROPOSED 20m² BIORETENTION BASIN

EROSION AND SEDIMENTATION CONTROL NOTES:

1. ALL EROSION AND SEDIMENTATION CONTROL MEASURES MUST BE APPROPRIATE FOR THE SEDIMENT TYPE(S) OF THE SOILS ON-SITE, IN ACCORDANCE WITH THE 'BLUE BOOK' (MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION. LANDCOM, 2004), OR OTHER CURRENT RECOGNISED INDUSTRY STANDARDS FOR EROSION AND SEDIMENT CONTROL FOR AUSTRALIAN CONDITIONS. THIS INCLUDES SEDIMENT TRAPS AND LINING OF CHANNELS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING A DETAILED WRITTEN RECORD OF ALL EROSION AND SEDIMENT CONTROLS ON-SITE DURING THE CONSTRUCTION PERIOD. THIS RECORD SHALL BE UPDATED ON A DAILY BASIS AND SHALL CONTAIN DETAILS ON THE CONDITION OF CONTROLS AND ANY/ALL MAINTENANCE, CLEANING AND BREACHES. THIS RECORD SHALL BE KEPT ON-SITE AT ALL TIMES AND SHALL BE MADE AVAILABLE FOR INSPECTION BY THE PRINCIPAL CERTIFYING AUTHORITY AND THE SUPERINTENDENT DURING NORMAL WORKING HOURS.
3. INSTALL SEDIMENT PROTECTION FILTERS ON ALL NEW AND EXISTING STORMWATER INLET PITS IN ACCORDANCE WITH EITHER THE MESH AND GRAVEL INLET FILTER DETAIL SD6-11 OR THE GEOTEXTILE INLET FILTER DETAIL SD6-12 OF THE 'BLUE BOOK'.
4. ESTABLISH ALL REQUIRED SEDIMENT FENCES IN ACCORDANCE WITH DETAIL SD6-8 OF THE 'BLUE BOOK'.
5. INSTALL SEDIMENT FENCING, OR OTHER SEDIMENT CONTROL DEVICES, AROUND INDIVIDUAL BUILDING ZONES/AREAS AS REQUIRED AND AS DIRECTED BY THE SUPERINTENDENT OR APPROPRIATE COUNCIL OFFICER.

EROSION AND SEDIMENTATION CONTROL NOTES (CONT):

6. ALL TRENCHES INCLUDING ALL SERVICE TRENCHES AND SWALE EXCAVATION SHALL BE SIDE-CAST TO THE HIGH SIDE AND CLOSED AT THE END OF EACH DAYS WORK.
7. THE CONTRACTOR SHALL ENSURE THAT ALL VEGETATION (TREE, SHRUB AND GROUND COVER) WHICH IS TO BE RETAINED SHALL BE PROTECTED DURING THE DURATION OF CONSTRUCTION.
8. ALL VEGETATION TO BE REMOVED SHALL BE MULCHED ON-SITE AND SPREAD/STOCKPILED AS DIRECTED BY THE SUPERINTENDENT.
9. STRIP TOPSOIL IN AREAS DESIGNATED FOR STRIPPING AND STOCKPILE FOR RE-USE AS REQUIRED. ANY SURPLUS MATERIAL SHALL BE SPREAD ON-SITE AS DIRECTED BY THE SUPERINTENDENT OR REMOVED FROM SITE AND DISPOSED OF IN ACCORDANCE WITH EPA GUIDELINES.
10. CONSTRUCT AND MAINTAIN ALL MATERIAL STOCKPILES IN ACCORDANCE WITH DETAIL SD4-1 OF THE 'BLUE BOOK' (INCLUDING CUT-OFF SWALES TO THE HIGH SIDE AND SEDIMENT FENCES TO THE LOW SIDE).
11. ENSURE STOCKPILES DO NOT EXCEED 2.0m HIGH. PROVIDE WIND AND RAIN EROSION PROTECTION AS REQUIRED IN ACCORDANCE WITH THE 'BLUE BOOK'.
12. PROVIDE WATER TRUCKS OR SPRINKLER DEVICES DURING CONSTRUCTION AS REQUIRED TO SUPPRESS DUST.
13. ONCE CUT/FILL OPERATIONS HAVE BEEN FINALIZED ALL DISTURBED AREAS THAT ARE NOT BEING WORKED ON SHALL BE RE-VEGETATED AS SOON AS IS PRACTICAL.
14. INSTALL ROCK CHECK DAMS AS REQUIRED ACROSS AREAS OF CONCENTRATED FLOW CAUSING EROSION.

DRAWN: B. DUGGAN DESIGNED: J. CARROLL JOB MANAGER: B. CLARK VERIFIER: B.CLARK

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PROJECT: **LOT 152 RAVEN STREET KOORAGANG NSW 2304**

DRAWING TITLE: **CIVIL ENGINEERING PACKAGE**

EROSION AND SEDIMENT CONTROL PLAN

JOB NUMBER: **NL202347**

DRAWING NUMBER: **DA-C02.01** REVISION: **2**

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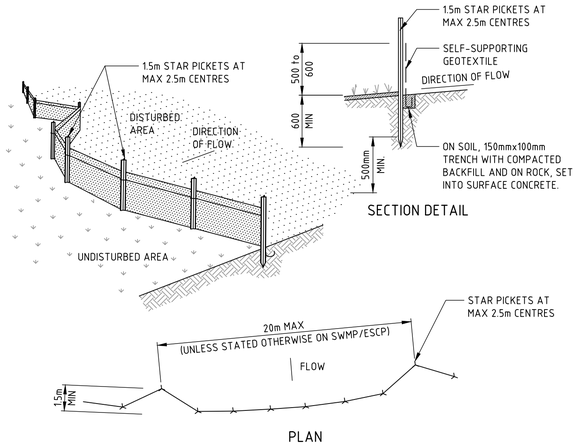
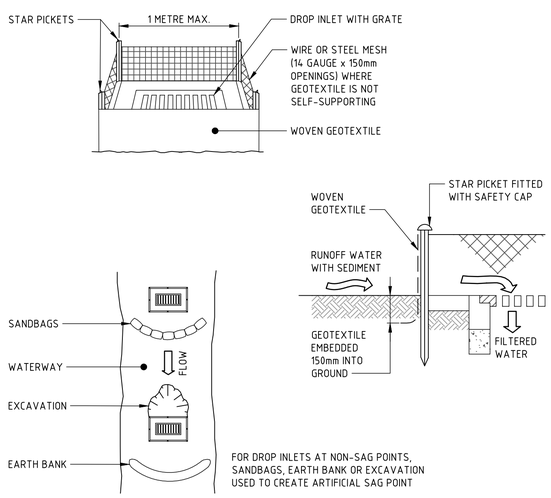


CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5 METRE LONG STAR PICKETS INTO GROUND AT 2.5 METRE INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

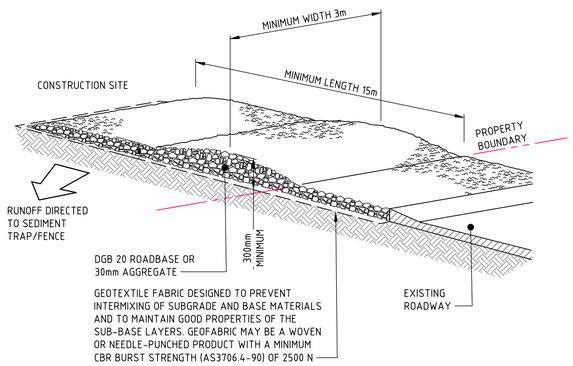
SEDIMENT FENCE (SD 6-8)



CONSTRUCTION NOTES

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

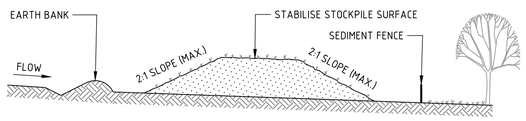
GEOTEXTILE INLET FILTER (SD 6-12)



CONSTRUCTION NOTES

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.

STABILISED SITE ACCESS (SD 6-14)



CONSTRUCTION NOTES

1. PLACE STOCKPILES MORE THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2m DOWNSLOPE.

STOCKPILES (SD 4-1)

DRAWN: B. DUGGAN
DESIGNED: J. CARROLL
JOB MANAGER: B. CLARK
VERIFIER: B.CLARK

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DRAWING TITLE: CIVIL ENGINEERING PACKAGE

EROSION AND SEDIMENT CONTROL DETAILS

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DRAWING NUMBER: DA-C02.02

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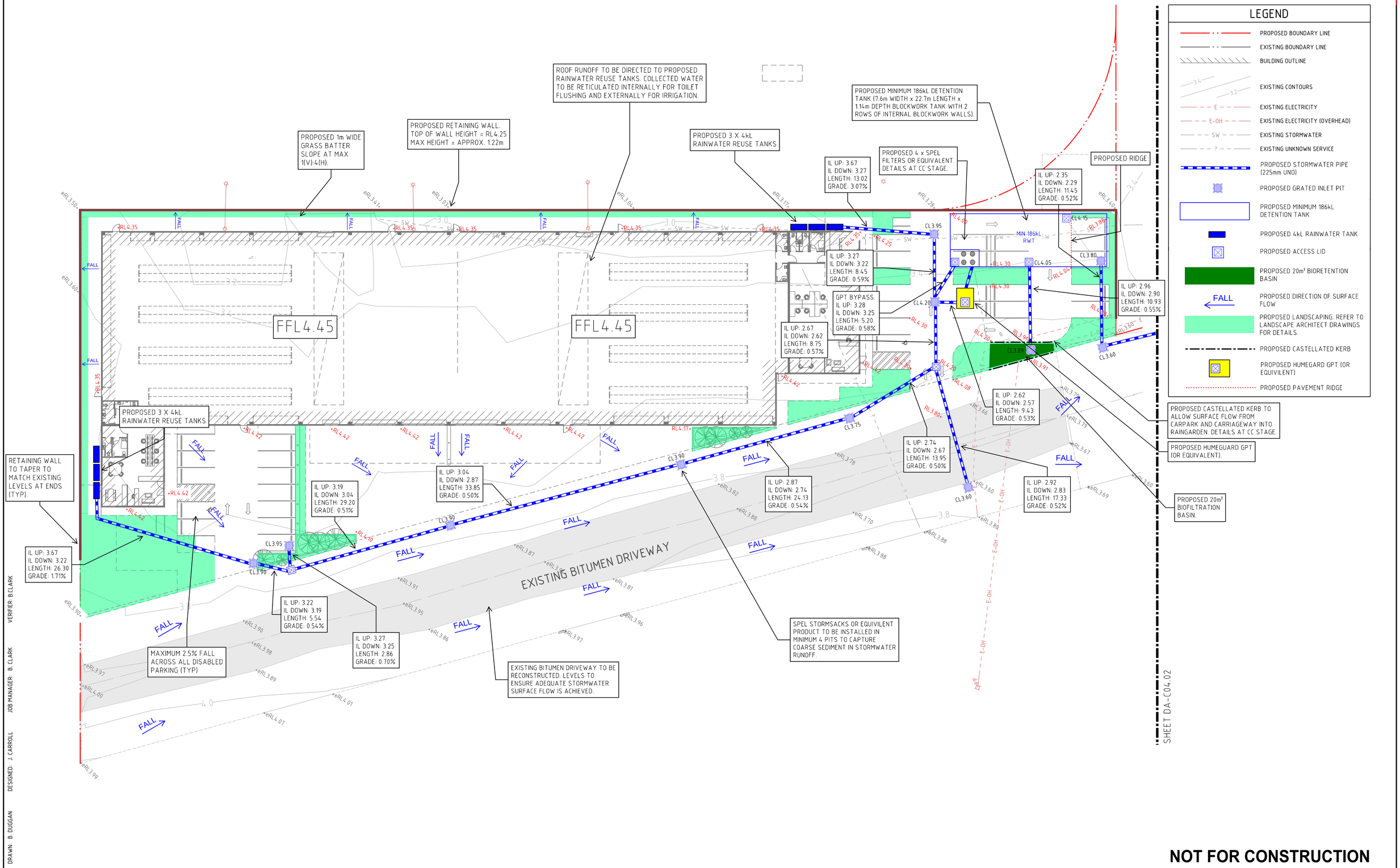

VERIFIER: B.CLARK
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DRAWING TITLE: CIVIL ENGINEERING PACKAGE
CIVIL WORKS PLAN - SHEET 1

JOB NUMBER: NL202347
DRAWING NUMBER: DA-C04.01
REVISION: 3
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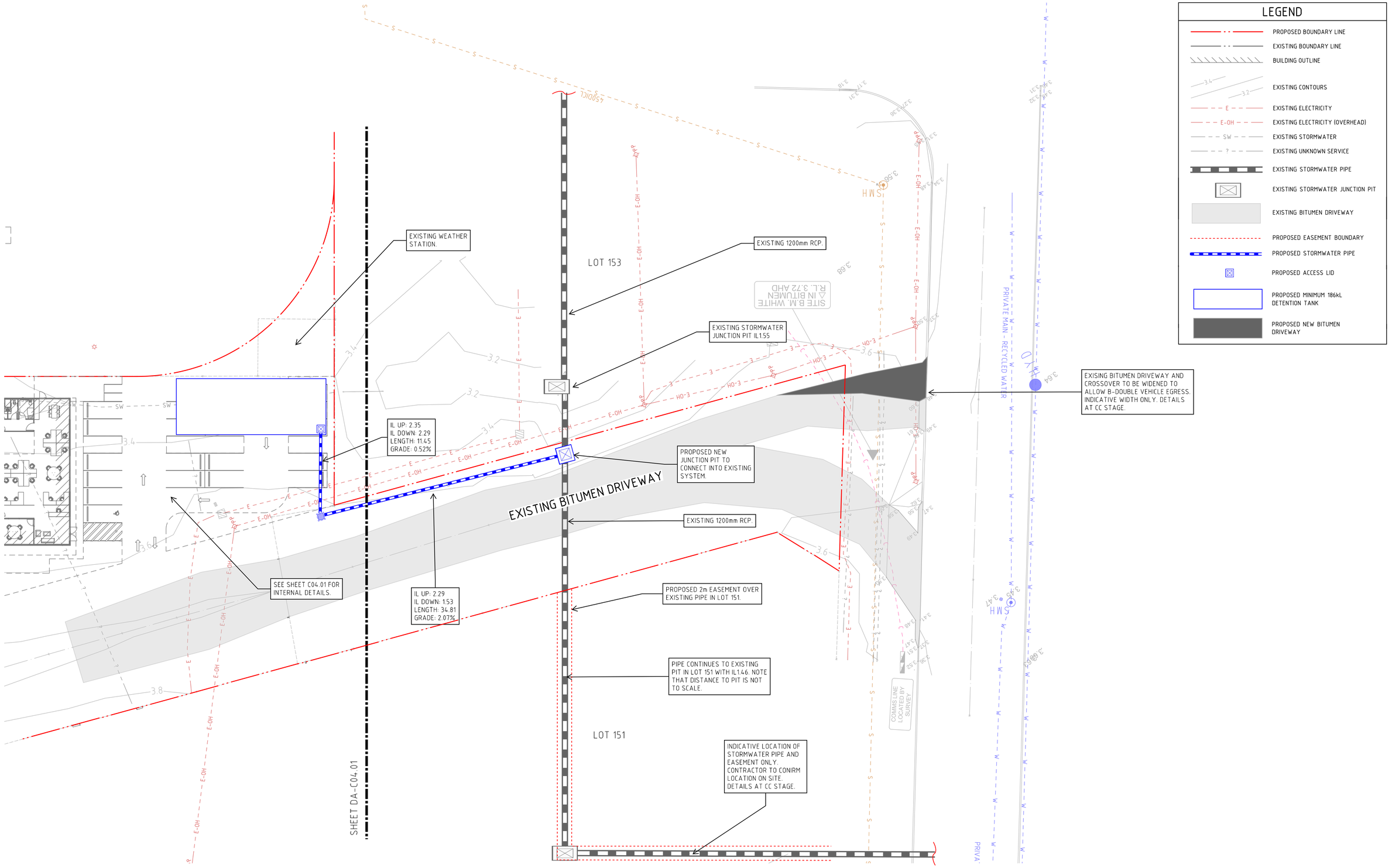

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DRAWING TITLE: CIVIL ENGINEERING PACKAGE
CIVIL WORKS PLAN - SHEET 2

JOB NUMBER: NL202347
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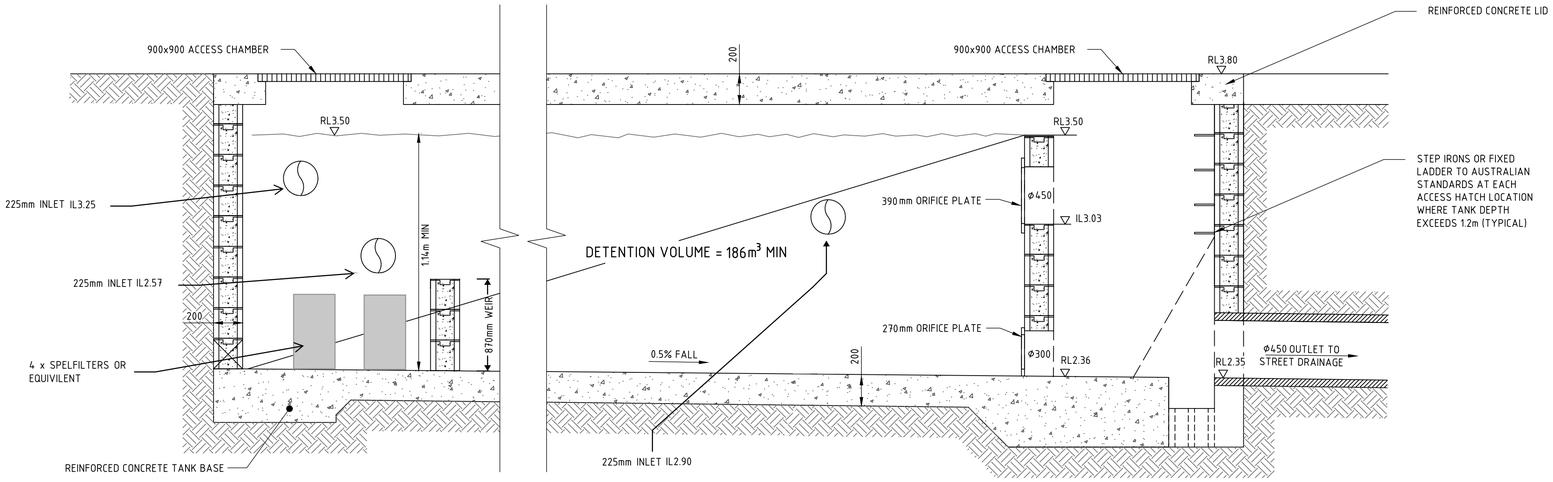
REVISION: 3
DRAWING SHEET SIZE = A1



OSD TANK DETAIL (TYPICAL)

(NOT TO SCALE)

DRAWN: B. DUGGAN DESIGNED: J. CARROLL JOB MANAGER: B. CLARK VERIFIER: B.CLARK

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR CLIENT REVIEW	JC	BC	BC	15.03.21
2	ISSUED FOR DA REVIEW	JC	BC	BC	30.04.21

CLIENT

PORT of NEWCASTLE

DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURE HAS BEEN ADDED

ARCHITECT

EJE architecture

ALL DIMENSIONS TO BE VERIFIED ON SITE BEFORE COMMENCING WORK.
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ABN 81 094 433 100

PROJECT

LOT 152 RAVEN STREET KOORAGANG NSW 2304

DRAWING TITLE

CIVIL ENGINEERING PACKAGE

CIVIL DETAILS

JOB NUMBER **NL202347**

DRAWING NUMBER **DA-C09. 01**

REVISION **2**

DRAWING SHEET SIZE = A1

Appendix B – MUSICLink Report

THE CITY OF NEWCASTLE

MUSIC-*link* Report

Project Details		Company Details	
Project:	Lot 152 Raven Street	**Company:**	Northrop Consulting Engineers
Report Export Date:	29/04/2021	**Contact:**	Jamie Carroll
Catchment Name:	NL202347_MUSIC_JC	**Address:**	1/215 Pacific Highway, Charlestown, NSW, 2290
Catchment Area:	0.881ha	**Phone:**	0423399559
Impervious Area*:	91.60%	**Email:**	jcarroll@northrop.com.au
Rainfall Station:	61078 WILLIAMTOWN		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1995 - 31/12/2008 11:54:00 PM		
Mean Annual Rainfall:	1125mm		
Evapotranspiration:	1735mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.33		
Study Area:	Newcastle		
Scenario:	Newcastle		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness

Node: Post-Development Node	Reduction
Flow	1.83%
TSS	85.5%
TP	69.9%
TN	58.9%
GP	93.6%

Treatment Nodes

Node Type	Number
Rain Water Tank Node	1
Buffer Node	1
Bio Retention Node	1
Detention Basin Node	1
GPT Node	3
Generic Node	1

Source Nodes

Node Type	Number
Urban Source Node	9

Comments

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Bio	Bioretention 20m2	Hi-flow bypass rate (cum/sec)	None	None	100
Bio	Bioretention 20m2	PET Scaling Factor	2.1	2.1	2.1
Buffer	Buffer	Proportion of upstream impervious area treated	None	None	0.5
Detention	7.8/0.85 SPELFilter (Full Height) Vault - STANDARD VOLUME	% Reuse Demand Met	None	None	0
Detention	7.8/0.85 SPELFilter (Full Height) Vault - STANDARD VOLUME	Hi-flow bypass rate (cum/sec)	None	99	99
GPT	Humegard 2015	Hi-flow bypass rate (cum/sec)	None	None	100
GPT	SPEL Stormsacks (1)	Hi-flow bypass rate (cum/sec)	None	None	0.011
GPT	SPEL Stormsacks (3)	Hi-flow bypass rate (cum/sec)	None	None	0.033
Post	Post-Development Node	% Load Reduction	None	None	1.83
Post	Post-Development Node	GP % Load Reduction	90	None	93.6
Post	Post-Development Node	TN % Load Reduction	45	None	58.9
Post	Post-Development Node	TP % Load Reduction	65	None	69.9
Post	Post-Development Node	TSS % Load Reduction	85	None	85.5
Rain	Rainwater Tank	% Reuse Demand Met	70	None	100
Urban	Carpark/Carriageawy To Bio (0.0455ha)	Area Impervious (ha)	None	None	0.046
Urban	Carpark/Carriageawy To Bio (0.0455ha)	Area Pervious (ha)	None	None	0
Urban	Carpark/Carriageawy To Bio (0.0455ha)	Total Area (ha)	None	None	0.046
Urban	Hardstand over Buffer (0.029ha)	Area Impervious (ha)	None	None	0.029
Urban	Hardstand over Buffer (0.029ha)	Area Pervious (ha)	None	None	0
Urban	Hardstand over Buffer (0.029ha)	Total Area (ha)	None	None	0.029
Urban	Pervious (0.0662ha)	Area Impervious (ha)	None	None	0
Urban	Pervious (0.0662ha)	Area Pervious (ha)	None	None	0.066
Urban	Pervious (0.0662ha)	Total Area (ha)	None	None	0.066
Urban	Pervious Outside Gate (0.0748ha)	Area Impervious (ha)	None	None	0
Urban	Pervious Outside Gate (0.0748ha)	Area Pervious (ha)	None	None	0.075
Urban	Pervious Outside Gate (0.0748ha)	Total Area (ha)	None	None	0.075
Urban	ROAD BYPASS (0.0120ha)	Area Impervious (ha)	None	None	0.012
Urban	ROAD BYPASS (0.0120ha)	Area Pervious (ha)	None	None	0
Urban	ROAD BYPASS (0.0120ha)	Total Area (ha)	None	None	0.012
Urban	Road bypass GPT (0.0902ha)	Area Impervious (ha)	None	None	0.09
Urban	Road bypass GPT (0.0902ha)	Area Pervious (ha)	None	None	0
Urban	Road bypass GPT (0.0902ha)	Total Area (ha)	None	None	0.09
Urban	Road to GPT (0.3764ha)	Area Impervious (ha)	None	None	0.376
Urban	Road to GPT (0.3764ha)	Area Pervious (ha)	None	None	0
Urban	Road to GPT (0.3764ha)	Total Area (ha)	None	None	0.376
Urban	ROOF (0.3357ha)	Area Impervious (ha)	None	None	0.336
Urban	ROOF (0.3357ha)	Area Pervious (ha)	None	None	0
Urban	ROOF (0.3357ha)	Total Area (ha)	None	None	0.336
Urban	Weather Station (0.0162ha)	Area Impervious (ha)	None	None	0.00808
Urban	Weather Station (0.0162ha)	Area Pervious (ha)	None	None	0.007

Only certain parameters are reported when they pass validation

Node Type	Node Name	Parameter	Min	Max	Actual
Urban	Weather Station (0.0162ha)	Total Area (ha)	None	None	0.016

Only certain parameters are reported when they pass validation