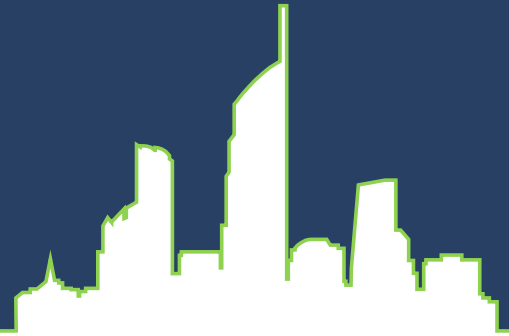




SITE BASED STORMWATER MANAGEMENT PLAN

PROPOSED COMMERCIAL/RETAIL REDEVELOPMENT
946-960 Greenbank Road, North MacLean QLD

SOOMAL PROPERTIES PTY LTD

SEPTEMBER 2023
REVISION 03

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL



Approval no: DEV2023/1417

Date: 8 May 2024

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1 Introduction

Pinnacle Engineering Group (Pinnacle) was engaged by Soomal Properties Pty Ltd to prepare a site based stormwater quality management plan (SBSMP) and undertake the associated investigations as supporting documentation for the proposed development application for a commercial and retail redevelopment located at 946-960 Greenbank Road, North MacLean QLD within the local authority of the Economic Development Queensland (EDQ) and Logan City Council (LCC).

The current version of this report (revision 03), has been updated in response to EDQ's Request for Further Information letter dated 17th July 2023.

1.1 Scope of Investigation

This report addresses the proposed stormwater management strategy for the aforementioned development, including but not limited to the following elements:

- Nomination of the Lawful Point of Discharge;
- Details of stormwater quantity management strategy for the site;
- Details of the stormwater quality treatment train to be implemented for the site;
- Nomination of maintenance schedules and techniques for each of the proposed stormwater quality improvement devices; and
- Sediment and erosion control plan.

1.2 Site Description

1.2.1 Location

Street Address	-	946-960 Greenbank Road, North MacLean QLD
RP Description	-	Lot 1 on SP267252
Total Site Area	-	1.208 Hectares
Current Zoning	-	Priority Development Area
Proposed Use	-	Commercial and Retail Development
Local Authority	-	LCC

Refer to Figure 1.1 for the site location.

1.2.2 Existing Site Conditions and Topography

The subject site is currently occupied by an existing service station and food retail premises located within the southern portion of the subject site. The northern portion of the subject site is occupied by an existing detention/bio-retention as well as an onsite sewerage treatment system and associated irrigation area. The site is currently accessed via two existing heavy duty vehicular crossovers from Greenbank Road to the southwest.

The subject site generally grades towards the existing stormwater easement located adjacent to the subject site's northern property boundary. The highest elevation of the site of approximately RL28.90m AHD is reached within the central portion of the site adjacent to the existing buildings while the lowest elevation of approximately RL27.00m AHD is reached along the northern property boundary.

Refer to Figure 1.2 for the existing aerial view of the site with the topographic data of the site included in Appendix B.

1.2.3 Proposed Development

The proposed redevelopment will retain the existing service station and food retail premises and deliver two additional drive-thru food and drink outlets within the northern portion of the site. The proposed development will be accessed via the existing vehicular crossovers and car park from Greenbank Road to the southwest.

Plans detailing the proposed development are included within Appendix A.

1.2.4 Existing Drainage System

Currently, the stormwater runoff from the subject site is generally conveyed to four defined discharge locations. The majority of the 'developed' site is captured by an existing private drainage pit/pipe system and conveyed to combined bio-detention basin before discharging to the north-east corner of the subject site. The northern portion of the site is a vegetated sewerage treatment area, and discharges runoff as sheet flow over the entire northern boundary. The balance of the site is generally landscaping and discharges as overland sheet flow to the Greenbank Road and Mount Lindesay Highway road reserves.

Existing culverts and a stormwater gully pit/pipe system are located within the Greenbank Road road reserve and convey stormwater runoff east to the Mount Lindesay Highway road reserve.

1.3 Flood Assessment

A review of the LCC interactive online mapping system has identified that the subject site is now located inside the new revised mapped flood affected zone. The Defined Flood Level (DFL) for the subject site is RL27.50m. It is proposed to balance flood plain storage in the post-development case via the use of underground tanks, which shall be free draining. Please refer to preliminary sketch drawing PEG1046-DA-SK07 within Appendix C for further details.

The relevant LCC Planning Scheme maps are included within Appendix G.

1.4 External Catchments

A review of the surrounding topography has not revealed any existing external catchments discharging through the subject site.

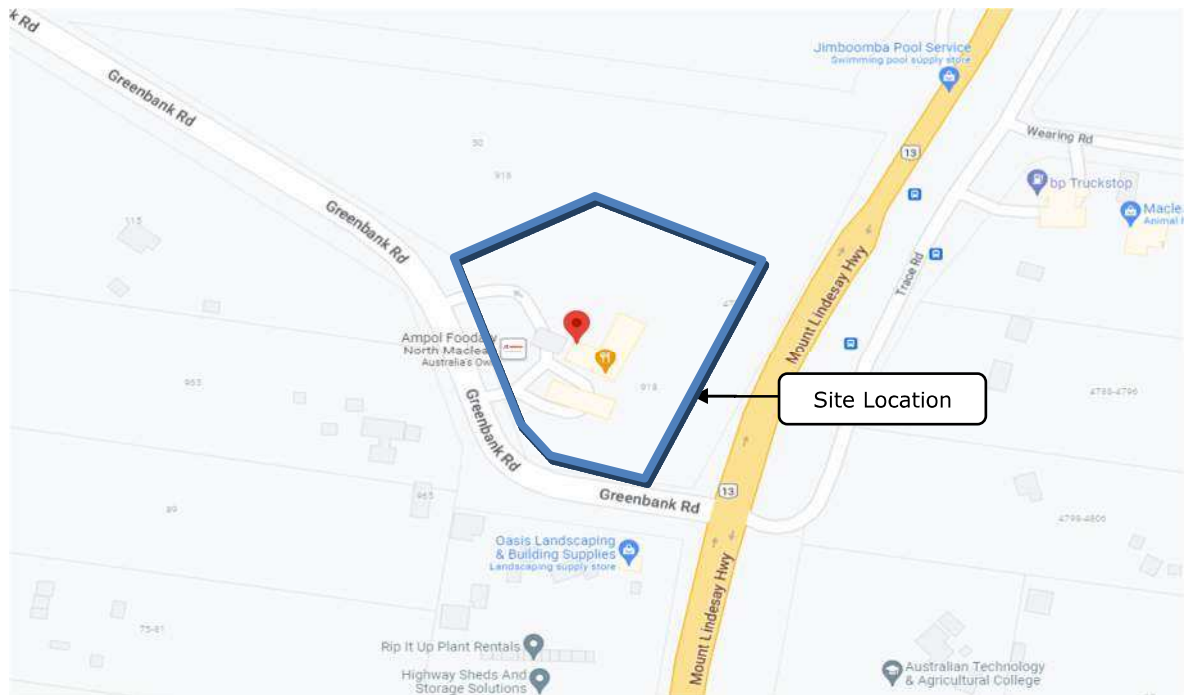


Figure 1.1: Map View (Source: Google Maps)



Figure 1.2: Aerial View (Source: Google Maps)

2 Stormwater Quantity Assessment

2.1 Hydrologic Objectives

The hydrologic objectives for the subject site were set in accordance with the requirements of the Queensland Urban Drainage Manual (QUDM, 2016) and the LCC Planning Scheme Policies. These objectives include but are not limited to the following:

- The proposed development shall ensure that all stormwater drainage is directed to the Lawful Point of Discharge in accordance with QUDM;
- Minor System Design for 10% AEP (Q_{10}) storm event;
- Major System Design for 1% AEP (Q_{100}) storm event;
- No adverse impact on adjoining or downstream properties; and
- No increase in post-development stormwater discharge, up to and including the 1% AEP storm event.

2.2 Lawful Point of Discharge

The primary Lawful Point of Discharge ('LPoD C') for the subject site is taken as the existing stormwater and sewer easement located within the adjacent property to the north of the subject site being 916-944 Greenbank Road, North MacLean (Lot 2 on SP267252). Secondary Lawful Points of discharge are taken as the Greenbank Road and Mount Lindesay Highway road reserves ('LPoD A & B').

2.3 Stormwater Quantity Assessment

The analysis of the stormwater runoff from the subject site was undertaken using the non-linear software package XP-Rafts.

2.3.1 Site Specific Rainfall Data

The design rainfall Intensity Frequency Duration (IFD) data for the storm events up to and including the 1% AEP storm event was derived based on the LCC Planning Scheme Policies and the AR&R.

The design IFD data for the catchment is summarised in Table 2.1 below.

The rainfall temporal patterns utilised by the XP-Rafts analysis were derived in accordance with Australian Rainfall and Runoff (AR&R), 2016 edition.

Table 2.1: IFD Data for North MacLean, QLD (mm/hr) (-27.7625, 153.0125) (Source: BOM)

Annual Exceedance Probability (AEP)							
Duration	63.21%	39.35%	18.13%	10%	5%	2%	1%
1 min	141.0	179.0	228.0	265.0	306.0	359.0	400.0
2 min	114.0	144.0	185.0	218.0	254.0	304.0	343.0
3 min	108.0	136.0	174.0	204.0	238.0	283.0	319.0
4 min	103.0	131.0	167.0	195.0	227.0	268.0	301.0
5 min	99.6	126.0	161.0	187.0	217.0	256.0	286.0
10 min	82.9	105.0	133.0	155.0	178.0	208.0	231.0
15 min	70.3	89.1	113.0	131.0	151.0	177.0	196.0
20 min	60.9	77.3	98.3	114.0	131.0	154.0	171.0
25 min	53.8	68.3	87.0	101.0	117.0	137.0	152.0
30 min	48.3	61.2	78.1	91.0	105.0	123.0	137.0
45 min	37.2	47.1	60.2	70.4	81.6	96.6	108.0
1 hour	30.5	38.6	49.5	58.0	67.5	80.2	90.2
1.5 hour	22.8	28.9	37.1	43.7	51.0	61.1	69.1
2 hour	18.5	23.5	30.2	35.6	41.7	50.2	56.9
3 hour	13.9	17.5	22.6	26.7	31.5	38.0	43.3
4.5 hour	10.5	13.2	17.1	20.3	23.9	29.0	33.1
6 hour	8.6	10.9	14.1	16.8	19.8	24.1	27.5
9 hour	6.7	8.4	10.9	13.0	15.3	18.7	21.4
12 hour	5.6	7.1	9.2	10.9	12.9	15.7	18.0

2.3.2 XP-Rafts Modelling Inputs

The rainfall loss parameters for each sub-catchment were applied using an initial and continuing rainfall loss model. The design rainfall loss parameters input into the XP-Rafts model are based on the guideline values recommended by the AR&R and other reputable industry standards.

The rainfall loss parameters adopted for this XP-Rafts model are as tabulated below.

Table 2.2: Adopted XP-Rafts Rainfall Loss Parameters

Storm Event	Pervious Areas		Impervious Areas	
	Initial Loss (mm)	Continuing Loss (mm)	Initial Loss (mm)	Continuing Loss (mm)
39-18	15	2.5	1	0
10-5	10	2.5	1	0
2-1	2.5	2.5	0	0

2.3.3 XP-Rafts Model Validation

The validation of the XP-Rafts model was undertaken through the comparison of the XP-Rafts generated stormwater discharge rates to the pre-development Rational Method calculations included within Appendix D.

The Rational Method calculations have adopted C_{10} coefficients of runoff in accordance with Table 4.5.3 of QUDM. As detailed in Table 2.3 below, the stormwater discharge rates calculated using the Rational Method

are generally comparable to the stormwater discharge rates calculated using the XP-Rafts model. We can therefore reasonably adopt the stormwater discharge rates generated from the XP-Rafts model.

2.3.4 Critical Duration Analysis

Design storm durations ranging from 10-minutes to 720-minutes were simulated by the XP-Rafts model analysis in order to determine the design stormwater discharge for the subject site.

2.3.5 Existing Discharge Locations

As outlined in the previous sections of this report the subject site generally discharges towards the northern property boundary, with minor landscaped portions in the south of the subject site discharging south toward the adjacent road reserves.

2.4 Hydrologic Analysis

2.4.1 Pre-development Scenario

The results obtained from the XP-Rafts model generally show that the critical storm duration throughout the local catchment analysed for all AEP storm events is generally the 25-minute storm.

A total fraction impervious of 0.52 was calculated for the pre-development catchments from the topographic survey included within Appendix B.

The pre-development catchment discharges for the 39.35%, 18.13%, 10%, 5%, 2% and 1% AEP storm events are detailed in Table 2.3 below.

Table 2.3: Pre-development Catchment Details and Peak Discharges

Catchment	Total Area (ha)	Impervious Area (ha), (Av. Slope)	Pervious. Area (ha), (Av. Slope)	XP-Rafts Results (Peak discharge, m ³ /s)						Rational Method
				39.35% AEP	18.13% AEP	10% AEP	5% AEP	2% AEP	1% AEP	
A	0.0341	0.0066 (7%)	0.0275 (7%)	0.010	0.014	0.016	0.019	0.024	0.027	0.020
LPoD A Total	0.0341	0.006	0.0275	0.010	0.014	0.016	0.019	0.024	0.027	0.020
B	0.3023	0.1247 (5%)	0.1776 (5%)	0.068	0.106	0.132	0.154	0.196	0.219	0.196
LPoD B Total	0.3023	0.1247	0.1776	0.068	0.106	0.132	0.154	0.196	0.219	0.196
C	0.5389	0.4836 (1.5%)	0.0553 (1.5%)	0.188	0.237	0.281	0.324	0.387	0.429	0.428
LPoD C Total	0.5389	0.4836	0.0553	0.188	0.237	0.281	0.324	0.387	0.429	0.428
D	0.3328	0.0088 (3.5%)	0.3240 (3.5%)	0.056	0.082	0.111	0.135	0.163	0.184	0.168
LPoD D Total	0.3328	0.0088	0.3240	0.056	0.082	0.111	0.135	0.163	0.184	0.168

2.4.2 Post-development Scenario – Unmitigated

A total fraction impervious of 0.73 was calculated for the post-development scenario catchments from the architectural drawings provided. For the purposes of this analysis the post-development catchment was further split into sub-catchments being the roof, road and ground areas.

A copy of the architectural drawings is included in Appendix A. The post-development catchment plan is included in Appendix C.

The impervious areas were modelled using the second sub-catchment option within XP-Rafts. The total impervious area for each sub-catchment is tabulated below. The results of the XP-Rafts post-development analysis show that the critical storm duration throughout the catchment for all AEP storm events varies between the 10-minute and 15-minute storm events. Table 2.4 summarises the unmitigated peak flow rates for the post-development catchment.

Table 2.4: Post-development Catchment Details and Peak Discharges (Unmitigated)

Catchment	Total Area (ha)	Impervious Area (ha), (Av. Slope)	Pervious. Area (ha), (Av. Slope)	XP-Rafts Results (Peak discharge, m ³ /s)					
				39.35% AEP	18.13% AEP	10% AEP	5% AEP	2% AEP	1% AEP
A	0.0341	0.0066 (7%)	0.0275 (7%)	0.010	0.014	0.016	0.019	0.024	0.027
LPoD A Total	0.0341	0.006	0.0275	0.010	0.014	0.016	0.019	0.024	0.027
B	0.2893	0.1247 (5%)	0.1646 (5%)	0.067	0.103	0.127	0.149	0.189	0.219
LPoD B Total	0.2893	0.1247	0.1646	0.067	0.103	0.127	0.149	0.189	0.219
C	0.8847	0.7525 (1.5%)	0.1322 (1.5%)	0.291	0.370	0.436	0.504	0.606	0.674
LPoD C Total	0.8847	0.7525	0.1322	0.291	0.370	0.436	0.504	0.606	0.674
D*	0.0000	-	-	-	-	-	-	-	-
LPoD D Total	0.0000	-	-	-	-	-	-	-	-

* Catchment D has been redirected to LPoD C in the post-development scenario.

Comparison in Table 2.5 below shows no change/increase in the 'LPoD A' peak discharge as the catchment remains unchanged. A minor decrease of approximately 3% is observed across the 'LPoD B' catchment which is attributed to the reduction in catchment size. A significant increase of approximately 55% is observed across the 'LPoD C' catchment which is attributed to the re-direction of Catchment D, and the increase impervious area proposed. Catchment D has been fully re-directed in the developed catchment.

It is proposed to mitigate the increases in discharge to 'LPoD C' through the use of a dual-use detention/treatment tank basin which will accept stormwater discharge from the development site.

Table 2.5: Pre-development and Post-development Peak Discharge Comparison (Un-mitigated).

AEP Storm Event	LPoD A Total		Difference	
	Pre (m ³ /s)	Post (Un-mitigated) (m ³ /s)	(m ³ /s)	(%)
39.35%	0.010	0.010	+ 0.000	0.0 %
18.13%	0.014	0.014	+ 0.000	0.0 %
10%	0.016	0.016	+ 0.000	0.0 %
5%	0.019	0.019	+ 0.000	0.0 %
2%	0.024	0.024	+ 0.000	0.0 %
1%	0.027	0.027	+ 0.000	0.0 %
AEP Storm Event	LPoD B Total		Difference	
	Pre (m ³ /s)	Post (Un-mitigated) (m ³ /s)	(m ³ /s)	(%)
39.35%	0.068	0.067	- 0.001	-1.5
18.13%	0.106	0.103	- 0.003	-2.8
10%	0.132	0.127	- 0.005	-3.8
5%	0.154	0.149	- 0.005	-3.2
2%	0.196	0.189	- 0.007	-3.6
1%	0.219	0.211	- 0.008	-3.7
AEP Storm Event	LPoD C Total		Difference	
	Pre (m ³ /s)	Post (Un-mitigated) (m ³ /s)	(m ³ /s)	(%)
39.35%	0.188	0.291	+ 0.103	+ 54.8 %
18.13%	0.237	0.370	+ 0.133	+ 56.1 %
10%	0.281	0.436	+ 0.155	+ 55.2 %
5%	0.324	0.504	+ 0.180	+ 55.6 %
2%	0.387	0.606	+ 0.219	+ 56.6 %
1%	0.429	0.674	+ 0.245	+ 57.1 %

2.5 Post Development Stormwater Mitigation Strategy

Based on the above investigation, the following stormwater management strategy is proposed to mitigate the post-development stormwater discharge to the site's pre-development discharge rates.

- Attenuation of post-development storm discharge from the subject site through the use of a dual-use detention/treatment tank located within the new carparking area in the north-eastern portion of the subject site;
- Discharge the minor 10% AEP storm event stormwater runoff from the post development catchment to the Lawful Point of Discharge via a piped network;
- Discharge the major 1% AEP storm event stormwater runoff from the post development catchment to the Lawful Point of Discharge via piped and overland flow;
- Direct all stormwater runoff from the ground/roof catchments to the proposed dual-use detention/treatment tank via an internal stormwater reticulation network and overland sheet flow prior to discharge to the Lawful Point of Discharge; and
- Generally, maintain the existing drainage regimes and drainage discharge locations.

2.5.1 Detention Tank Design

Table 2.6 details the proposed detention Tank characteristics with Table 2.7 detailing the tank storage/height relationship adopted. The tank was used to mitigate the flow discharging from the post-development site.

Table 2.6: Detention Tank Details

Design Parameter	Details					
Tank Outlets	Low-flow Outlet = 3 x Ø250mm orifice Low-flow Level = Invert of tank (+0.0m) High-flow Outlet = 3m wide internal weir High-flow Outlet Level = 0.85m above invert of tank (+0.85m)					
Tank Geometry	Base Area = 226m ² (min.) (35 x 7kL precast Australian tanks, or approved equivalent) Storage Height = 1.1m (min.) Storage Volume = 248.6m ³ (min.)					
Tank Modelling Summary	AEP (%)	Peak Outflow (m ³ /s)	Stage (m)	AEP (%)	Peak Outflow (m ³ /s)	Stage (m)
	39.35	0.185	+ 0.42	5	0.292	+ 0.73
	18.13	0.229	+ 0.53	2	0.356	+0.89
	10	0.260	+ 0.62	1	0.423	+ 0.93

Table 2.7: Tank Height/Storage Relationship

Tank Height (m)	Tank Storage (m ³)	Tank Height (m)	Tank Storage (m ³)
0.0	0.0	0.6	135.5
0.1	22.6	0.7	158.0
0.2	45.2	0.8	180.6
0.3	67.7	0.9	203.2
0.4	90.3	1.0	226.0
0.5	113.0	1.1	248.6

2.5.2 Pre-development and Post-development Scenario Comparison

Table 2.8 below details the comparison between the pre-development and post-development site total discharge.

Table 2.8: Pre-development and Post-development Scenario Peak Discharge Comparison

AEP Storm Event	LPoD A Total		Difference	
	Pre (m ³ /s)	Post (Un-mitigated) (m ³ /s)	(m ³ /s)	(%)
39.35%	0.010	0.010	+ 0.000	0.0 %
18.13%	0.014	0.014	+ 0.000	0.0 %
10%	0.016	0.016	+ 0.000	0.0 %
5%	0.019	0.019	+ 0.000	0.0 %
2%	0.024	0.024	+ 0.000	0.0 %
1%	0.027	0.027	+ 0.000	0.0 %
AEP Storm Event	LPoD B Total		Difference	
	Pre (m ³ /s)	Post (Un-mitigated) (m ³ /s)	(m ³ /s)	(%)
39.35%	0.068	0.067	- 0.001	-1.5
18.13%	0.106	0.103	- 0.003	-2.8
10%	0.132	0.127	- 0.005	-3.8
5%	0.154	0.149	- 0.005	-3.2
2%	0.196	0.189	- 0.007	-3.6
1%	0.219	0.211	- 0.008	-3.7
AEP Storm Event	LPoD C Total		Difference	
	Pre (m ³ /s)	Post (mitigated) (m ³ /s)	(m ³ /s)	(%)
39.35%	0.188	0.185	- 0.003	- 1.6 %
18.13%	0.237	0.229	- 0.008	- 3.4 %
10%	0.281	0.260	- 0.021	- 7.5 %
5%	0.324	0.292	- 0.032	- 9.9 %
2%	0.387	0.356	- 0.031	- 8.0 %
1%	0.429	0.423	- 0.006	- 1.4 %

The results presented above demonstrate that the post-development site peak discharge is less than or equal to the pre-developed rates.

3 Stormwater Quality Assessment

3.1 Water Quality Objectives

This water quality analysis was undertaken in accordance with Healthy Waterways WSUD Technical Design Guidelines for South East Queensland – Version 1 and the Queensland State Planning Policy.

The pollutant types and the associated Water Quality Objectives that will be evaluated are as follows:

Table 3.1: Water Quality Objective Summary

Pollutant Types	Site Water Quality Objective
Total Suspended Solids (TSS)	80% reduction
Total Phosphorous (TP)	60% reduction
Total Nitrogen (TN)	45% reduction
Gross Pollutants (GP)	90% reduction

3.2 Proposed Treatment Strategy

In order to meet the above LRO during the post-development scenario we propose to utilise a treatment train has been proposed for the site which comprises as number of individually designed proprietary Ocean Protect treatment devices that will collectively contribute to the required water quality objectives.

3.3 Proposed Treatment Measures

The following water quality treatment measures are proposed for this development. We note that if an approved equivalent product is proposed by the Developer, appropriate modelling and testing data shall be provided by the supplier and approved by Council prior to installation to ensure that the water quality objectives for the site can be achieved.

3.3.1 Ocean Protect Water Quality Treatment Products

The OceanGuard effectively acts as a gross pollutant trap, and is typically located within inlet pits or immediately preceding an inflow pipe into a rainwater or detention tank receiving surface runoff. The system uses a mesh and grated system to capture 'large' pollutants prior to further nutrient and fine particle treatment.

The StormFilter cartridge system is a passive, flow-through stormwater filtration system which consists of a number of filter cartridges containing a variety of filter media. The system works based on the incoming hydraulic grade forcing water up and into the cartridge system which traps and slowly releases the runoff, containing pollutants within the filter. Clean water is then discharged out of the system and into downstream infrastructure.

Figure 3.1 below illustrates a typical filter Ocean Protect StormFilter OceanGuard treatment train configuration.

Additional information on Ocean Protect treatment devices is included in Appendix H.

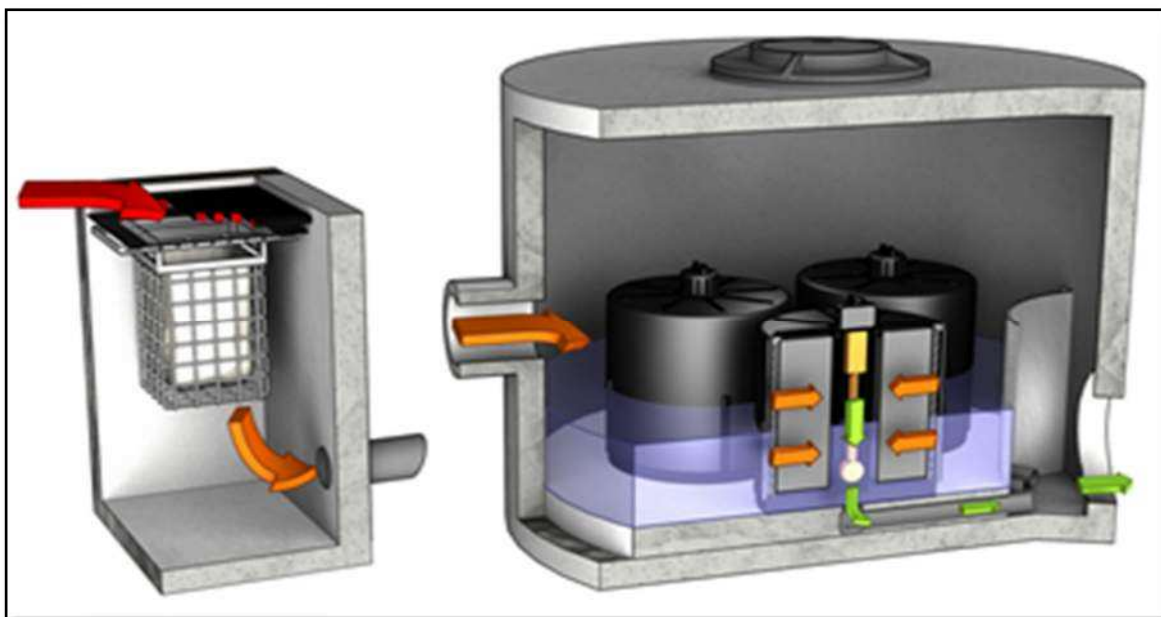


Figure 3.1: Typical Ocean Protect Treatment Train Configuration (Source: Ocean Protect)

3.4 MUSIC Modelling

The proposed treatment train is detailed in Appendix F, with additional details of the modelling procedure described in the following sections.

3.4.1 Meteorological Data

The meteorological data inputs utilised by MUSIC to simulate catchment hydrology processes includes rainfall data (at intervals relevant to the time step being modelled) and average areal potential evapotranspiration (measured in millimetres per day).

The meteorological data adopted for this model was the Greenbank station 40659 (6 minute time step 1980-1989).

3.4.2 MUSIC Source Nodes

The MUSIC source node properties for a split catchment were obtained from the Healthy Waterways MUSIC Modelling Guidelines and are as follows.

Table 3.2: Pollutant Export Parameter for Split Catchment (Log¹⁰ Values)

Land Use		Mean EMC (mg/L)					
		TSS		TP		TN	
Commercial		Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow
Roof	Mean	1.30	0.00	-0.89	0.00	0.37	0.00
	Std. Deviation	0.38	0.00	0.34	0.00	0.34	0.00
Roads	Mean	2.43	0.78	-0.30	-0.60	0.37	0.32
	Std. Deviation	0.38	0.39	0.34	0.50	0.34	0.30
Ground	Mean	2.16	0.78	-0.39	-0.60	0.37	0.32
	Std. Deviation	0.38	0.39	0.34	0.50	0.34	0.30

3.5 Performance Assessment

The site was modelled as a number of commercial source nodes. The MUSIC model parameters were adopted in accordance with the Healthy Waterways MUSIC Modelling Guidelines and are outlined within Table 3.3 below.

Table 3.3: Adopted MUSIC Model Source Node Parameters

Parameter	Value
Source Data	
Rainfall data and modelling period	Greenbank station 40659
Modelling period	1/01/1980 – 31/12/1989
Model time step	6 Minute
Soil properties (Rainfall runoff parameter)	Commercial (Healthy Waterways MUSIC Modelling Guidelines) (Table A1.2)
Site Data	
<u>Catchment A – Landscape/commercial</u>	MA2 – 0.0275 ha – Ground/Landscaping, Existing Bypass (0% Impervious). MA3 – 0.0066 ha – Road, Existing Bypass (100% Impervious).
<u>Catchment B – Commercial</u>	MB2 – 0.1635 ha – Ground/Landscaping, Existing Bypass via landscaped swales (0.3% Impervious) MB3 – 0.1258 ha – Road/carpark, Existing Bypass via landscaped swales (100% Impervious)
<u>Catchment C – Commercial</u>	MC1 – 0.1741 ha – Roof (100% Impervious) MC2 – 0.1870 ha – Ground/Landscaping (29.3% Impervious) MC3 – 0.5263 ha – Road/carpark (100% Impervious)

Table 3.4: Adopted MUSIC Model Treatment Node Parameters

Parameter	Value
Treatment Devices	
<u>Catchment C – OceanGuard</u>	<u>OceanGuard</u> Required number = 11 (min 1 per pit) High flow bypass = 0.02m ³ /s per OceanGuard
<u>Catchment C – StormFilter</u>	<u>StormFilter Chamber (19.6m²)</u> High flow bypass = 100m ³ /s Storage surface area = 17.5m ² Extended detention depth = 0.77m Equivalent pipe diameter = 82mm <u>StormFilter Cartridge</u> Type = 690mm PSorb Required number = 12 High flow bypass = 0.01080m ³ /s

3.5.1 MUSIC Analysis Results

Table 3.5 summarises the load analysis and reduction achieved by MUSIC using the WSUD strategy outlined above. As detailed within Table 3.5 below, the LRO of 80% for TSS, 60% for TP, 45% for TN and 90% for GP as described in Section 3.1 have been achieved for the post-development scenario.

Table 3.5: MUSIC Pollutant Load Assessment

System	Parameter	Sources	Residual Load	Reduction (%)
Receiving node	Total Suspended Solids (kg/yr)	1610.0	319.0	80.2
	Total Phosphorous (kg/yr)	3.17	0.577	81.8
	Total Nitrogen (kg/yr)	17.7	7.65	56.7
	Gross Pollutants (kg/yr)	128.0	0.0	100.0

4 Monitoring and Maintenance

4.1 Monitoring of Devices

A monitoring program will be established for the stormwater treatment devices as required by Ocean Protect.

Ocean Protect will be responsible for all monitoring activities associated with the operation of the treatment train which will be undertaken under a maintenance agreement between Ocean Protect and the Developer.

4.2 Maintenance of Devices

The ongoing performance of the Ocean Protect treatment devices will be dependent on the regular maintenance conducted.

The maintenance program will be as required by Ocean Protect and will be undertaken as part of maintenance agreement between Ocean Protect and the Developer.

5 Erosion and Sediment Control Strategy

The objective of erosion and sediment management on construction sites is to minimise soil erosion and control silt and/or sediment discharge from the sites through the use of suitable control devices during the four primary phases of the project lifecycle being:

1. Pre-construction/Establishment Phase;
2. Bulk Earthworks/Change to Ground Level Phase;
3. Construction Phase; and
4. Post-development/Operational Phase.

Sections 5.2 and 5.3 below outline the typical and industry best practice erosion and sediment control measures that will be implemented throughout the life cycle of this project.

5.1 Development Lifecycle Erosion and Sediment Management

5.1.1 Pre-construction/Establishment Phase

Prior to the commencement of construction, during the site establishment phase of the works, the following sediment and erosion control measures will be implemented in order to minimise site disturbance and ensure that water quality is maintained.

- Silt/Sediment fences will be installed around the proposed bulk earthworks site (along the toe of the batter alignment) and any environmentally sensitive areas; and
- A construction vehicle entry/exit shakedown area will be installed and will comprise of a vibratory cattle grid or gravel/rock pad in accordance with the IEAust Guidelines.

5.1.2 Bulk Earthworks Phase/Change to Ground Level

Excavation during the bulk earthworks/change to ground level phase of the project will be staged in a manner that runoff will generally be directed towards sediment and erosion controls established during the pre-construction phase.

As applicable, sediment basins will be constructed within proposed park/open space areas generally in the location of the proposed bio-retention basins to ensure that all sediment runoff is intercepted and treated prior to discharging from site.

5.1.3 Construction Phase

During the construction phase of the project, the following erosion and sediment controls will be implemented to ensure water quality is maintained.

- Sediment fences will be erected at the base of all batters and stockpiles to prevent sediment transportation offsite;
- All sediment and erosion control structures will be maintained and inspected regularly as well as after each storm event to ensure the ongoing integrity is maintained. No structure is to accumulate sediment above 40% of its capacity; and
- Regular monitoring of water quality will be undertaken to determine the effectiveness of the sediment and erosion control measures. Testing may be required and shall be provided to the Local Authority on request.

5.1.4 Post-development/Operational Phase

Following the completion of the construction phase of the project and the development reaching 'Practical Completion' and/or 'On-maintenance', a monitoring program will be established for the stormwater treatment devices outlined previously within this report, where applicable. The monitoring program will ensure the ongoing integrity and effectiveness of these stormwater treatment devices following the completion of the construction phase of the project.

5.2 Dust Suppression and Erosion Control Measures

The time of disturbance onsite will be kept to a minimum by ensuring that the civil works are undertaken directly following the earthworks phase. Consideration to staging of the works shall be given in order to minimise the area of exposed earthworks at any given time.

Erosion control and dust suppression measures shall be applied to the exposed areas of the site as deemed necessary by the site supervisor in order to prevent the emission of dust from the site.

A number of erosion control measures are available inclusive of but not limited to the following:

- Water spraying (by water truck);
- Dust suppressants;
- Surface stabilisation; and
- Covering of exposed areas.

5.3 Sediment Control Measures

With reference to the IEAust Guidelines and Current Industry Best Practice, there are three (3) fundamental sediment control principles that have been identified for use during construction:

- Construction Vehicle Shakedown and/or Entry/Exit;
- Sediment Fences; and
- Sediment Barriers.

5.3.1 Construction Vehicle Shakedown and/or Entry/Exit

A dedicated construction vehicle shakedown will be installed at the site's entry/exit point for road and construction vehicles. This construction vehicle shakedown area 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 shakedown will comprise of a gravel/rock pad designed or a vibratory grid system constructed and maintained in accordance with the IEAust Guidelines. The advantages of the vibratory grid system include ease of movement and ability to reuse for several years at different construction sites.

5.3.2 Sediment Fences

Sediment fencing will be established at the bottom of slopes on any exposed earthworks batters where there is an established risk of contaminated water discharging from the site prior to clearing and earthworks commencing. Sediment fencing may be required at regular spacing down the disturbed slope to limit scour and rutting caused by channelising of stormwater discharge. Sediment fences will be used to protect any temporary stockpile sites as required. Sediment collected from sediment barriers will be regularly removed and either taken offsite as part of the earthworks phase or stockpiled for use during revegetation works.

5.3.3 Sediment Barriers

Sediment barriers will be constructed around all stormwater drainage gully pits and field inlets where contaminated water may enter the existing and proposed stormwater network. The provision of these sediment barriers will facilitate the settlement of sediments prior to entering the downstream stormwater drainage network. Sediment barriers will generally comprise of gravel wrapped in geotextile 'sausage', sediment fences around field inlets or similar approved products.

5.4 Monitoring and Maintenance

The site supervisor will be responsible for the following regular monitoring and maintenance activities during the various phases of the development:

1. Inspection of downstream stormwater network as well as sediment and erosion controls will be conducted at the end of each construction day and after each rainfall event greater than 25mm.
2. If any established complaints by neighbouring property owners and/or local authority or evidence of water quality deterioration is reported downstream of the works site the following actions are to be taken immediately:
 - a. locate source of stormwater quality deterioration.
 - b. construct temporary erosion and sediment controls to prevent the continuing short term stormwater quality deterioration.
 - c. repair existing erosion and sediment controls, modify construction procedures or construct additional controls to prevent further deterioration.

6 Conclusions and Recommendations

This report outlines the stormwater drainage management strategy developed to manage potential impacts due to the proposed commercial and retail redevelopment located at 946-960 Greenbank Road, North MacLean.

Following the investigation, the following stormwater quality management strategy has been adopted for the subject site:

- Attenuation of post-development storm discharge from the subject site through the use of a dual-use detention/treatment tank located within the new carparking area in the north-eastern portion of the subject site;
- Discharge the minor 10% AEP storm event stormwater runoff from the post development catchment to the Lawful Point of Discharge via a piped network;
- Discharge the major 1% AEP storm event stormwater runoff from the post development catchment to the Lawful Point of Discharge via piped and overland flow;
- Best practice stormwater quality management techniques will be implemented to achieve water quality objectives by directing stormwater runoff from the development to the proprietary treatment for treatment prior to discharging from the site; and
- Implementation of typical erosion and sediment control devices during the four (4) primary phases of the proposed development.

Following the completion of this investigation we can conclude that the proposed re-development site, with the implementation of the stormwater quality management strategy outlined in this report, will result in a 'no worsening' effect of the current stormwater quality upstream or downstream of the site.

7 Reference Documentation

LCC Planning Scheme Policies (LCC, 2015)

Institution of Engineers, Australia (2001) "Australian Rainfall and Runoff – A Guide to Flood Estimation"

Institute of Public Works Engineers Australia (Queensland Division) (2016) "Queensland Urban Drainage Design Manual (QUDM)", Fourth Edition

The State of Queensland: Department of State Development, Infrastructure and Planning, July 2017. State Planning Policy

Water by Design (2018) "MUSIC Modelling Guidelines" – Consultation Draft, November 2018

Appendix A

Proposed Development Plans



PROPERTY DESCRIPTION

LOT 1 ON SP267252
LOCALITY: NORTH MACLEAN
COUNCIL: LOGAN CITY

DEVELOPMENT ASSESSMENT

TOTAL SITE AREA - 12080m²
LANDSCAPE AREA - 3040m²
BUILDING SITE COVER - 15%
(INCLUDES ALL ROOFED AREAS)

IMPERVIOUS AREAS

(CALCULATED OVER DEVELOPED SITE AREA)
- PRE SITE DEVELOPMENT (APPROX) - 6130m²
- INCLUDES BUILDING ROOFED AREAS
- POST SITE DEVELOPMENT - 9040m²
- INCLUDES BUILDING ROOFED AREAS

BUILDING AREAS - GFA

- EXISTING SERVICE STATION - 280m²
- EXISTING FOOD & DRINK - 250m²
- T1 - FOOD & DRINK OUTLET - 200m²
- T2 - FOOD & DRINK OUTLET - 200m²
TOTAL GFA - 930m²

EXTERNAL STRUCTURE AREAS

- T1 ALFRESCO SEATING - 30m²
- T2 ALFRESCO SEATING - 30m²
- T1 REFUSE ENCLOSURE - 7m²
- T2 REFUSE ENCLOSURE - 11m²
TOTAL EXTERNAL STRUCTURES - 78m²

CAR PARKING

- PARKING REQUIRED - T.B.C
- PARKING PROVIDED - T2
- T1 D/THRU QUEUING - 12
- T2 D/THRU QUEUING - 12

NOTE

1. ALL EXTERNAL MATERIALS & FINISHES SHOWN INDICATE ONLY & SUBJECT TO FINAL TENANT STANDARDS
2. ALL DIMENSIONS MEASURED FROM FINISHED GROUND FLOOR LEVEL UNLESS NOTED OTHERWISE
3. ALL SIGNAGE INCLUDING LOCATIONS & HEIGHTS ARE SUBJECT TO A SEPARATE SIGNAGE APPLICATION & APPROVAL BY LOCAL AUTHORITY
4. LANDSCAPING IS SHOWN FOR 'ARTIST IMPRESSION' PURPOSES ONLY. REFERENCE SHOULD BE MADE TO THE LANDSCAPE DRAWINGS PREPARED BY THE RELEVANT CONSULTANT



VERVE SCHEDULES DISCLAIMER

1. SCHEDULES SHOULD BE CHECKED WITH THE REMINDER OF THE DRAWING SET.
2. SCHEDULED RATES AND AREAS ARE INTENDED FOR ASSISTANCE ONLY. NO RESPONSIBILITY IS TAKEN FOR THE ACCURACY OF QUANTITIES.
3. ANY DISCREPANCIES IN SCHEDULES SHOULD BE REFERRED TO THE AUTHOR.
4. ALL AREAS ARE GROSS AREAS, UNLESS NOTED OTHERWISE.

CONSULTING FUNDERS



VERVE
ENVIRONMENTAL DESIGN
CONSULTING FUNDERS

imagine created deliver

- ☐ commercial / industrial / retail
- ☒ fast food restaurant design
- ☐ travel centre / service stations
- ☐ project concept to completion

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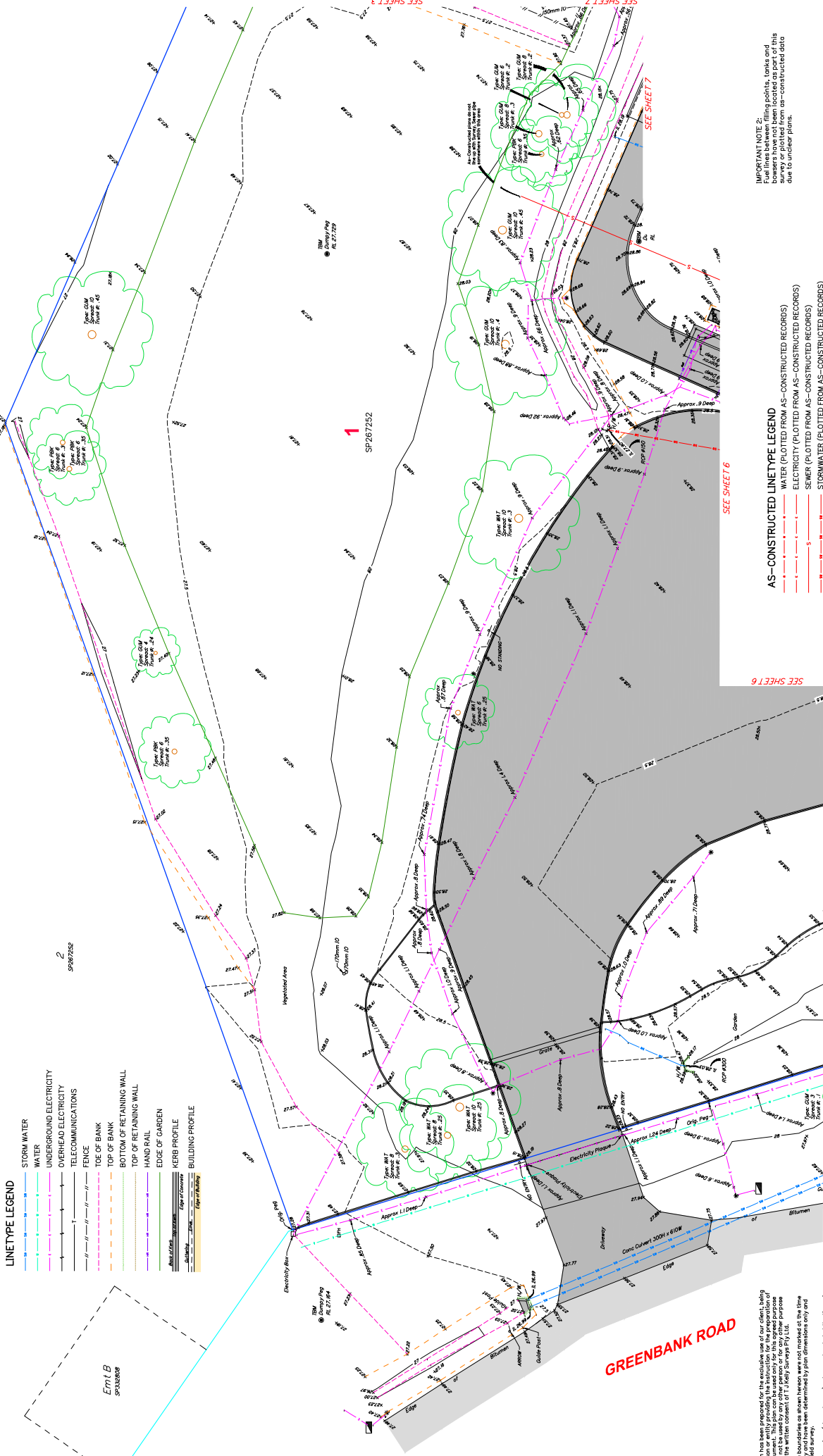
Revision and approvals		Project Description
Rev	Date	Description
P1	26.03.2021	ON SITE VISIT FOR PRELIMINARY DESIGN
P2	26.03.2021	ON SITE VISIT FOR PRELIMINARY DESIGN
P3	26.03.2021	ON SITE VISIT FOR PRELIMINARY DESIGN
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Drawing Title		Revision
PROP. SITE PLAN		B
Job Number - Drawing Number	22181	DA02

Appendix B

Topographic Survey

- LINE TYPE LEGEND**
- STORM WATER
 - WATER
 - UNDERGROUND ELECTRICITY
 - OVERHEAD ELECTRICITY
 - TELECOMMUNICATIONS
 - FENCE
 - TOE OF BANK
 - BOTTOM OF RETAINING WALL
 - TOP OF RETAINING WALL
 - HAND RAIL
 - EDGE OF GARDEN
 - KERB PROFILE
 - BUILDING PROFILE



IMPORTANT NOTE:
This plan is presented at a scale of 1:1. To convert to MGA2020 Coordinates scale all horizontal dimensions by a factor of 0.999963377 (a scale factor of 0.999963377).

GENERAL NOTES

- Date of field survey: 6/23/23
- Lot dimensions compiled from SP267252
- Contour interval 0.5m

PROPERTY DESCRIPTION

Lot 1 on SP267252

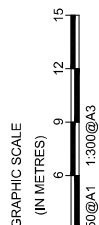
LOCALITY : North Maclean

- AS-CONSTRUCTED LINETYPE LEGEND**
- WATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
 - ELECTRICITY (PLOTTED FROM AS-CONSTRUCTED RECORDS)
 - SEWER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
 - STORMWATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)

IMPORTANT NOTE 2:
Fuel lines between filling points, tanks and other structures are not shown on this survey or plotted from as-constructed data due to unclear plans.

- SYMBOL LEGEND**
- Denotes Light Pole
 - Denotes Water Valve
 - Denotes Water Meter
 - Denotes Fire Hydrant
 - Denotes Gas Pit
 - Denotes Sign
 - Denotes Electricity Pit

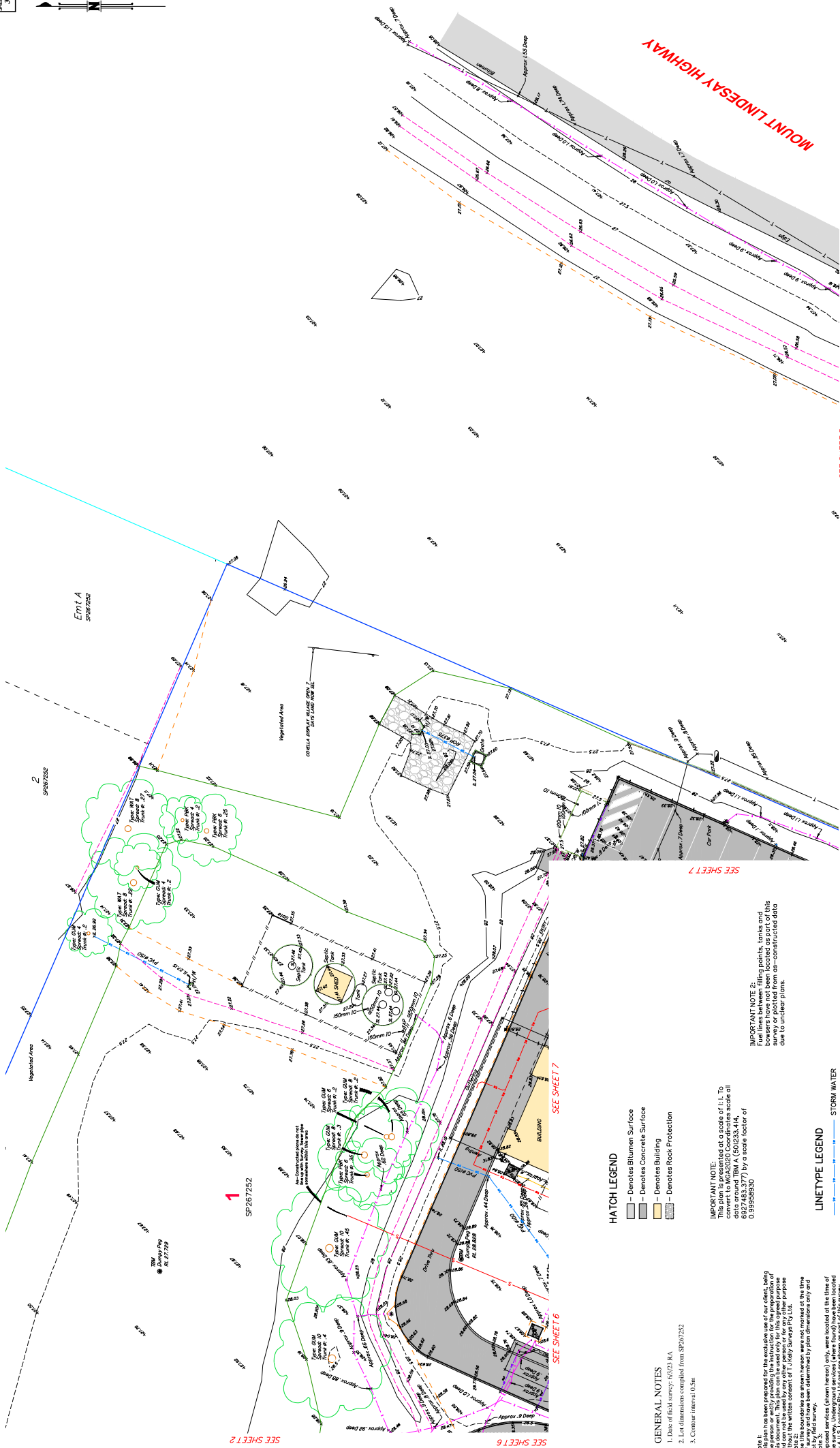
- HATCH LEGEND**
- Denotes Bitumen Surface
 - Denotes Concrete Surface
 - Denotes Building
 - Denotes Rock Protection



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REV	REVISION DETAILS	DATE	INIT
A	AMEND AS-CON LEGEND, ADD IMPORTANT NOTE 2	15/03/2023	AD
B	ORIGINAL ISSUE	14/03/2023	KO

Greenbank Road North Maclean Singh Properties Pty Ltd Detail & Level Survey	PROJECT NO: 2023/001 CLIENT: Singh Properties Pty Ltd SCALE: 1:150 METERS: 4600-01	LEVEL DATUM: AHD FROM GNSS Virt. Augmented	AID: 1150@A1 1:300@A3
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SEE SHEET 5

SEE SHEET 7

SEE SHEET 6

SEE SHEET 2

GENERAL NOTES

1. Date of field survey: 6/02/23 RA
2. Lot dimensions compiled from SP267252
3. Contour interval 0.3m

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Note 2: The site boundaries as shown hereon were not marked at the time of the survey and were determined by plan information only and not by field survey.

Note 3: The plan is presented at a scale of 1:1. To convert to MQA2020 Coordinates scale all easting and northing coordinates by a scale factor of 0.99958930.

Note 4: Where such services are provided by a cable locating service and are approximate only.

Note 5: All depths to services are indicative only and should not be relied upon for design or construction works without further investigation.

Note 6: No guarantee can be given that the services shown on this plan are correct. The client is responsible for the accuracy of the data. The client is responsible for the accuracy of the data. The client is responsible for the accuracy of the data.

Note 7: The client is responsible for the accuracy of the data. The client is responsible for the accuracy of the data. The client is responsible for the accuracy of the data.

Note 8: The client is responsible for the accuracy of the data. The client is responsible for the accuracy of the data. The client is responsible for the accuracy of the data.

Note 9: The client is responsible for the accuracy of the data. The client is responsible for the accuracy of the data. The client is responsible for the accuracy of the data.

Note 10: The client is responsible for the accuracy of the data. The client is responsible for the accuracy of the data. The client is responsible for the accuracy of the data.

IMPORTANT NOTE:

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IMPORTANT NOTE 2:

Fuel lines between filling points, tanks and buildings are not shown on this plan due to unclear plans.

HATCH LEGEND

- Denotes Bitumen Surface
- Denotes Concrete Surface
- Denotes Building
- Denotes Rock Protection

LINE TYPE LEGEND

- WATER
- UNDERGROUND ELECTRICITY
- OVERHEAD ELECTRICITY
- TELECOMMUNICATIONS
- FENCE
- TOE OF BANK
- TOP OF BANK
- TOP OF RETAINING WALL
- HAND RAIL
- EDGE OF GARDEN
- KERB PROFILE
- BUILDING PROFILE

AS-CONSTRUCTED LINETYPE LEGEND

- WATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
- ELECTRICITY (PLOTTED FROM AS-CONSTRUCTED RECORDS)
- SEWER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
- STORMWATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)

SYMBOL LEGEND

- Denotes Light Pole
- Denotes Water Valve
- Denotes Water Meter
- Denotes Gas Meter
- Denotes Telling Pit
- Denotes Sign
- Denotes Electricity Pit

PROPERTY DESCRIPTION

Lot 1 on SP267252
LOCALITY : North Maclean

GRAPHIC SCALE



REV	REVISION DETAILS	DATE	INIT
A	AMEND AS-CON LEGEND, ADD IMPORTANT NOTE 2	15/03/2023	AD
1	ORIGINAL ISSUE	14/03/2023	KO

PROJECT NAME	PROJECT NO.	PROJECT DATE	PROJECT LOCATION
Greenbank Road North Maclean	155294	14/03/2023	North Maclean, QLD
CLIENT NAME	CLIENT NO.	CLIENT DATE	CLIENT LOCATION
Singh Properties Pty Ltd	4600-01	14/03/2023	North Maclean, QLD
PROJECT NO.	PROJECT DATE	PROJECT LOCATION	PROJECT STATUS
4600-01	14/03/2023	North Maclean, QLD	Completed

TJ KELLY SURVEYS
CONSULTANTS & SURVEYORS
A.C.N. 607 761 347
10/100 South Street, Macleay Street
Sydney NSW 2000
Phone: 02 9550 1234
Fax: 02 9550 1235
Email: tj@tkellysurveys.com.au

AID
FROM PSN 155294
KL 27.50m

LEVEL DATUM
MEVDIANI MQA2020 Zone 56 with SiametAn

LOCAL AUTHORITY : Logan C.C

GENERAL NOTES

1. Date of field survey: 6/3/23 RA
2. Lot dimensions compiled from SP267252
3. Contour interval 0.5m

PROPERTY DESCRIPTION

Lot 1 on SP267252

LOCALITY : North Maclean

AS-CONSTRUCTED LINETYPE LEGEND

- WATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
- ELECTRICITY (PLOTTED FROM AS-CONSTRUCTED RECORDS)
- SEWER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
- STORMWATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)

SEE SHEET 6

GREENBANK ROAD

SYMBOL LEGEND

- * — Denotes Light Pole
- W — Denotes Water Valve
- WM — Denotes Water Meter
- — Denotes Fire Hydrant
- — Denotes Telstra Pit
- — — — — Denotes Sign
- — — — — Denotes Electricity Pit

IMPORTANT NOTE:
This plan is presented at a scale of 1:1. To convert to MGA2020 Coordinates scale all data around TBM A (501233.414, 6927483.377) by a scale factor of 0.99958930

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Note 2:
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Note 3:
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Note 4:
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Note 5:
All depths to services are indicative only and should not be relied upon for design or construction works without further investigation to fully locate identified services.

Note 6:
No guarantee can be given that the services shown on this plan are accurate, complete or in fact are the services identified.

Note 7:
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.

LINETYPE LEGEND

- STORM WATER
- WATER
- UNDERGROUND ELECTRICITY
- OVERHEAD ELECTRICITY
- TELECOMMUNICATIONS
- FENCE
- TOE OF BANK
- TOP OF BANK
- BOTTOM OF RETAINING WALL
- TOP OF RETAINING WALL
- HAND RAIL
- EDGE OF GARDEN
- KERB PROFILE
- BUILDING PROFILE

HATCH LEGEND

- Denotes Bitumen Surface
- Denotes Concrete Surface
- Denotes Building
- Denotes Rock Protection

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GRAPHIC SCALE
(IN METRES)

3 0 3 6 9 12 15
1:150@A1 1:300@A3

Greenbank Road
North Maclean

Singh Properties Pty Ltd
Detail & Level Survey

DATE: 14/03/2023
JOB NO: 600
DRAWN BY: BODOLIA
CHECKED BY: AD
Scale: 1:150
Drawing Number: 4600-01

LEVEL DATUM

AHD
FROM PSM 152294
R.L. 27.308m
MERIDIAN: MGA2020 Zone 56 wide SmartnetAus
LOCAL AUTHORITY : Logan C.C

TJ KELLY SURVEYS PTY LTD
CONSULTING SURVEYORS & CIVIL ENGINEERS
111 BARKER STREET, BEATSBY
QUEENSLAND 4205
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Web: www.tjkellysurveys.com.au

REVISION	REVISION DETAILS	DATE	INIT
A	AMEND AS-CON LEGEND, ADD IMPORTANT NOTE 2	15/03/2023	AD
—	ORIGINAL ISSUE	14/03/2023	KO

SEE SHEET 3

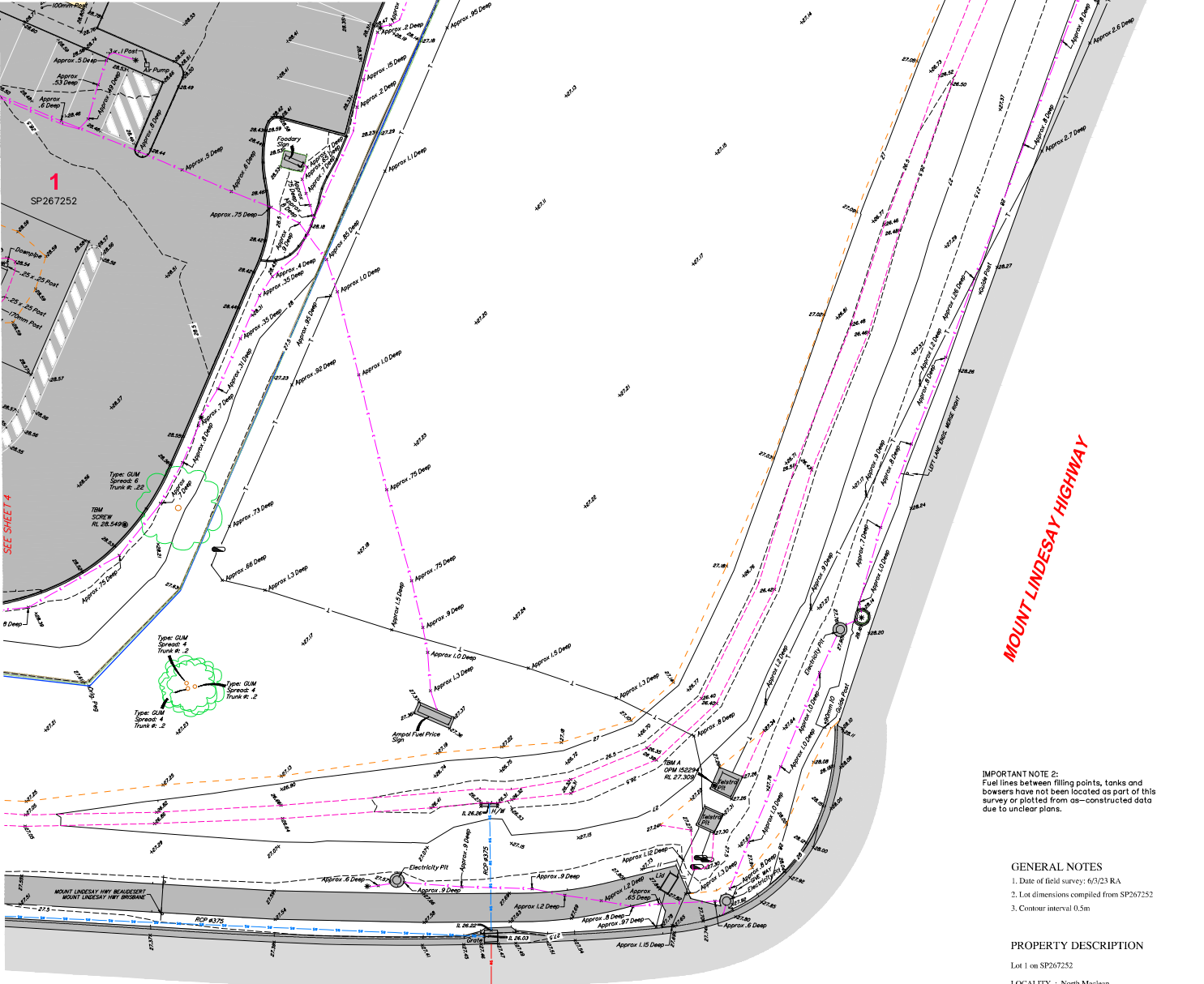
LINETYPE LEGEND

- STORM WATER
- WATER
- UNDERGROUND ELECTRICITY
- OVERHEAD ELECTRICITY
- TELECOMMUNICATIONS
- FENCE
- TOE OF BANK
- TOP OF BANK
- BOTTOM OF RETAINING WALL
- TOP OF RETAINING WALL
- HAND RAIL
- EDGE OF GARDEN
- KERB PROFILE
- BUILDING PROFILE



SEE SHEET 7

SEE SHEET 7



MOUNT LINDESAY HIGHWAY

GREENBANK ROAD

IMPORTANT NOTE 2:
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GENERAL NOTES

1. Date of field survey: 6/3/23 RA
2. Lot dimensions compiled from SP267252
3. Contour interval 0.5m

PROPERTY DESCRIPTION

Lot 1 on SP267252
LOCALITY : North Maclean

AS-CONSTRUCTED LINETYPE LEGEND

- WATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
- ELECTRICITY (PLOTTED FROM AS-CONSTRUCTED RECORDS)
- SEWER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
- STORMWATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)

SYMBOL LEGEND

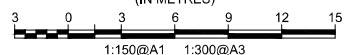
- Denotes Light Pole
- Denotes Water Valve
- Denotes Water Meter
- Denotes Fire Hydrant
- Denotes Telstra Pit
- Denotes Sign
- Denotes Electricity Pit

HATCH LEGEND

- Denotes Bitumen Surface
- Denotes Concrete Surface
- Denotes Building
- Denotes Rock Protection

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GRAPHIC SCALE
(IN METRES)



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Greenbank Road
North Maclean

Singh Properties Pty Ltd
Detail & Level Survey

DATE	14/03/2023
JOB NO	6600
DRAWN BY	BOBOLA
CHECKED BY	AD
Scale	1:150
Drawing Number	4600-01
	A

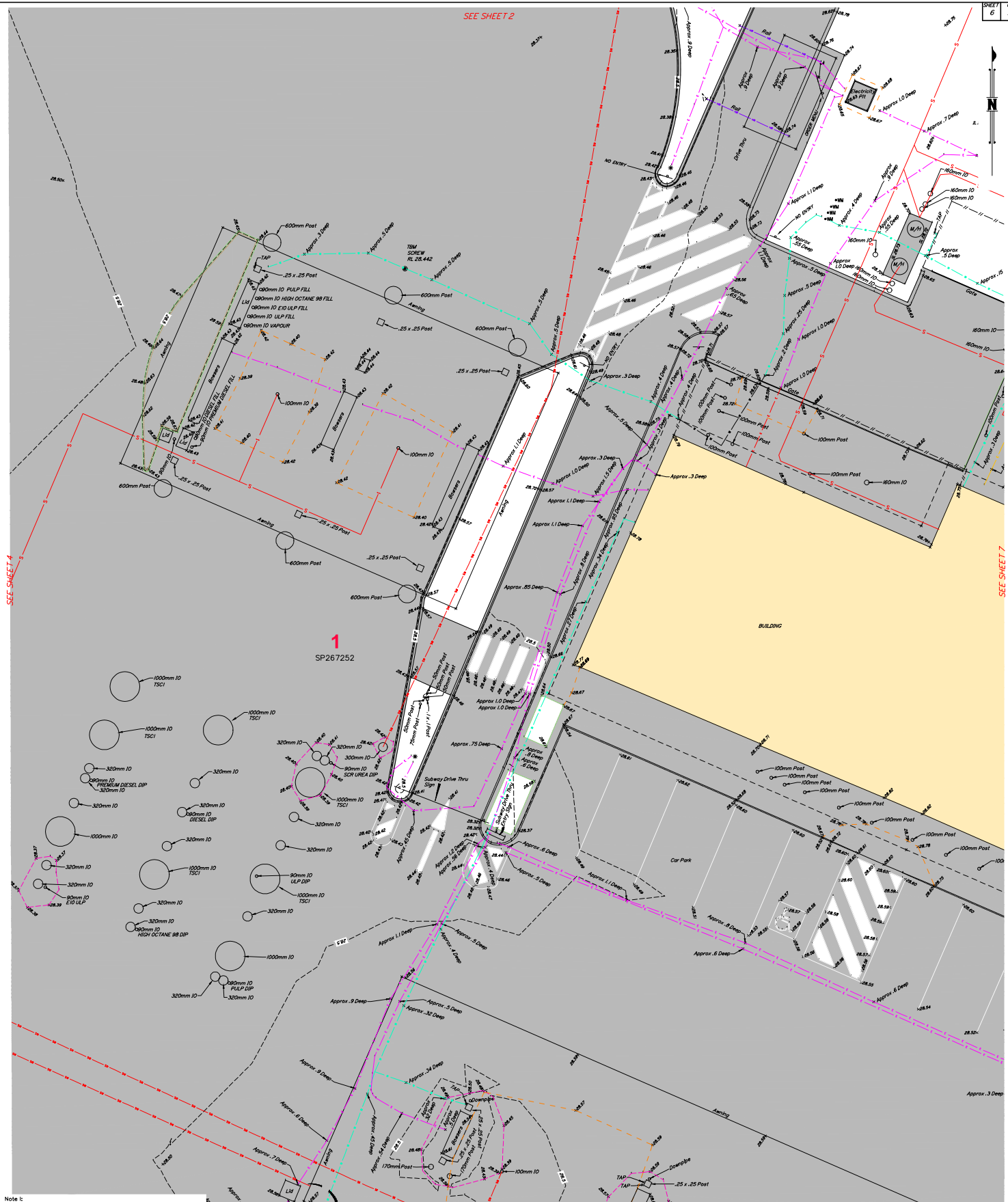
LEVEL DATUM
AHD
FROM PSM 152294
R.L. 27.308m
MERIDIAN: MGA2020 Zone 56 wide SmartnetAus
LOCAL AUTHORITY : Logan C.C

TJ KELLY SURVEYS PTY LTD
CONSULTING SURVEYORS & TOWN PLANNERS
A.C.N. 691 725 471

Phone: 071 264 2172
Email: info@tjkelly.com.au
Web: www.tjkelly.com.au

A	AMEND AS-CON LEGEND, ADD IMPORTANT NOTE 2	15/03/2023	AD
—	ORIGINAL ISSUE	14/03/2023	KO
AMEND	REVISION DETAILS	DATE	INIT

SEE SHEET 2



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LINETYPE LEGEND

	STORM WATER
	WATER
	UNDERGROUND ELECTRICITY
	OVERHEAD ELECTRICITY
	TELECOMMUNICATIONS
	FENCE
	TOE OF BANK
	TOP OF BANK
	BOTTOM OF RETAINING WALL
	TOP OF RETAINING WALL
	HAND RAIL
	EDGE OF GARDEN
	KERB PROFILE
	BUILDING PROFILE

AS-CONSTRUCTED LINETYPE LEGEND

	WATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
	ELECTRICITY (PLOTTED FROM AS-CONSTRUCTED RECORDS)
	SEWER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
	STORMWATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)

SYMBOL LEGEND

	Denotes Light Pole
	Denotes Water Valve
	Denotes Water Meter
	Denotes Fire Hydrant
	Denotes Telstra Pit
	Denotes Sign
	Denotes Electricity Pit

HATCH LEGEND

	Denotes Bitumen Surface
	Denotes Concrete Surface
	Denotes Building
	Denotes Rock Protection

IMPORTANT NOTE:
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PROPERTY DESCRIPTION

Lot 1 on SP267252

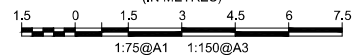
LOCALITY : North Maclean

GENERAL NOTES

1. Date of field survey: 6/2/23 RA
2. Lot dimensions compiled from SP267252
3. Colour interval 0.5m

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GRAPHIC SCALE (IN METRES)



AMEND	REVISION DETAILS	DATE	INIT
A	AMEND AS-CON LEGEND, ADD IMPORTANT NOTE 2	15/03/2023	AD
-	ORIGINAL ISSUE	14/03/2023	KO

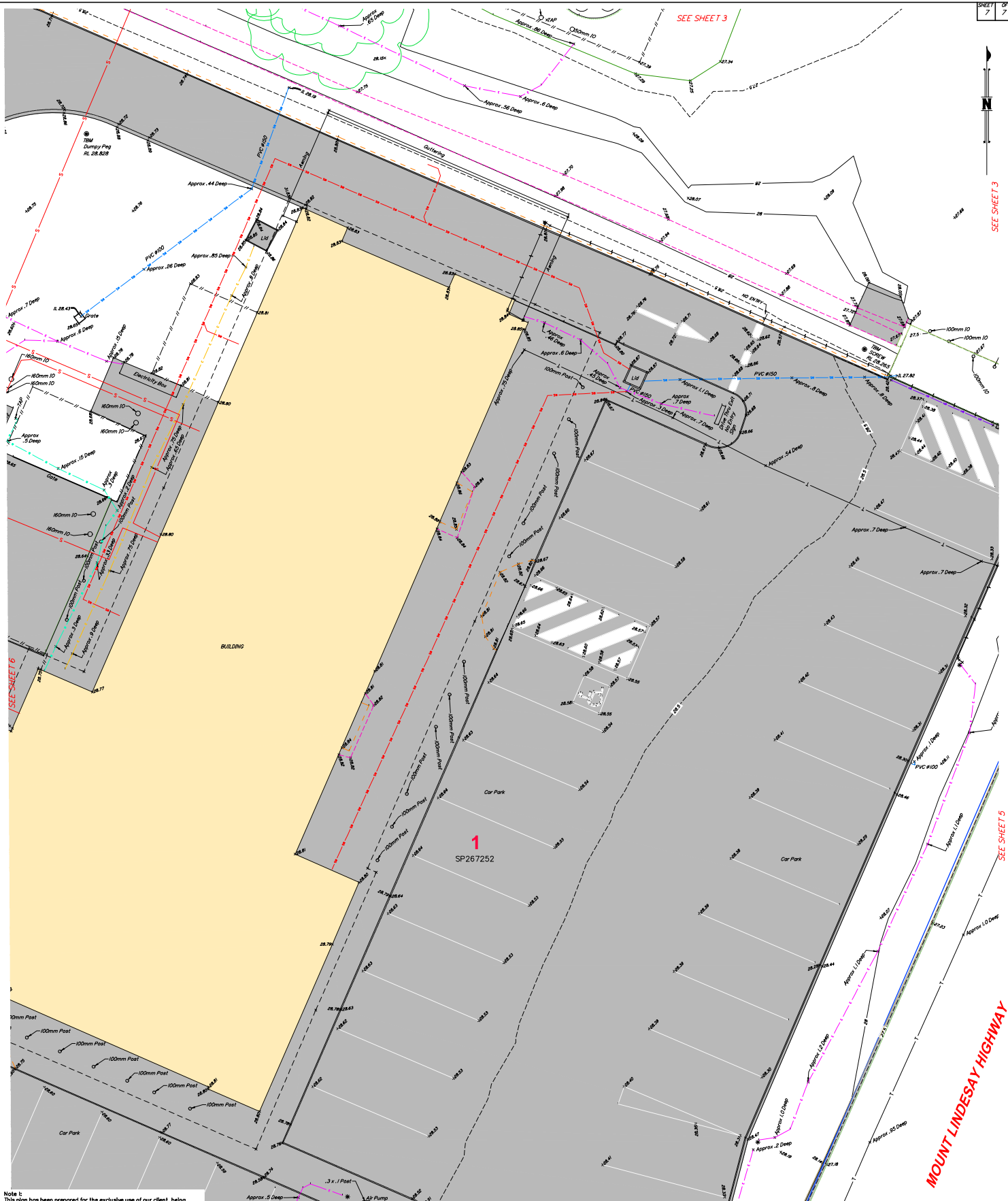
Greenbank Road
North Maclean
Singh Properties Pty Ltd
Detail & Level Survey

DATE	14/03/2023
JOB NO	6600
DRAWN BY	BOBOLA
CHECKED BY	AD
Scale	1:75

LEVEL DATUM	AHD
FROM PSM	152294
R.L.	27.308m
MERIDIAN:	MGA2020 Zone 56 wide SmartnetAus
LOCAL AUTHORITY :	Logan C.C

TJ KELLY SURVEYS PTY LTD
CONSULTING SURVEYORS & TOWN PLANNERS
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Phone: 071 264 4172
Brisbane office: 071 271 4723
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LINETYPE LEGEND

	STORM WATER
	WATER
	UNDERGROUND ELECTRICITY
	OVERHEAD ELECTRICITY
	TELECOMMUNICATIONS
	FENCE
	TOE OF BANK
	TOP OF BANK
	BOTTOM OF RETAINING WALL
	TOP OF RETAINING WALL
	HAND RAIL
	EDGE OF GARDEN
	KERB PROFILE
	BUILDING PROFILE

AS-CONSTRUCTED LINETYPE LEGEND

	WATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
	ELECTRICITY (PLOTTED FROM AS-CONSTRUCTED RECORDS)
	SEWER (PLOTTED FROM AS-CONSTRUCTED RECORDS)
	STORMWATER (PLOTTED FROM AS-CONSTRUCTED RECORDS)

	Denotes Light Pole
	Denotes Water Valve
	Denotes Water Meter
	Denotes Fire Hydrant
	Denotes Telstra Pit
	Denotes Sign
	Denotes Electricity Pit

HATCH LEGEND

	Denotes Bitumen Surface
	Denotes Concrete Surface
	Denotes Building
	Denotes Rock Protection

IMPORTANT NOTES:
This plan is presented at a scale of 1:1. To convert to MGA2020 Coordinates scale all data around TBM A (501233.414, 6927483.377) by a scale factor of 0.99956930.

GENERAL NOTES
1. Date of field survey: 6/3/23 RA
2. Lot dimensions compiled from SP267252
3. Contour interval 0.5m

PROPERTY DESCRIPTION
Lot 1 on SP267252
LOCALITY : North Maclean

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GRAPHIC SCALE
(IN METRES)
1:75@A1 1:150@A3

AMEND	REVISION DETAILS	DATE	INIT
A	AMEND AS-CON LEGEND, ADD IMPORTANT NOTE 2	15/03/2023	AD
—	ORIGINAL ISSUE	14/03/2023	KO

Greenbank Road
North Maclean
Singh Properties Pty Ltd
Detail & Level Survey

DATE	14/03/2023
JOB NO	6600
DRAWN BY	BOISOLA
CHECKED BY	AD
Scale	1:75
Drawing Number	4600-01

LEVEL DATUM	AHD FROM PSM 152294 R.L. 27.308m
MERIDIAN	MGA2020 Zone 56 wide SmartnetAus
LOCAL AUTHORITY	Logan C.C

TJ KELLY SURVEYS PTY LTD
CONSULTING SURVEYING & TOWN PLANNING
A.C.N. 69 125 401

111 Bulwer Street, BEAVERIDGE
VIC 3015, AUSTRALIA
Ph: 08 921 2122
Fax: 08 921 2123
Email: tj@tjkelly.com.au
Web: www.tjkelly.com.au

Appendix C

Catchment Layouts

LEGEND	
---	EXISTING TELSTRA CABLE
---	EXISTING SEWERAGE RETICULATION
---	EXISTING WATER RETICULATION
---	EXISTING STORMWATER PIPE
---	EXISTING OVERHEAD ELECTRICAL
---	EXISTING UNDER GROUND ELECTRICAL
---	EXISTING BOUNDARY
---	EXISTING NOMINAL KERB LINE
---	INDICATIVE WORKS AREA
---	EXISTING SURFACE CONTOURS (0.25m)
---	EXISTING FEATURE TO BE DEMOLISHED
---	ROOF / BUILDING HARDSTAND AREA
---	CONCRETE DRIVEWAY / PAVED AREA
---	PERVIOUS AREA
---	OVERLAND FLOW DIRECTION
---	EXISTING CATCHMENT BOUNDARY
---	EXISTING CATCHMENT LABEL
---	DENOTES LEGAL POINT OF DISCHARGE
---	SHEET FLOW LINE OF DISCHARGE
---	LPoD A

NOTES	
1.	THE LOCATION OF THE EXISTING SERVICES HAS BEEN PLOTTED FROM SURVEY AND RECORDS AND IS TO BE CONFIRMED PRIOR TO CONSTRUCTION.
2.	HISTORICAL AERIAL PHOTOGRAPHY HAS BEEN USED TO VALIDATE SURVEY DATA AND ESTABLISH PRE-DEVELOPMENT CATCHMENTS.

BEFORE

YOU DIG

www.byda.com.au

UNDERGROUND PUBLIC UTILITY PLANT EXISTS IN THIS VICINITY. THE CONTRACTOR IS ADVISED TO CONTACT THE RELEVANT AUTHORITIES TO CONFIRM THE EXACT LOCATION OF PUBLIC UTILITY PLANT ON SITE PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION OR CONSTRUCTION WORKS.

CATCHMENT TABLE (PRE DEVELOPMENT)			
CATCHMENT NAME	TOTAL AREA (ha)	Av. SLOPE (%)	IMPERVIOUS (%)
A	0.0341	7.0	19.4
B	0.3023	5.0	41.3
C	0.5389	1.5	89.7
D	0.3328	3.5	2.6

PINNACLE

ENGINEERING GROUP

LEVEL 119 SHORT STREET, SOUTHPORT QLD 4215
(PO BOX 517, PARADISE POINT QLD 4216)
WWW.PINNACLEENG.COM.AU



DRAWING TITLE		PROJECT		CLIENT
PRE DEVELOPMENT CATCHMENT LAYOUT		PROPOSED SERVICE STATION DEVELOPMENT 946-960 GREENBANK ROAD NORTH MCLEAN QLD 4280 (LOT 1 ON SP267252)		SOOMAL PROPERTIES
STATUS		PRELIMINARY (NOT TO BE USED FOR CONSTRUCTION)		
APPROVED		RPEQ No		
DRAWING NUMBER		REVISION		
PEG1046-DA-SK01		B		

STATUS	
PRELIMINARY (NOT TO BE USED FOR CONSTRUCTION)	
RPEQ No	

9310-00-00-0001 PRE DEVELOPMENT CATCHMENT LAYOUT.dwg (B, 50 x 11.00 British) (Name: Jamb, 1/1/2023)

LEGEND	
	PROPOSED STORMWATER DRAINAGE
	PROPOSED NOMINAL KERB LINE
	EXISTING TELSTRA CABLE
	EXISTING SEWERAGE RETICULATION
	EXISTING WATER RETICULATION
	EXISTING STORMWATER PIPE
	EXISTING OVERHEAD ELECTRICAL
	EXISTING UNDER GROUND ELECTRICAL
	EXISTING BOUNDARY
	EXISTING NOMINAL KERB LINE
	INDICATIVE WORKS AREA
	EXISTING SURFACE CONTOURS (0.25m)
	OVERLAND FLOW DIRECTION
	ROOF / BUILDING HARDSTAND AREA
	CONCRETE DRIVEWAY / PAVED AREA
	PERVIOUS AREA
	CATCHMENT BOUNDARY
	SITE CATCHMENT LABEL
	EXISTING CATCHMENT BOUNDARY
	EXTERNAL CATCHMENT LABEL
	DENOTES LEGAL POINT OF DISCHARGE
	SHEET FLOW LINE OF DISCHARGE
	MUSIC 'ROOF' AREA
	MUSIC 'GROUND' AREA
	MUSIC 'ROADS' AREA
	MUSIC CATCHMENT LABEL

NOTES	
1.	THE LOCATION OF THE EXISTING SERVICES HAS BEEN PLOTTED FROM SURVEY AND RECORDS AND IS TO BE CONFIRMED PRIOR TO CONSTRUCTION
2.	THE DETAILED DESIGN OF THE DISCHARGE PIPE WORK IS THE SUBJECT OF THE SEPARATE PLUMBING AND DRAINAGE APPLICATION

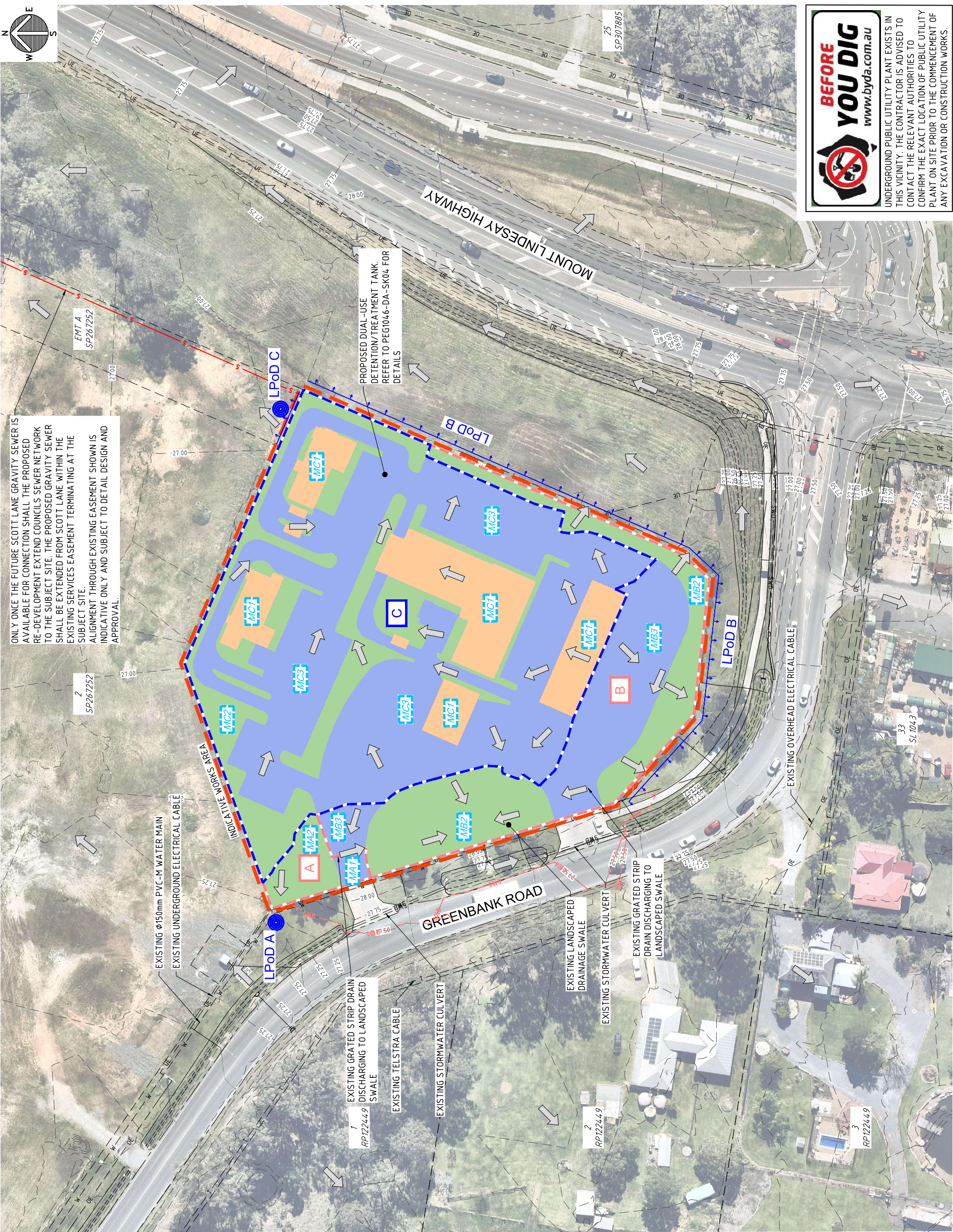
CATCHMENT TABLE (POST DEVELOPMENT)			
CATCHMENT NAME	TOTAL AREA (ha)	Av. SLOPE (%)	IMPERVIOUS (%)
A	0.0341	7.0	19.4
B	0.3023	5.0	41.3
C	0.8847	1.5	85.1

CATCHMENT TABLE - MUSIC MODELLING AREAS			
CATCHMENT NAME	CATCHMENT TYPE	TOTAL AREA (ha)	IMPERVIOUS (%)
MA2	GROUND	0.0275	0.0
MA3	ROADS	0.0066	100.0
MB2	GROUND	0.1635	0.3
MB3	ROADS	0.1258	100.0
MC1	ROOF	0.1714	100.0
MC2	GROUND	0.1870	29.3
MC3	ROADS	0.5263	100.0



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(PO BOX 517, PARADISE POINT QLD 4216)
WWW.PINNACLEENGINEERING.COM.AU





BEFORE
YOU DIG
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 LEVEL 1 19 SHORT STREET, SOUTHPORT QLD 4215 (PO BOX 517, PARADISE POINT QLD 4216) WWW.PINNACLEENG.COM.AU PINNACLE ENGINEERING GROUP		REVDESCRIPTIONDRAWNDATEDRAWNDATE A PRELIMINARY ISSUE FOR COMMENT M.G. 21.04.2023 B RESPONSE TO COUNCIL RFI M.G. 31.08.2023		TASKBYINITIALDATE REVIEW B. POPA 31.08.2023 DESIGN J. LAMB 31.08.2023 DRAWN M. GLASSON 31.08.2023 SCALE		CLIENT SOOMAL PROPERTIES		PROJECT PROPOSED SERVICE STATION DEVELOPMENT 946-960 GREENBANK ROAD NORTH MCLEAN QLD 4280 (LOT 1 ON SP267252)		DRAWING TITLE POST DEVELOPMENT CATCHMENT LAYOUT		DRAWING NUMBER PEG1064-DA-SK02		REVISION B	
								STATUS PRELIMINARY (NOT TO BE USED FOR CONSTRUCTION)		APPROVED		RPEQ No			

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Appendix D

Rational Method Calculations

RATIONAL METHOD CALCULATIONS



Project:	PEG1046_946-960 Greenbank Road, North MacLean
Date:	18-Apr-23
Designed:	J. Lamb
Comments:	Catchment A

PARAMETERS

VALUE

Catchment Name	A	
Catchment Size	0.0341	ha
C10 Coefficient of Runoff	0.60	(QUDM T4.5.3 ($f = 0.2$, $^1I_{10} = 58.0$))

Total Time of Concentration

Total time of Conentration (t_c)	5.0 mins
--------------------------------------	----------

Rational Method for Peak Catchment flow

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

AEP (%)	Rainfall Intensity (mm/h)	Rainfall Depth (mm)	Fy	Coefficient of Runoff	Discharge (m ³ /s)
63.2	99.6	8.30	0.80	0.48	0.005
39.35	126.0	10.50	0.85	0.51	0.006
18.13	161.0	13.42	0.95	0.57	0.009
10	187.0	15.58	1.00	0.60	0.011
5	217.0	18.08	1.05	0.63	0.013
2	256.0	21.33	1.15	0.69	0.017
1	286.0	23.83	1.20	0.72	0.020

RATIONAL METHOD CALCULATIONS

Project:	PEG1046_946-960 Greenbank Road, North MacLean
Date:	18-Apr-23
Designed:	J. Lamb
Comments:	Catchment B



PARAMETERS

VALUE

Catchment Name	B	
Catchment Size	0.3023 ha	
C10 Coefficient of Runoff	0.68	(QUDM T4.5.3 ($f_i = 0.4$, $l_{10} = 58.0$))

Total Time of Concentration

Total time of Conentration (t_c)	5.0 mins
--------------------------------------	----------

Rational Method for Peak Catchment flow

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

AEP (%)	Rainfall Intensity (mm/h)	Rainfall Depth (mm)	Fy	Coefficient of Runoff	Discharge (m ³ /s)
63.2	99.6	8.30	0.80	0.54	0.045
39.35	126.0	10.50	0.85	0.58	0.061
18.13	161.0	13.42	0.95	0.65	0.087
10	187.0	15.58	1.00	0.68	0.107
5	217.0	18.08	1.05	0.71	0.130
2	256.0	21.33	1.15	0.78	0.168
1	286.0	23.83	1.20	0.82	0.196

RATIONAL METHOD CALCULATIONS

Project:	PEG1046_946-960 Greenbank Road, North MacLean
Date:	18-Apr-23
Designed:	J. Lamb
Comments:	Catchment C



PARAMETERS

VALUE

Catchment Name	C	
Catchment Size	0.5389	ha
C10 Coefficient of Runoff	0.86	(QUDM T4.5.3 ($f_i = 0.9$, $l_{10} = 58.0$))

Total Time of Concentration

Total time of Conentration (tc)	5.0 mins
--	----------

Rational Method for Peak Catchment flow

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

AEP (%)	Rainfall Intensity (mm/h)	Rainfall Depth (mm)	Fy	Coefficient of Runoff	Discharge (m ³ /s)
63.2	99.6	8.30	0.80	0.69	0.103
39.35	126.0	10.50	0.85	0.73	0.138
18.13	161.0	13.42	0.95	0.82	0.197
10	187.0	15.58	1.00	0.86	0.241
5	217.0	18.08	1.05	0.90	0.293
2	256.0	21.33	1.15	0.99	0.379
1	286.0	23.83	1.20	1.00	0.428

RATIONAL METHOD CALCULATIONS

Project:	PEG1046_946-960 Greenbank Road, North MacLean
Date:	18-Apr-23
Designed:	J. Lamb
Comments:	Catchment D



PARAMETERS

VALUE

Catchment Name	D	
Catchment Size	0.3328 ha	
C10 Coefficient of Runoff	0.53	(QUDM T4.5.4 ($f_i = <0.2$, $^1I_{10} = 58.0$))

Total Time of Concentration

Total time of Conentration (tc)	5.0 mins
---------------------------------	----------

Rational Method for Peak Catchment flow

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

AEP (%)	Rainfall Intensity (mm/h)	Rainfall Depth (mm)	Fy	Coefficient of Runoff	Discharge (m ³ /s)
63.2	99.6	8.30	0.80	0.42	0.039
39.35	126.0	10.50	0.85	0.45	0.052
18.13	161.0	13.42	0.95	0.50	0.075
10	187.0	15.58	1.00	0.53	0.092
5	217.0	18.08	1.05	0.56	0.112
2	256.0	21.33	1.15	0.61	0.144
1	286.0	23.83	1.20	0.64	0.168

Appendix E

Stormwater Management Layout



ONLY ONCE THE FUTURE SCOTT LANE GRAVITY SEWER IS AVAILABLE FOR CONNECTION SHALL THE PROPOSED RE-DEVELOPMENT EXTEND COUNCILS SEWER NETWORK TO THE SUBJECT SITE. THE PROPOSED GRAVITY SEWER SHALL BE EXTENDED FROM SCOTT LANE WITHIN THE EXISTING SERVICES EASEMENT TERMINATING AT THE SUBJECT SITE.

ALIGNMENT THROUGH EXISTING EASEMENT SHOWN IS INDICATIVE ONLY AND SUBJECT TO DETAIL DESIGN AND APPROVAL.

PROPOSED FLOOD BALANCE STORAGE TANK.
284m³ MINIMUM STORAGE VOLUME BETWEEN R.L 27.1m AND 27.5m. PROPOSED 755m² OF 'ATLANTIS FLO-VAULT' OR APPROVED EQUIVALENT. REFER TO PEG01046-DA-SK07 FOR DETAILS

PROPOSED LEVEL SPREADER TO BE USED TO EVENLY DISTRIBUTE STORMWATER OUTFLOW ACROSS THE EXISTING STORMWATER EASEMENT

EXISTING GRATED STRIP DRAIN DISCHARGING TO LANDSCAPED SWALE

GREENBANK ROAD

EXISTING STORMWATER CULVERT

LEGEND

- EXISTING TELSTRA CABLE
- EXISTING SEWERAGE RETICULATION
- EXISTING WATER RETICULATION
- EXISTING STORMWATER PIPE
- EXISTING OVERHEAD ELECTRICAL
- EXISTING UNDER GROUND ELECTRICAL
- EXISTING BOUNDARY
- EXISTING NOMINAL KERB LINE
- INDICATIVE WORKS AREA
- ROOF / BUILDING HARDSTAND AREA
- CONCRETE DRIVEWAY / PAVED AREA
- PERVIOUS AREA
- OVERLAND FLOW DIRECTION
- CATCHMENT BOUNDARY
- CATCHMENT LABEL

NOTES

- THE LOCATION OF THE EXISTING SERVICES HAS BEEN PLOTTED FROM SURVEY AND RECORDS AND IS TO BE CONFIRMED PRIOR TO CONSTRUCTION
- THE DETAILED DESIGN OF THE DISCHARGE PIPE WORK IS THE SUBJECT OF THE SEPARATE PLUMBING AND DRAINAGE APPLICATION.

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**PINNACLE**
ENGINEERING GROUP

LEVEL 119 SHORT STREET, SOUTHBPORT QLD 4215
(PO BOX 517 PARADISE POINT QLD 4216)
WWW.PINNACLEENG.COM.AU

REV	DESCRIPTION	DRAWN	DATE
A	PRELIMINARY ISSUE FOR COMMENT	M.G.	21.04.2023
B	RESPONSE TO COUNCIL RFI	M.G.	31.08.2023
SCALE			
2 1 0 2 4 6 8 10			
SCALE 1:200			
(SCALE ABOVE DENOTES ORIGINAL SHEET SIZE - A1)			

SOOMAL PROPERTIES

PROPOSED SERVICE
STATION DEVELOPMENT
946-960 GREENBANK ROAD
NORTH MCLEAN QLD 4280
(LOT 1 ON SP267252)

DRAWING TITLE

STORMWATER MANAGEMENT LAYOUT

DRAWING NUMBER

PEG1064-DA-SK03

REVISION

B

STATUS

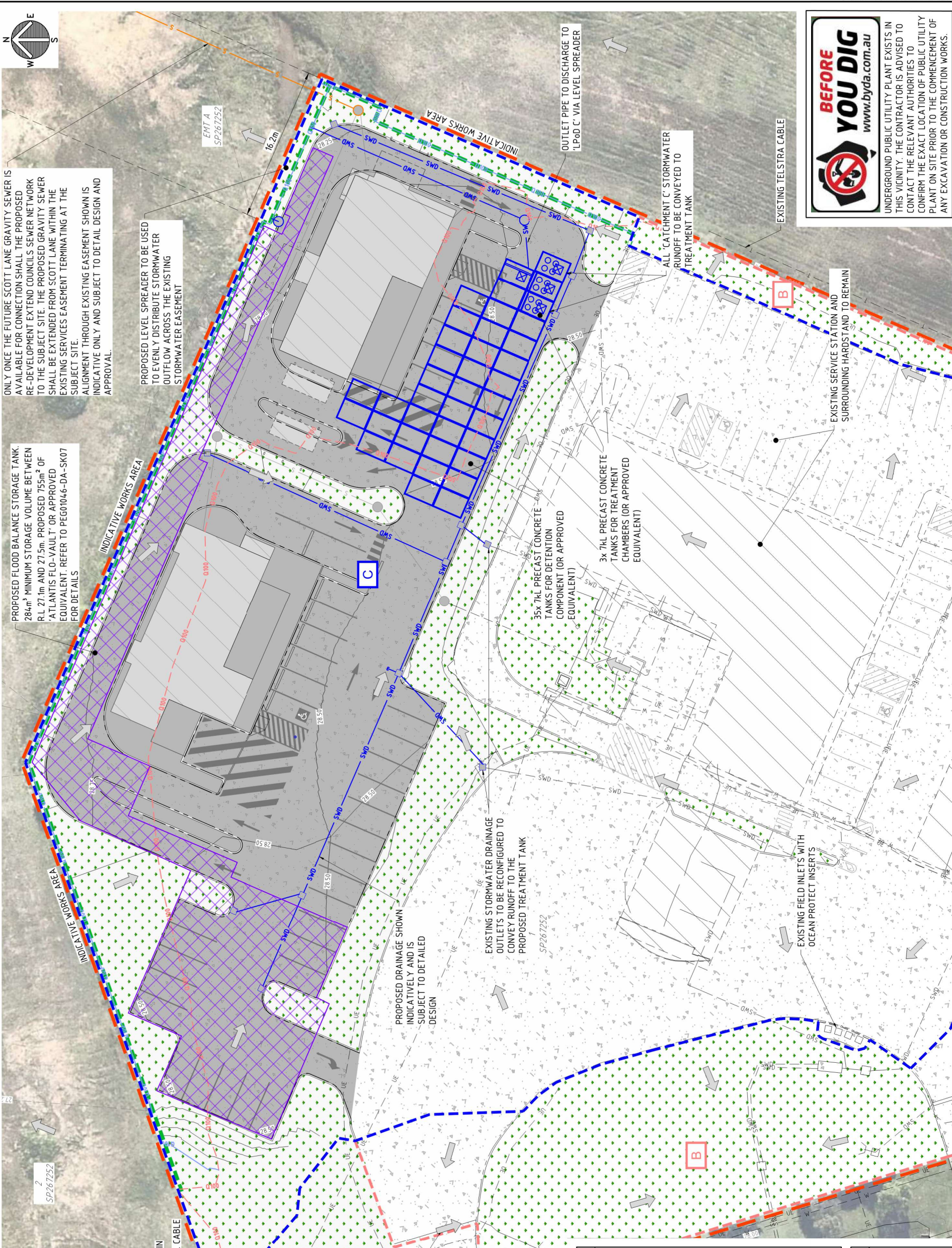
PRELIMINARY
(NOT TO BE USED FOR CONSTRUCTION)

APPROVED

RPEQ No

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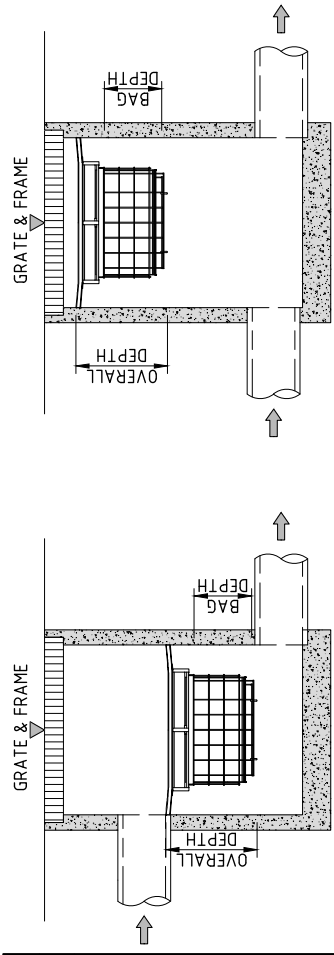
UNDERGROUND PUBLIC UTILITY PLANT EXISTS IN THIS VICINITY. THE CONTRACTOR IS ADVISED TO CONTACT THE RELEVANT AUTHORITIES TO CONFIRM THE EXACT LOCATION OF PUBLIC UTILITY PLANT ON SITE PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION OR CONSTRUCTION WORKS.



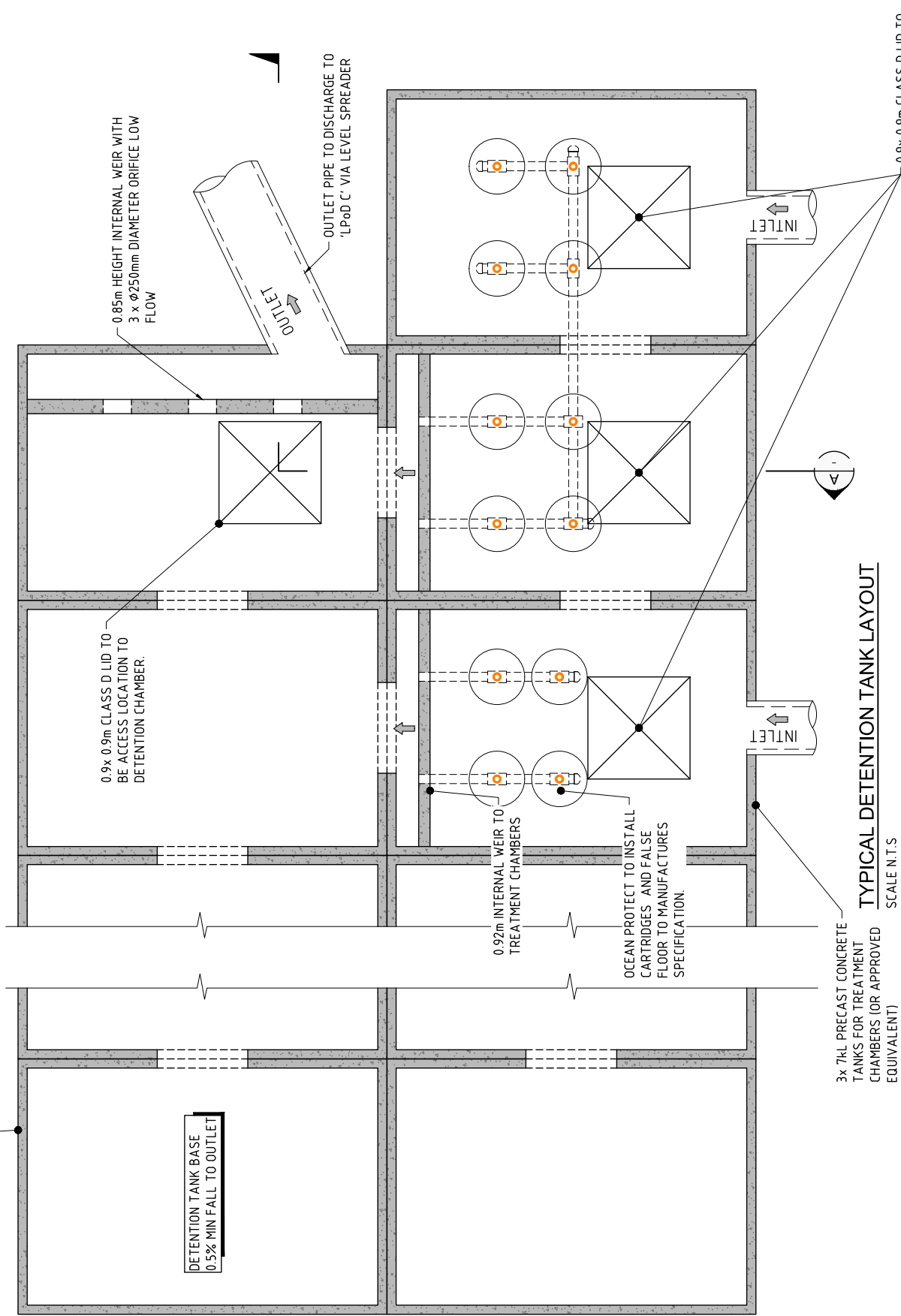
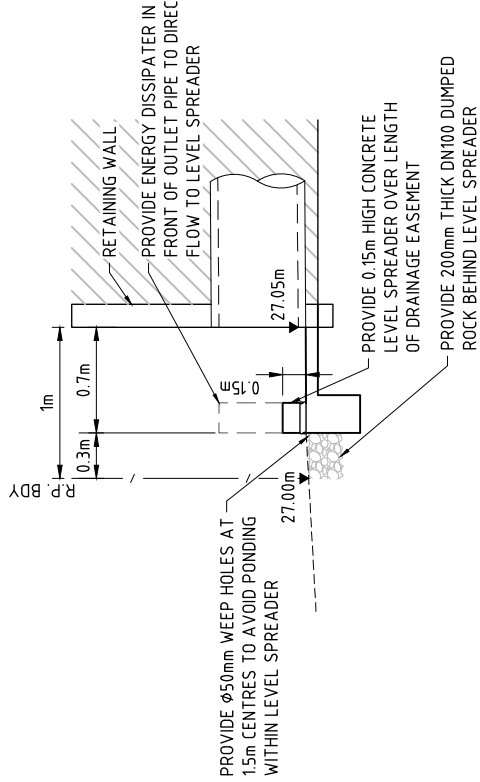
DETENTION DETAILS	
PARAMETERS	TANK
TANK OUTLETS	
LOW FLOW OUTLET	= $3 \times \varnothing 750\text{mm}$ ORIFICE
LOW FLOW OUTLET LEVEL	= INVERT OF TANK (+0.0m)
HIGH FLOW OUTLET	= 3.0m WIDE INTERNAL OVERFLOW WEIR
HIGH FLOW OUTLET LEVEL	= +0.85m
TANK GEOMETRY	
STORAGE AREA	= 226m^2 MIN.
STORAGE HEIGHT	= 11m
STORAGE VOLUME	= 248.6m^3
TANK MODELLING SUMMARY	
10% AEP PEAK OUTFLOW	= $0.260\text{m}^3/\text{s}$
10% AEP PEAK STAGE	= +0.67m
1% AEP PEAK OUTFLOW	= $0.423\text{m}^3/\text{s}$
1% AEP PEAK STAGE	= +0.93m

MUSIC MODEL TREATMENT NODE PARAMETERS	
PARAMETERS	
CATCHMENT C – OCEAN PROTECT (OCEANGUARD)	
REQUIRED NUMBER	= 11 (MIN 1 PER PIT)
HIGH FLOW BYPASS	= 0.02m ³ /s PER OCEANGUARD
CATCHMENT A – STORMFILTER (CHAMBER	
HIGH FLOW BYPASS	= 100m ³ /s
STORAGE SURFACE AREA	= 17.5m ²
EXTENDED DETENTION DEPTH	= 0.171m
EQUIVALENT PIPE DIAMETER	= 82mm
OCEAN PROTECT FILTER TYPE	= 690mm CARTRIDGE (PSORB)
REQUIRED NUMBER	= 12
HIGH FLOW BYPASS	= 0.0108m ³ /s

OCEAN PROTECT DETAILS
OCEAN PROTECT DETAILS AND ARRANGEMENT ARE
INDICATIVE ONLY AND ARE TO BE CONFIRMED BY THE
CONTRACTOR WITH THE MANUFACTURER PRIOR TO
PROCUREMENT AND CONSTRUCTION.



OCEANGUARD TYPICAL ARRANGEMENTS			
PLAN ID		MAXIMUM PIT PLAN DIMENSIONS	
S		450x450mm	
M		600x600mm	
L		900x900mm	
XL		1200x1200mm	
DEPTH ID	BAG DEPTH (mm)	OVERALL DEPTH (mm)	
1	170	270	
2	300	450	
3	600	700	
DEPTH ID			
1	2	3	
S			
M			
L			
XL			



PINNACLE
ENGINEERING GROUP

LEVEL 1 19 SHORT STREET, SOUTHPORT QLD 4215
(PO BOX 517, PARADISE POINT QLD 4216)
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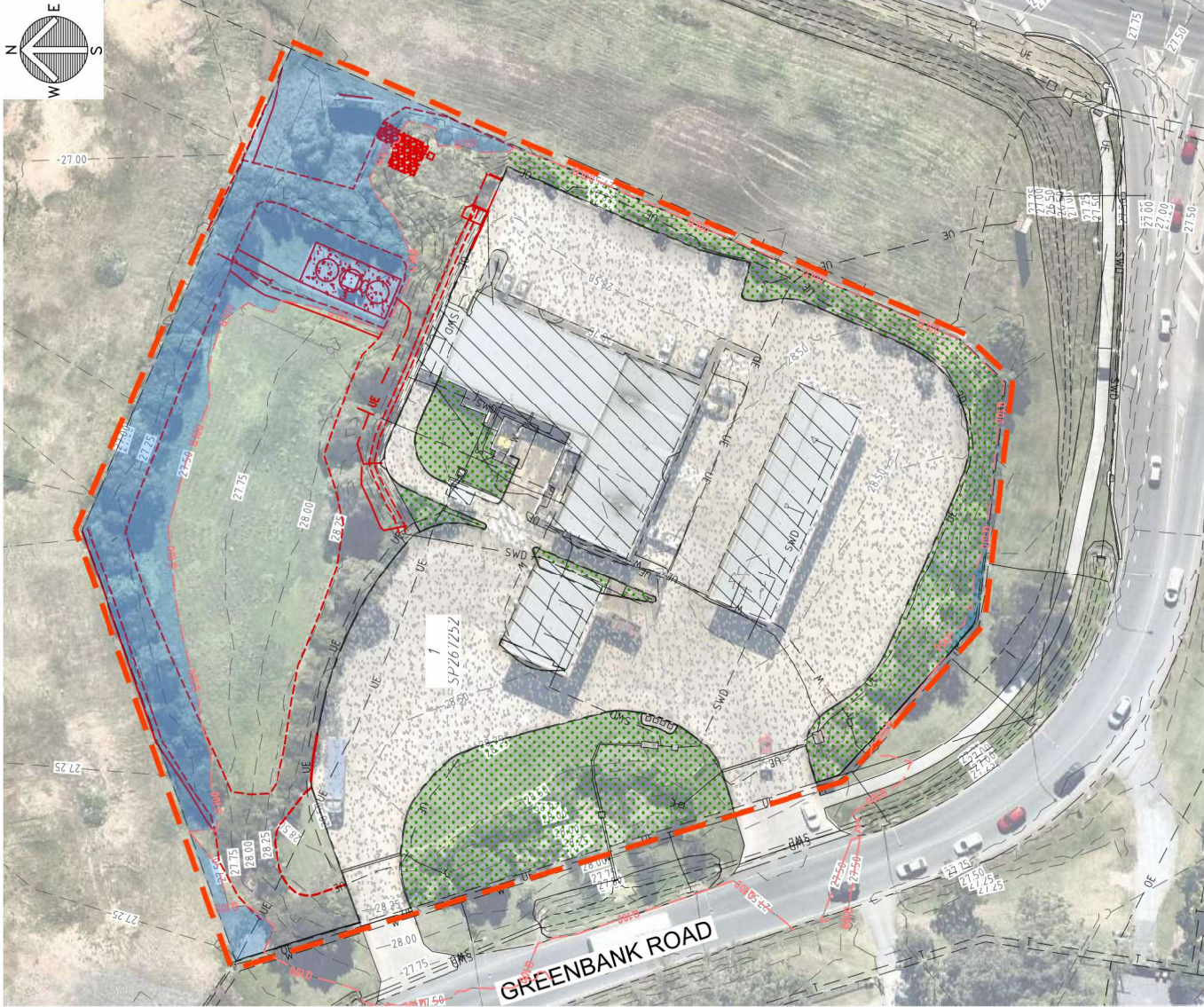
PROJECT
PROPOSED SERVICE
STATION DEVELOPMENT
946-960 GREENBANK ROAD
NORTH MCLEAN QLD 4280
(LOT 1 ON SP267252)

SOOMAL PROPERTIES

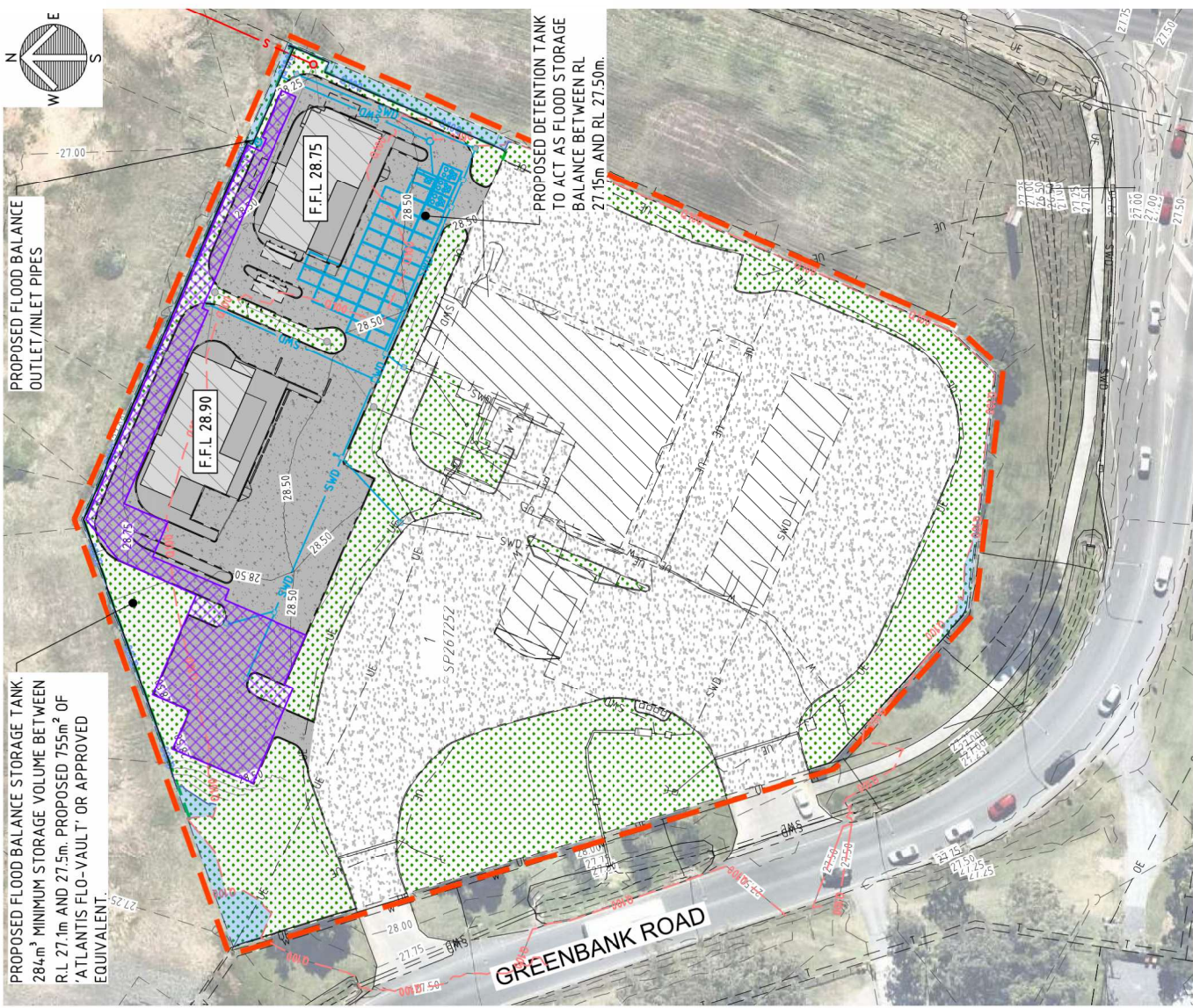
TASK	BY	INITIAL	DATE
REVIEW	B. POFA		31.08.2023
DESIGN	J. LAMB		31.08.2023
DRAWN	M. GLASSON		31.08.2023
SCALE			

REV	DESCRIPTION	DRAWN	DATE
A	PRELIMINARY ISSUE FOR COMMENT	M.G.	21.04.
B	RESPONSE TO COUNCIL RFI	M.G.	31.08.

DRAWING TITLE		STORMWATER MANAGEMENT DETAILS	
STATUS	APPROVED		
	RPEQ No		
PRELIMINARY (NOT TO BE USED FOR CONSTRUCTION)	DRAWING NUMBER		REVISION
	PEG1046-DA-SK04		B



FLOOD STORAGE LAYOUT - PRE DEVELOPMENT



FLOOD STORAGE LAYOUT - POST DEVELOPMENT

LEGEND	
EXISTING TELSTRA CABLE	---
EXISTING SEWERAGE RETICULATION	---
EXISTING WATER RETICULATION	---
EXISTING UNDERGROUND ELECTRICAL	---
EXISTING OVERHEAD ELECTRICAL	---
PROPOSED STORMWATER DRAINAGE	---
PROPOSED SEWER RETICULATION	---
FINISHED SURFACE CONTOURS (0.10m)	---
EXISTING SURFACE CONTOURS (0.10m)	---
ROOF / BUILDING HARDSTAND AREA	---
CONCRETE DRIVEWAY / PAVED AREA	---
PERVIOUS AREA	---
SUSPENDED DECKING	---
PROPOSED VEHICLE CROSSOVER	---
PROPOSED LOT BOUNDARY	---
EXISTING LOT BOUNDARY	---
INDICATIVE WORKS AREA	---
1% AEP (Q ₁₀₀) FLOOD LEVEL = RL 27.5m AHD	---
1% AEP (Q ₁₀₀) FLOOD EXTENT	---
1% AEP (Q ₁₀₀) FLOOD BALANCE TANK	---
PROPOSED SURFACE LEVEL	---
PROPOSED FINISHED FLOOR LEVEL	---

- NOTES
- FLOODING OCCURS ON ADJACENT PROPERTIES. FLOODING EXTERNAL TO THE SITE HAS BEEN OMITTED TO CLEARLY DELINEATE FLOODING ON THE SUBJECT SITE. REFER TO COUNCIL FLOOD AFFECTED AREAS MAPPING FOR FURTHER INFORMATION
 - HABITABLE FINISHED FLOOR LEVELS TO BE 300mm ABOVE 1% AEP EVENT (Q₁₀₀) OF RL 27.50m AHD.
 - AERIAL IMAGERY COURTESY OF NEARMAP.COM.

FLOOD STORAGE - PRE AND POST DEVELOPMENT	
PRE-DEVELOPMENT FLOOD STORAGE VOLUME	
EVENT	DFL (m AHD)
1% AEP (Q ₁₀₀)	27.50m
FLOOD STORAGE TO DFL (m³)	
402m³	
POST-DEVELOPMENT FLOOD STORAGE VOLUME	
EVENT	DFL (m AHD)
1% AEP (Q ₁₀₀)	27.50m
1% AEP (Q ₁₀₀)	27.80m
FLOOD STORAGE TO DFL (m³)	
39m³	
POST-DEVELOPMENT COMPENSATORY STORAGE REQUIRED (VIA TANK)	
COMPENSATORY FLOOD STORAGE REQUIRED (m³)	
363m³	
FLOOD STORAGE WITHIN FLOOD STORAGE TANK (m³)	
284m³ MIN	
FLOOD STORAGE AVAILABLE WITHIN DETENTION TANK TO DFL (m³)	
79m³	

FLOOD STORAGE LEVELS

IT IS THE PRINCIPAL CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE FINISHED SURFACE LEVELS NOMINATED ON THIS DRAWING ARE ACHIEVED TO ENSURE NO LOSS OF FLOODPLAIN STORAGE POST-DEVELOPMENT.

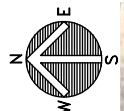
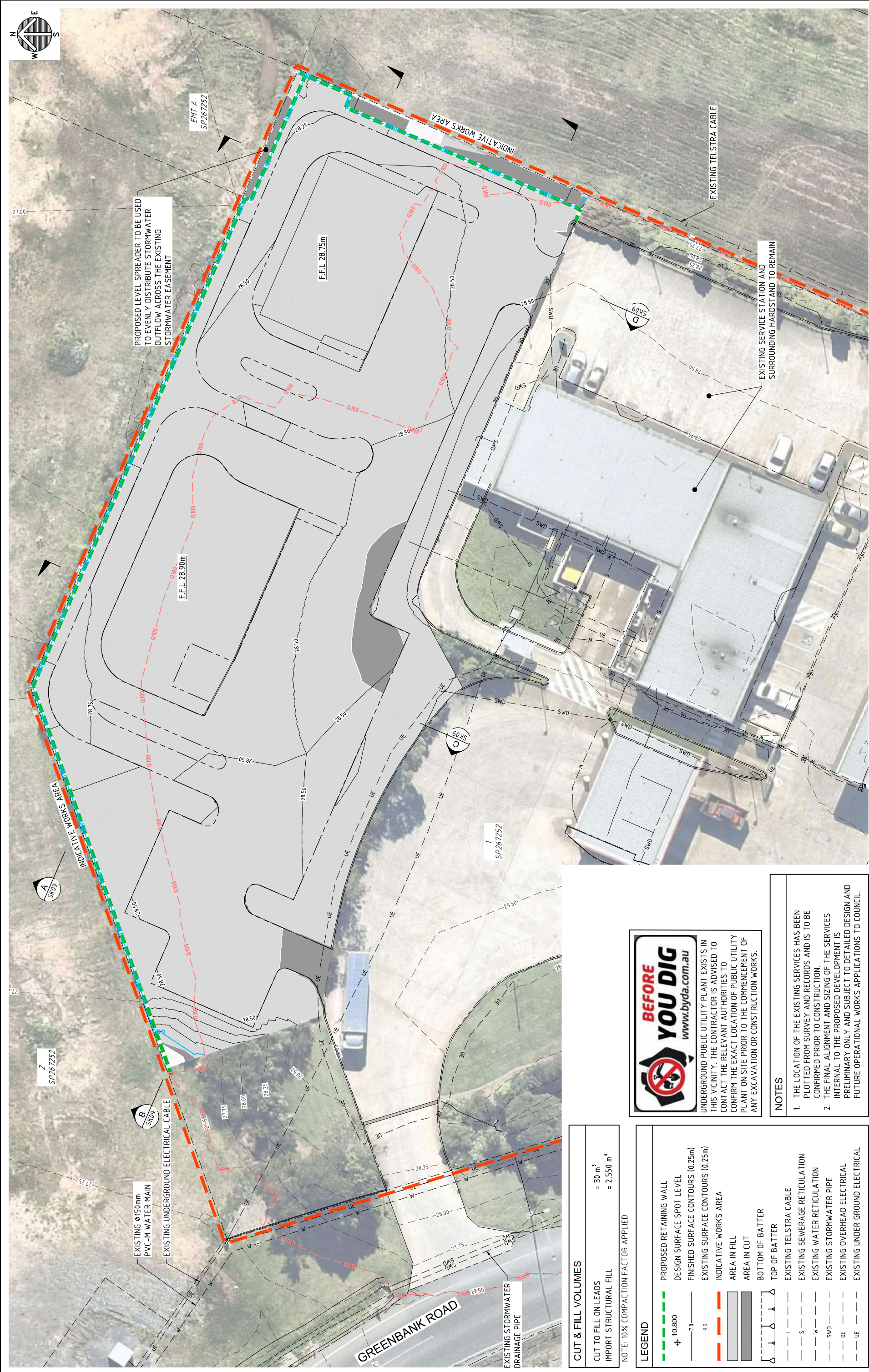
REV	DESCRIPTION	DRAWN	DATE
A	RESPONSE TO COUNCIL RFI	M.G.	31.08.2023
REVIEW			
DESIGN			
DRAWN			
SCALE			
SCALE 10 0 10 20 1500			
SCALE ABOVE DENOTES ORIGINAL SHEET SIZE - A1			

SOOMAL PROPERTIES	
946-960 GREENBANK ROAD NORTH MCLEAN QLD 4280 (LOT 1 ON SP267252)	

PROPOSED SERVICE STATION DEVELOPMENT	
946-960 GREENBANK ROAD NORTH MCLEAN QLD 4280 (LOT 1 ON SP267252)	

FLOOD STORAGE LAYOUT	
PROJECT	
DRAWING NUMBER	
RPEQ No	
REVISION	
A	

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CUT & FILL VOLUMES	
CUT TO FILL ON LEADS	= 30 m³
IMPORT STRUCTURAL FILL	= 2,550 m³

NOTE: 10% COMPACTION FACTOR APPLIED

LEGEND	
	PROPOSED RETAINING WALL
	DESIGN SURFACE SPOT LEVEL
	FINISHED SURFACE CONTOURS (0.25m)
	EXISTING SURFACE CONTOURS (0.25m)
	INDICATIVE WORKS AREA
	AREA IN FILL
	AREA IN CUT
	BOTTOM OF BATTER
	TOP OF BATTER
	EXISTING TELSTRA CABLE
	EXISTING SEWERAGE RETICULATION
	EXISTING WATER RETICULATION
	EXISTING STORMWATER PIPE
	EXISTING OVERHEAD ELECTRICAL
	EXISTING UNDER GROUND ELECTRICAL



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- NOTES**
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 - THE FINAL ALIGNMENT AND SIZING OF THE SERVICES INTERNAL TO THE PROPOSED DEVELOPMENT IS PRELIMINARY ONLY AND SUBJECT TO DETAILED DESIGN AND FUTURE OPERATIONAL WORKS APPLICATIONS TO COUNCIL.

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PINNACLE
ENGINEERING GROUP

LEVEL 119 SHORT STREET, SOUTHPORT QLD 4215
(PO BOX 517 PARADISE POINT QLD 4216)
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REV	DESCRIPTION	DRAWN	DATE
A	RESPONSE TO COUNCIL RFI	M.G.	31.08.2023

SOOMAL PROPERTIES

PROPOSED SERVICE STATION DEVELOPMENT
946-960 GREENBANK ROAD
NORTH MCLEAN QLD 4280
(LOT 1 ON SP267252)

PRELIMINARY BULK EARTHWORKS LAYOUT

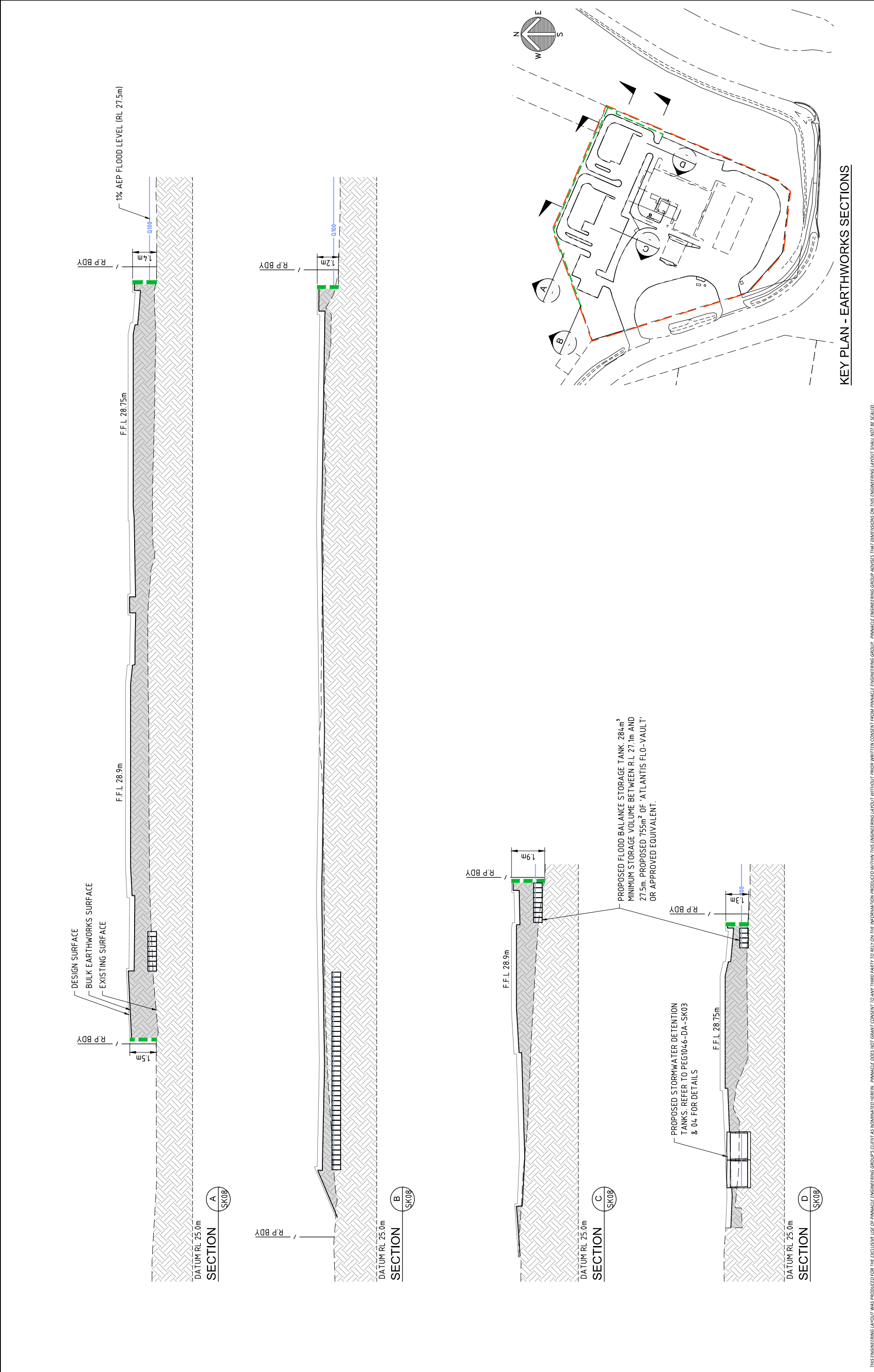
STATUS
PRELIMINARY
(NOT TO BE USED FOR CONSTRUCTION)

APPROVED
PEG1046-DA-SK08

DRAWING NUMBER
PEG1046-DA-SK08

RPEQ No

REVISION
A

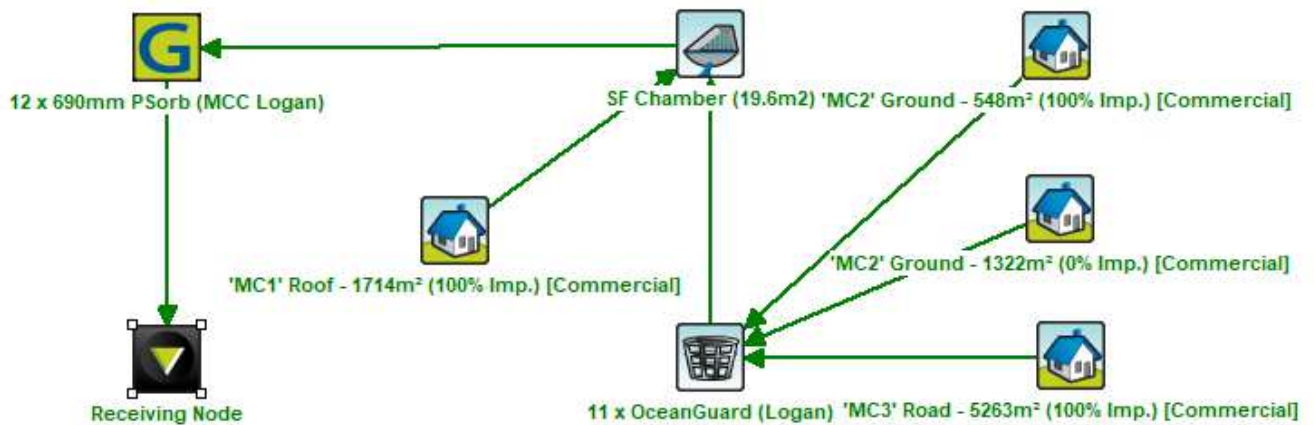


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 PINNACLE ENGINEERING GROUP LEVEL 1 19 SHORT STREET, SOUTHPORT QLD 4215 (PO BOX 517, PARADISE POINT QLD 4216) WWW.PINNACLEENG.COM.AU	REV	DESCRIPTION	DRAWN	DATE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Appendix F

MUSIC Model Results



Treatment Train Effectiveness - Receiving Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	5.51	5.51	0
Total Suspended Solids (kg/yr)	1610	319	80.2
Total Phosphorus (kg/yr)	3.17	0.577	81.8
Total Nitrogen (kg/yr)	17.7	7.65	56.7
Gross Pollutants (kg/yr)	128	0	100

Appendix G

LCC Maps



Your Ref:

Enquiry Phone: Miss Megan Gould (07) 3412 5282
Please Quote File: 918043-1
Document Reference: 16837544

28 July 2023

Wolter Consulting
gsavins@wolterconsulting.com.au

Dear Sir/Madam

APPLICATION FOR PROPERTY INFORMATION - FLOODING
LOCATED AT: 946-960 GREENBANK ROAD, NORTH MACLEAN
PROPERTY DESCRIPTION: LOT 1 SP 267252

Thank you for your enquiry requesting information on the above property. Investigation shows that the property is identified as being at risk of flooding in a one percent Annual Exceedance Probability (AEP) flood event. This flood event has a one percent (1 in 100) chance of being equalled or exceeded in any given year.

Table 1: 1% Annual Exceedance Probability (AEP) Flood Level for Property

Flood Event	Flood level (m) Australian Height Datum
one percent AEP	27.5

The flood level provided above includes an allowance for future climate change.

The information provided is based on flood modelling undertaken by Council. Flood modelling references available rainfall and river level data to estimate the magnitude of flood events with a certain probability. The flood levels and maps do not represent particular historic flood events but these events are used to ensure the accuracy of the flood models.

Please be aware it is possible that local flooding from overland flow or minor tributaries may not have been captured in the flood modelling but could still be experienced.

Flood models are developed from the best available information at the time to estimate flood extents. To ensure Council continues to provide the best available information to the public, flood models may be reviewed in the future to take advantage of updated topographic and rainfall data and improved flood modelling technology. Consequently, there is no warranty given to the accuracy of this information.

If you have any further enquiries on this matter or require clarification, please do not hesitate to contact Council's River and Catchment Engineering Program, on (07) 3412 5282.

Yours faithfully

Kylie Drapala
Acting River & Catchment Engineering Program Leader



Important Warning – Updated Flood Hazard

- 1. Flood hazard is being remodelled across the city**
Logan City Council is remodelling flood hazard across the city in accordance with the endorsed Flood Studies Review Program.
- 2. Logan Planning Scheme Flood hazard overlay does not reflect the updated flood hazard**
The Logan Planning Scheme 2015 Flood hazard overlay map OM-05.00 does not reflect the updated flood hazard and should not be relied upon as accurately reflecting the current extent of properties affected by flood hazard.
- 3. Existing approvals do not reflect the updated flood hazard**
Any existing approvals may not be based on the updated extent of flood hazard likely to affect a property.
- 4. There are substantial changes to the extent of properties affected by flood hazard and increases in flood level heights**
Based on updated flood data it is expected there will be substantial changes to the extent and flood levels of properties affected by a flood hazard.
- 5. You must obtain the latest flood information from Council**
Any person undertaking development, including building work, must contact Council's River and Catchment Engineering Program (phone: 07 3412 3412) to find out the status of the flood hazard remodelling affecting their property. For information on how it may impact development or building work, please contact the Development Assessment Branch on 07 3412 5269 or by emailing council@logan.qld.gov.au

As flood studies are completed the updated extent of flood hazard and the updated flood levels will be included in the online flood report available on Council's PDHub.

Completed flood studies [and the progress status of others] are available from Council's River and Catchment Engineering Program.

The Planning Scheme will be amended once all the flood studies are completed to reflect the State Planning Policy and in line with best practice in flood risk management for the City of Logan.
- 6. You must take responsibility for ensuring your development avoids serious harm to persons and property from the updated flood hazard**
Any person undertaking development is responsible for ensuring they obtain the latest information on flood hazard affecting the property and that the development is located and designed based on the updated flood hazard. This is important to ensure that the risks associated with flood hazard are avoided or mitigated to protect people and property.



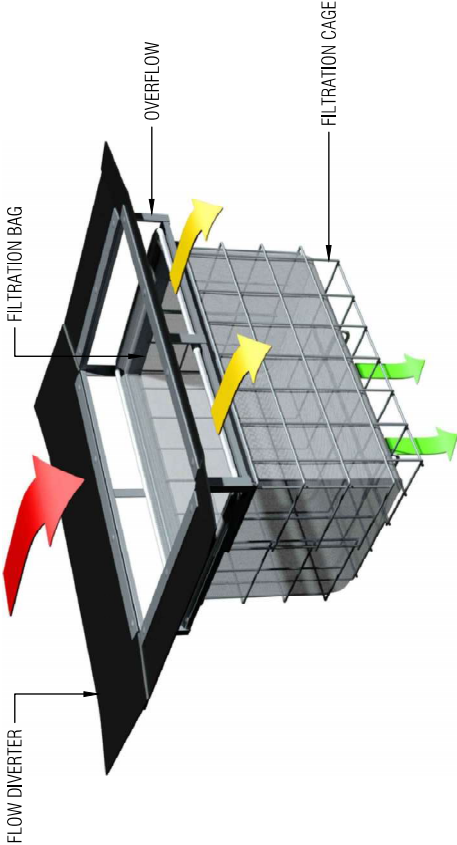
Appendix H

OceanProtect Documents

PLAN ID	MAXIMUM PIT PLAN DIMENSIONS
S	450mm x 450mm
M	600mm x 600mm
L	900mm x 900mm
XL	1200mm x 1200mm

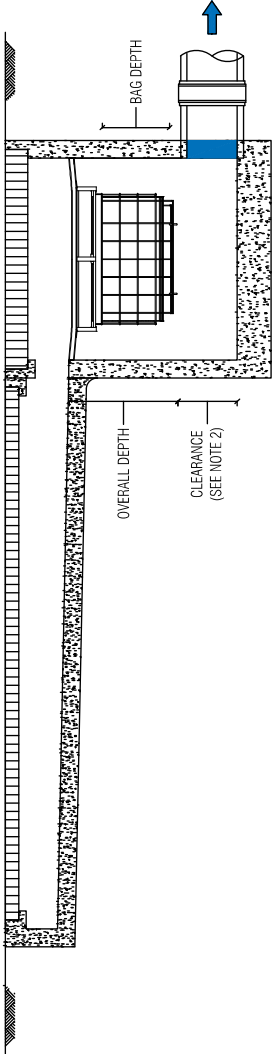
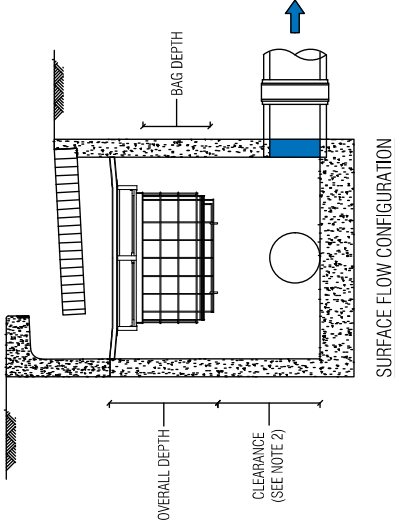
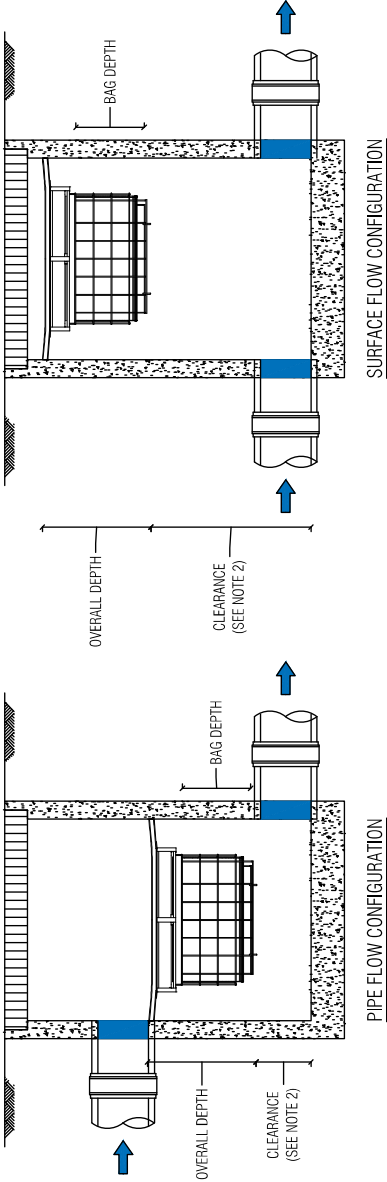
DEPTH ID	BAG DEPTH	OVERALL DEPTH
1	170	270
2	300	450
3	600	700

PLAN ID	DEPTH ID		
	1	2	3
S	■		
M	■	■	
L		■	■
XL		■	■



GENERAL NOTES

1. THE MINIMUM CLEARANCE DEPENDS ON THE CONFIGURATION (SEE NOTE 2) AND THE LOCAL COUNCIL REQUIREMENTS.
2. CLEARANCE FOR ANY PIT WITHOUT AN INLET PIPE (ONLY USED FOR SURFACE FLOW) CAN BE AS LOW AS 50mm. FOR OTHER PITS, THE RECOMMENDED CLEARANCE SHOULD BE GREATER OR EQUAL TO THE PIPE OBVERT SO AS NOT TO INHIBIT HYDRAULIC CAPACITY.
3. OCEAN PROTECT PROVIDES TWO FILTRATION BAG TYPES:- 200 MICRON BAGS FOR HIGHER WATER QUALITY FILTERING AND A COARSE BAG FOR TARGETING GROSS POLLUTANTS.
4. DRAWINGS NOT TO SCALE.



STORMFILTER DESIGN TABLE

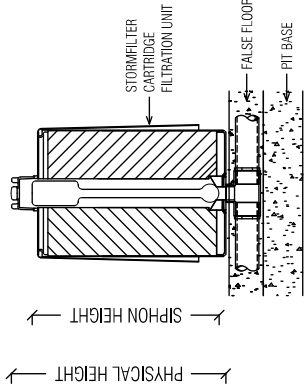
- STORMFILTER TREATMENT CAPACITY VARIES BY NUMBER OF FILTER CARTRIDGES INSTALLED.
- THE STANDARD CONFIGURATION IS SHOWN. ACTUAL CONFIGURATION OF THE SPECIFIED STRUCTURE(S) PER CERTIFYING ENGINEER WILL BE SHOWN ON SUBMITTAL DRAWING(S).
- FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF-CLEANING. RADIAL MEDIA DEPTH SHALL BE 178mm.

CARTRIDGE NAME / SIPHON HEIGHT (mm)	690	460	310
CARTRIDGE PHYSICAL HEIGHT (mm)	840	600	600
TYPICAL WEIR HEIGHT [H] (mm)	920	690	540
CARTRIDGE FLOW RATE FOR ZPG MEDIA (L/s)	1.6	1.1	0.7
CARTRIDGE FLOW RATE FOR PSORB MEDIA (L/s)	0.9	0.46	0.39

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	[]
NUMBER OF CARTRIDGES REQD	[]
SIPHON HEIGHT (310 / 460 / 690)	[]
MEDIA TYPE (ZPG / PSORB)	[]
WATER QUALITY FLOW RATE (L/S)	[]
DIMENSION A	[]
DIMENSION B	[]

TOTAL CARTRIDGE BAY AREA (A x B)
TO MATCH AREA REQUIRED BY MUSIC
MODELLING OR COUNCIL SPECIFIC
REQUIREMENTS



STORMFILTER CARTRIDGE DETAIL

GENERAL NOTES

1. INLET AND OUTLET PIPES TO BE IN ACCORDANCE WITH APPROVED PLANS.
2. A HIGH FLOW BYPASS ARRANGEMENT OR DISSIPATION STRUCTURE MAY BE REQUIRED TO MINIMISE RE-SUSPENSION OF SOLIDS OR ANY SIGNIFICANT INERTIAL FORCES ON THE CARTRIDGES.
3. ALL WATER QUALITY TREATMENT DEVICES REQUIRE PERIODIC MAINTENANCE. REFER TO OPERATION AND MAINTENANCE MANUAL FOR GUIDELINES AND ACCESS REQUIREMENTS.
4. SITE SPECIFIC PRODUCTION DRAWING WILL BE PROVIDED ON PLACEMENT OF ORDER.
5. THE INVERT LEVEL OF THE INLET PIPE MUST BE GREATER THAN THE RL OF THE FALSE FLOOR WITHIN THE CARTRIDGE CHAMBER.
6. CONCRETE STRUCTURE AND ACCESS COVERS DESIGNED AND PROVIDED BY OTHERS. ACCESS COVERS TO BE A MINIMUM 900 X 900 ABOVE CARTRIDGES. OH&S REGARDING ACCESS COVERS AND TANK ACCESS TO BE ASSESSED BY OTHERS ON SITE.
7. THE STRUCTURE THICKNESSES SHOWN ARE FOR REPRESENTATIONAL PURPOSES.
8. DRAWINGS NOT TO SCALE.

INSTALLATION NOTES

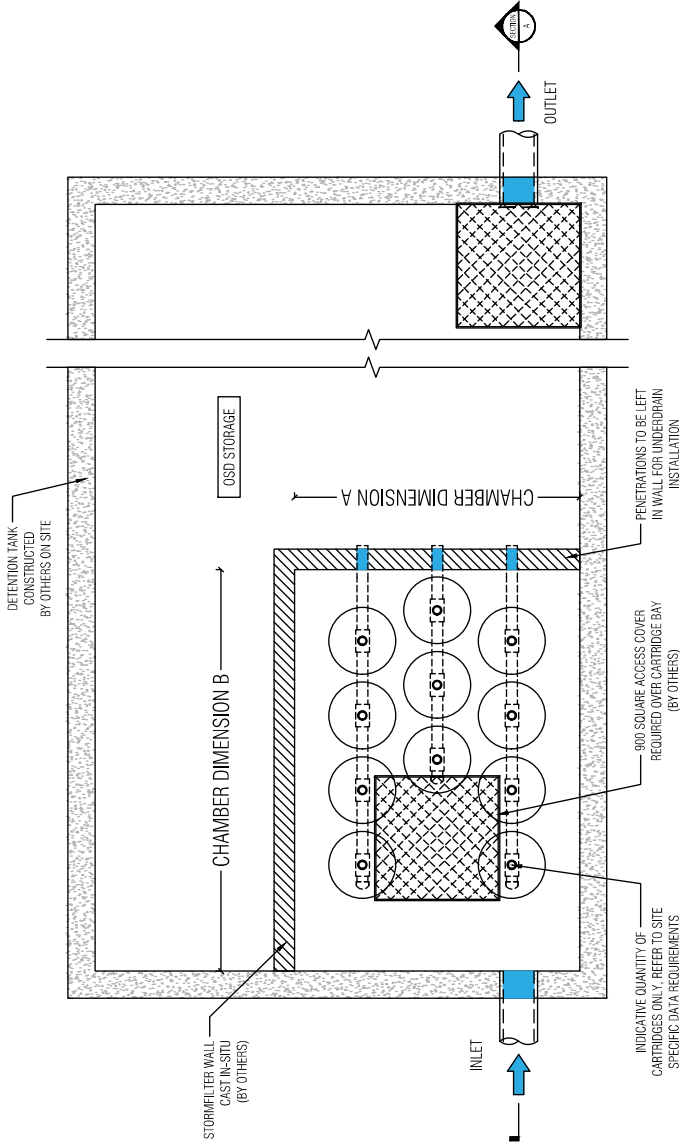
1. UNDERDRAIN AND FALSE FLOOR INSTALLED BY OCEAN PROTECT.



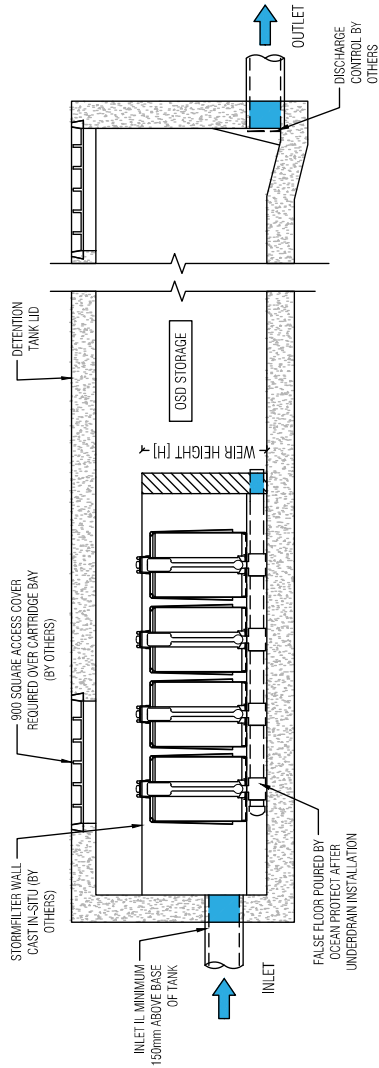
PHONE : 1300 354 722
www.oceanprotect.com.au

OCEAN PROTECT
STORMFILTER SYSTEM
DETENTION TANK ARRANGEMENT
SPECIFICATION DRAWING

NOT FOR CONSTRUCTION



PLAN LAYOUT



SECTION A



PINNACLE ENGINEERING GROUP

ABN: 80 608 431 625
PO Box 517, Paradise Point QLD 4216
www.pinnacleeng.com.au