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DEVELOPMENT APPROVAL

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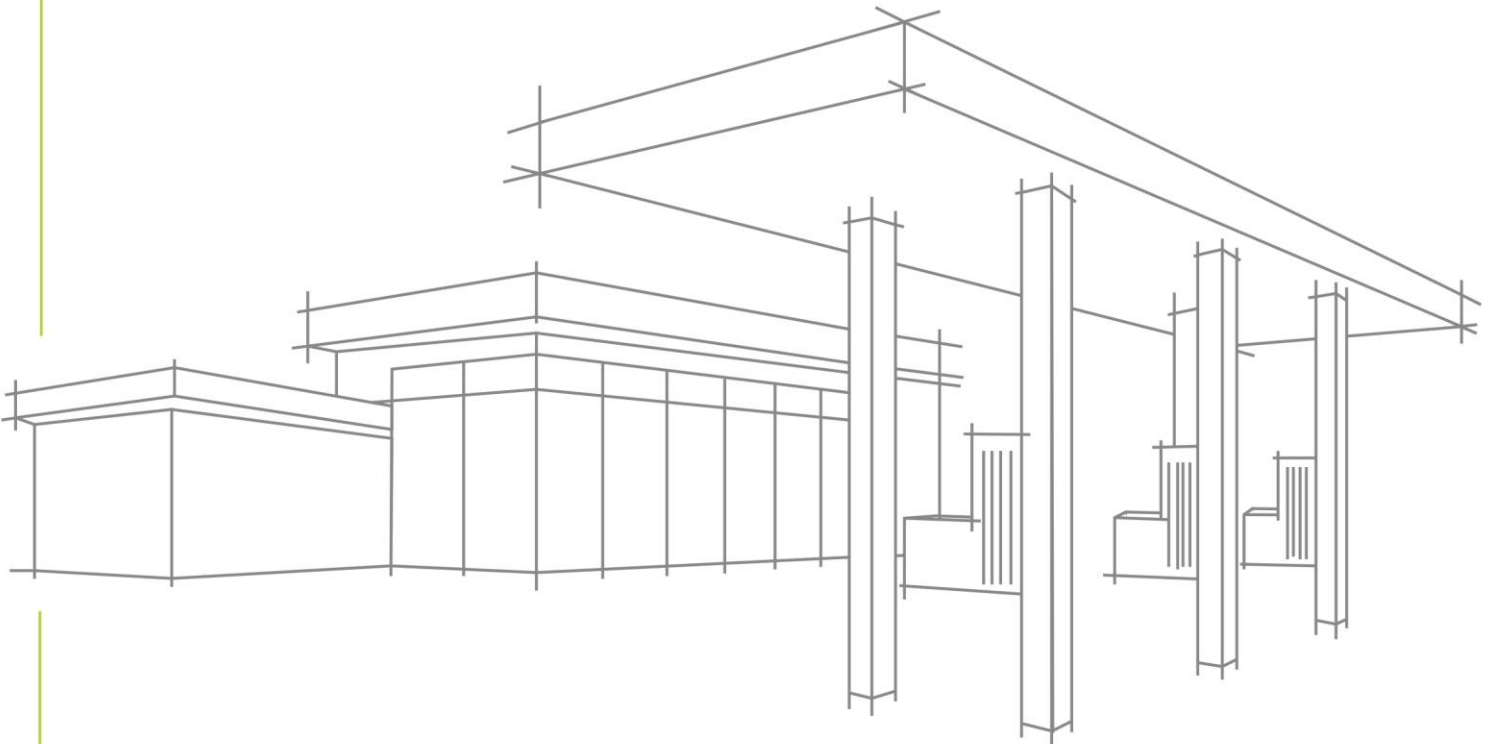
Date: 25 MAY 2021



SITE BASED STORMWATER MANAGEMENT PLAN

AMPOL - YARRABILBA

CNR YARRABILBA DRIVE & MILL STREET, YARRABILBA QLD 4207



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PROJECT MANAGERS | PLANNERS | DESIGNERS | ENGINEERS

SITE BASED STORMWATER MANAGEMENT PLAN

Ampol - Yarrabilba

Cnr Yarrabilba Drive & Mill Street, Yarrabilba Qld 4207

CLIENT: Ampol Australia Petroleum Pty Ltd

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Document Control

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1.0 INTRODUCTION

This Site Based Stormwater Management Plan (SBSMP) has been prepared by TFA Group on behalf of Ampol Australia Petroleum Pty Ltd (the applicant). The purpose of this document is to verify that stormwater quality and quantity have been considered as part of this development and do not have any adverse impact on the downstream environment as outlined in the State Planning Policy July 2017, Yarrabilba Stormwater Infrastructure Master Plan (Designflow, 2012), Yarrabilba Total Water Cycle Management Strategy (Designflow, 2012) and Queensland Urban Drainage Manual 2016.

The proposed development will be implemented in two Stages. Stage 1 consisting of a service station comprising a car canopy over fuel dispensing areas, a pay point building, car parking areas with associated driveways, walkways and landscape areas and Stage 2 comprising a Fast Food building with drive thru facilities.

The SBSMP is part of the Development Approval process and addresses both the construction and operational phases of the development. Table 1 below shows additional details of the proposed development. The proposed site layout plan is shown in **Appendix A**.

Table 1: Details of proposed development

Developer	Ampol Australia Petroleum Pty Ltd
Address	Cnr Yarrabilba Drive & Mill Street, Yarrabilba Qld 4207
Property Description	Lot 12 on SP304357
Area of Development	Overall area: 10,040 m ² Development area: 5,306 m ²
Stormwater Risk Classification	High Risk (due to the storage and transfer on site of petroleum products that have the potential to cause harm to the environment, if released)
Existing Land Use	Vacant land

2.0 THE SITE

2.1 Site Description

The overall site, formally referenced as Lot 12 on SP304357, comprises 10,040 m² in area and is currently a vacant land with a regular shape.

The proposed service station and fast food premises have a leased area of 5,000m². The site has two street frontages, to Yarrabilba Drive and Mill Street with approximate lengths of 132m and 170m respectively.

The site has stormwater, sewer, water and electrical / communications utilities service connection points. Refer Figure 1 below, which provides an aerial view of the current site.

Figure 1: Location of the proposed development site (Source: QLD Globe)



3.0 SITE TOPOGRAPHY AND EXISTING DRAINAGE

3.1 Description of the site current condition

Refer to **Appendix B** for the survey plans provided by Queensland Planning & Survey Pty Ltd. dated the 19 December 2019, which show the condition of the site.

The development site has existing surface levels approximately between RL 34.27m AHD to RL 31.87m AHD. The ground falls from south-east to north-west. Stormwater runoff generated from the lot is captured by 2x1200 sq. gully pits, which convey flows to two existing gully pits located on Yarrabilba Drive via Ø 375 pipes. Refer to section 6.1 for the site's pre-development catchment analysis.

4.0 FLOODING

4.1 Flooding information

Based on Logan City Council Planning Scheme 2015 v7.0 Overlay Map OM-05 'Flood hazard overlay', the site is not within any flood and storm tide hazard. An extract of this overlay map is shown in Figure 2 which indicates the extension of flood events near the site. Therefore, it is anticipated that flooding will not affect the proposed buildings on this development.

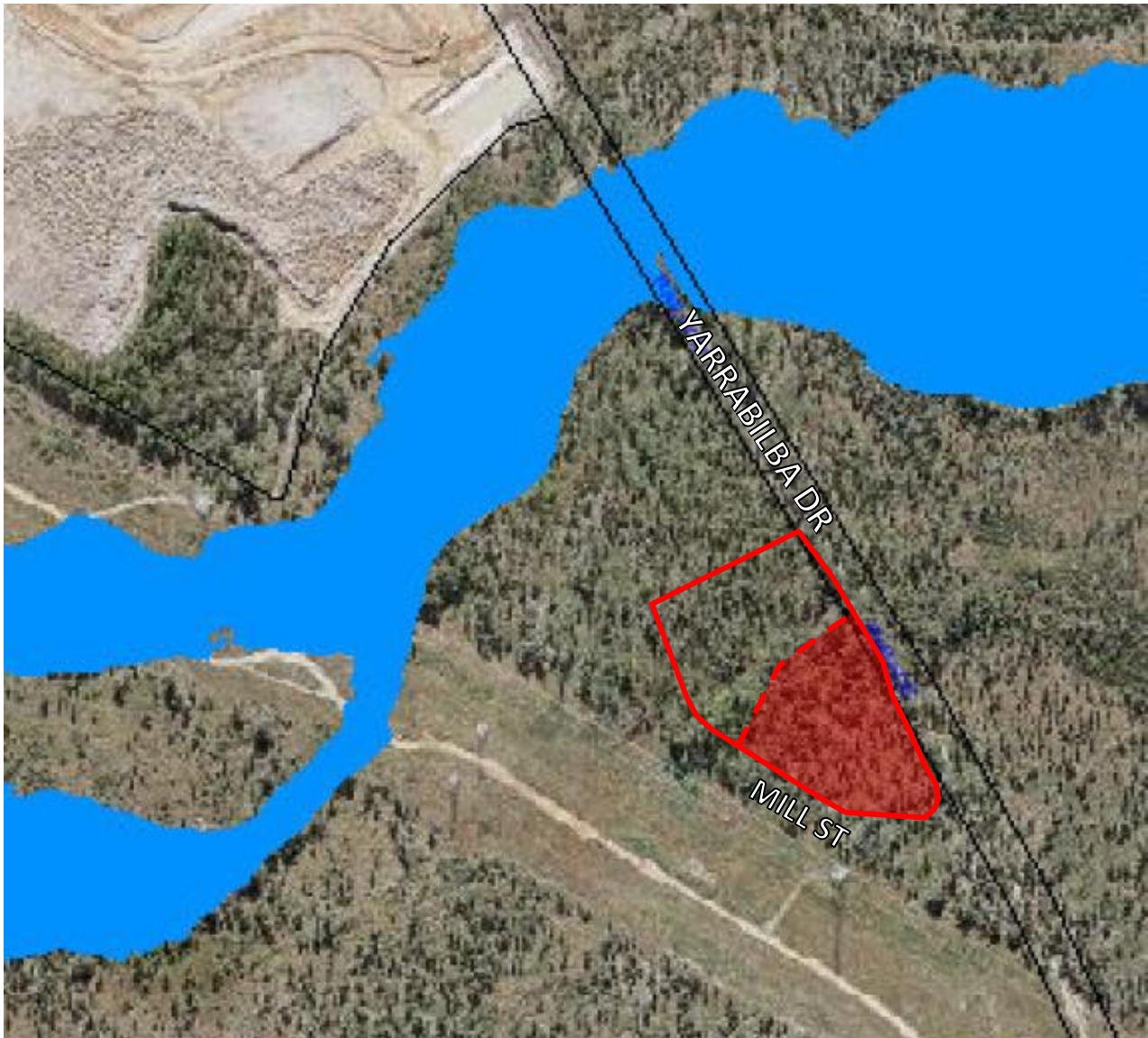


Figure 2: Development Flooding Information (Source: Overlay Map OM-05 'Flood Hazard Overlay')

5.0 PROPOSED DRAINAGE LAYOUT

5.1 Proposed drainage

Overall, the existing catchment boundary has been generally maintained in the post development scenario. The proposed drainage will capture and convey any spillage from High risk areas (hydrocarbon generating e.g. under the canopy) and stormwater runoff generated from low risk areas (rest of the catchment) to an Enviro Australis Environmental Protection System (EPS) MR60 unit (Enviro MR60) for hydrocarbon and nutrients removal. Treated flows will then be discharged to the site's stormwater network. Refer to Section 7 for the site's stormwater quality assessment.

The fuel delivery fill point (unloading area) will be located outside the canopy within a bunded concrete area and therefore any spills that might occur during unloading of fuel will be directed to the Enviro MR60 unit for treatment. A licensed contractor will perform maintenance as specified by the manufacturer. For details of the Enviro MR60 system refer **Appendix E**.

The proposed Enviro MR60 unit has a minimum containment capacity of 10,000L to ensure that potential spills are contained and disposed safely.

The proposed Enviro MR60 unit can treat flows up to 142 L/s, therefore the runoff generated from the site's low risk areas will be conveyed and directed to a concrete chamber fitted with a concrete weir where flows above 131 L/sec will be diverted bypassing treatment. This equals to runoff generated from the low risk catchment in a 2 years ARI-5 minutes rainfall event.

The proposed lawful point of discharge will be an existing gully pit located East of the site. Stormwater flows from the development will be discharged into a proposed onsite detention system from which a new stormwater line will direct stormwater flows to the lawful point of discharge. Refer section 6 for the detention system calculations and **Appendix C** for the proposed Conceptual Stormwater Management Plan.

6.0 WATER QUANTITY ASSESSMENT

The purpose of this part of the assessment is to investigate whether there is a need to attenuate stormwater flows to negate any adverse impacts on upstream or downstream environments. The water quantity assessment has been undertaken for a combined Stage 1 and Stage 2, which yields more conservative results in comparison to Stage 1 only, considering the fraction impervious ratio of Stages 1 and 2 combined are higher than Stage 1 alone.

Furthermore, it should be noted that the proposed stormwater quantity measures for both Stage 1 and 2 will be implemented during Stage 1 of the development.

Stormwater runoff from both pre and post-development scenarios will be calculated and the results analysed and possible solutions proposed.

6.1 Catchment Analysis

The proposed development area is 5,306 m² (0.530 ha), details of the pre-development catchment are shown in Figure 3 and Table 2 below, which show the surface types, areas, percentage imperviousness and fraction impervious.



Figure 3: Pre-development catchment details

Table 2: Pre-development catchment characteristics

Catchment	Total Area (m ²)	Split Catchment Area (m ²)		% Imperviousness	Fraction impervious
Pre-Development	5,306	0	Roof areas	100	0
		0	Paved areas	100	
		5,306	Landscaped areas	0	
TOTAL	5,306	5,306			

Details of the post-development catchment are shown in Figure 4 and Table 3 below, which show the surface types, areas, percentage imperviousness and fraction impervious.

Table 3: Post-development catchment characteristics

Catchment	Total Area (m ²)	Split Catchment Area (m ²)	Surface Type	% Impervious	Fraction Impervious
Proposed Development	5,306	839	Roof areas	100	0.81
		3,482	Paved areas	100	
		985	Landscaped areas	0	
TOTAL	5,306	5,306			

Table 2 and Table 3 above show that the fraction impervious for the post-development case is higher than the fraction impervious of the pre-development case, this will result in increased peak flows in the post-development case therefore onsite stormwater detention is required.

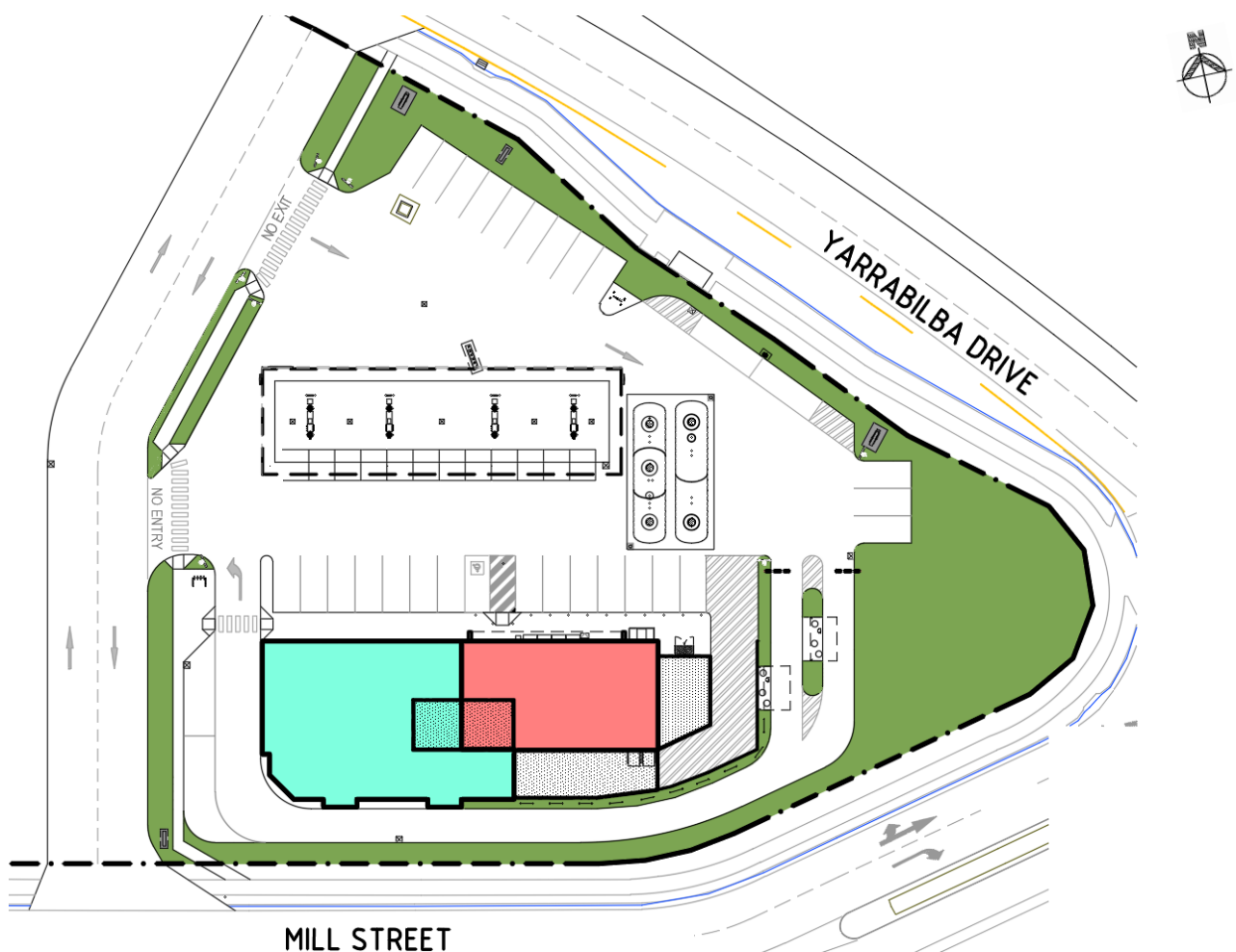


Figure 4: Post-development catchment details.

6.2 Stormwater Detention Sizing

6.2.1 Rational Method

The rational method was used to calculate the stormwater runoff flows from the site for the pre and post-development scenarios. The formula is as follows:

$$Q_y = (C_y \times i_y \times A) / 360 \quad (\text{QUDM 2016 Equation 4.2})$$

Where:

Q_y = peak flow rate (m^3/s) for average recurrence interval (ARI) of 'y' years

C_y = coefficient of discharge (dimensionless) for ARI of 'y' years

A = area of catchment (ha)

i_y = average rainfall intensity (mm/h) for a design duration of 't' hours and an ARI of 'y' years.

t = the nominal design storm duration as defined by the time of concentration (t_c).

The value '360' is a conversion factor to suit the units used.

6.2.2 Catchments

The existing catchment boundary has been maintained in the post development scenario. Pre and post-development catchment information is tabulated in Table 4 below.

Table 4: Catchment details

Catchment	Pre-development Area (Ha)	Pre-development fraction impervious	Post-development Area (Ha)	Post-development fraction impervious
Development	0.530	0.00	0.530	0.81

6.2.3 Time of concentration

The time of concentration of the pre-development scenario was calculated using the Friend's equation for overland sheet flow and figure 4.8 and 4.9 of the Queensland Urban Drainage Manual (QUDM 2016). The equation is shown below:

$$t_c = (107 \cdot n \cdot L^{0.333}) / S^{0.2} \quad \text{(QUDM 2016: Equation 4.5)}$$

Where:

t_c = overland sheet flow travel time (min)

L = overland sheet flow path length (m)

n = Horton's surface roughness factor

S = slope of surface (%)

The value '107' is a conversion factor to suit the units used.

Based on the survey information the assumed flow path for this calculation is indicated in Figure 5. A thick red line represents the flow path. For the development scenario the flow path starts at the south-east area of the site and finish north-west of the site. It is assumed a gravelled surface/bare soil type for Horton's coefficient.

Table 5: Pre-development time of concentration assumptions

Assumptions	Catchment – Stage 1
Overland sheet flow length (m)	66.0
Overland sheet flow slope (%)	2.20
Horton's coefficient	0.015
Overland sheet flow travel time (min)	5.50

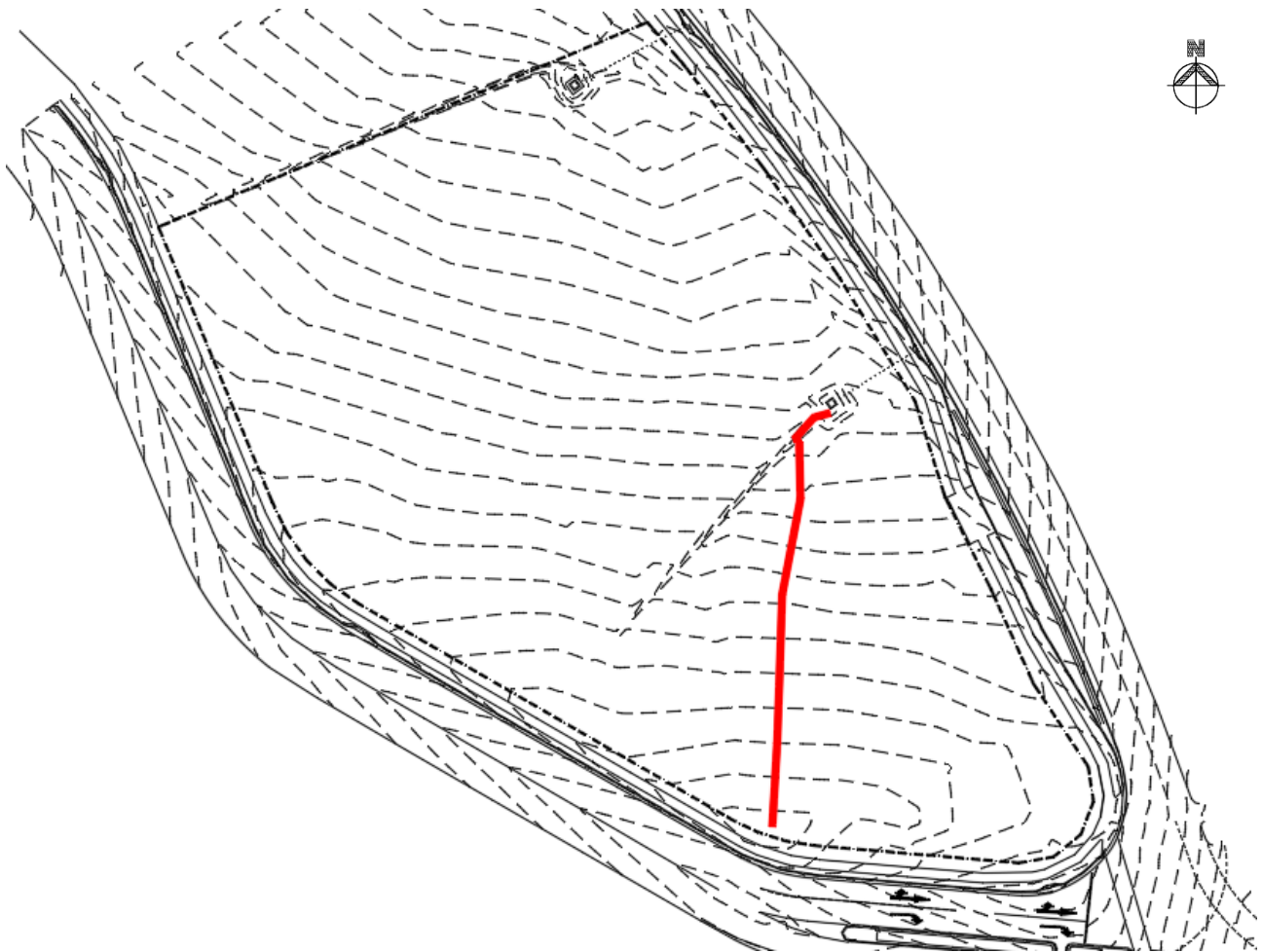


Figure 5: Assumed site overland flow path for time of concentration calculations

Table 6 below shows the times of concentration used in the water quantity assessment. The time of concentration for post-development scenarios was determined using clause 5.4.4 of AS3500.3:2018 Plumbing and Drainage: Stormwater Drainage.

Table 6: Time of concentration for the catchments

Catchment	Time of concentration (min)
Pre-development	5.50
Post-development	5.00

6.2.4 Coefficient of discharge

The formula used to find coefficient of discharge is as follows:

$$C_Y = F_Y \cdot C_{10} \quad (\text{QUDM 2016: Equation 4.5})$$

Where:

F_y = Frequency factor (QUDM Table 4.5.2)

C_{10} = Coefficient of discharge for a 1 in 10 year ARI (QUDM Table 4.5.3 & 4.5.4)

One hour rainfall intensity for a 1 in 10 year ARI (I_{10}) of 58.1 mm/hr and fraction impervious values obtained on section 6.2.2 are used to obtain C_{10} values. Table 7 illustrates the results.

Table 7: C_{10} values for the pre and post development cases

	Pre-Development	Post Development
C_{10}	0.66	0.83

Table 8 below shows the F_y factor used to calculate the C_y value for each ARI.

Table 8: F_y factors for the nominated ARI's

	1 year ARI (mm/hr)	2 year ARI (mm/hr)	5 year ARI (mm/hr)	10 year ARI (mm/hr)	20 year ARI (mm/hr)	50 year ARI (mm/hr)	100 year ARI (mm/hr)
F_y	0.80	0.85	0.95	1.00	1.05	1.15	1.20

The coefficient of discharge for both pre and post-development catchments is calculated based on equation 4.4 of QUDM and the results shown in Table 9.

Table 9: Coefficients of discharge for pre and post-development scenarios

Coefficient of Discharge	1 year ARI	2 year ARI	5 year ARI	10 year ARI	20 year ARI	50 year ARI	100 year ARI
Pre-development	0.53	0.56	0.63	0.66	0.69	0.76	0.79
Post-development	0.66	0.70	0.79	0.83	0.87	0.95	0.99

6.2.5 Rainfall Intensities

The rainfall intensities for the site were read from an IFD table obtained from the BOM website for the project site on 11 September 2020. The rainfall intensities for a given time of concentration for the pre and post-development cases for the nominated ARI's are shown in Table 10.

Table 10: Rainfall intensities for the nominated ARI's

t_c (mins)	1 year ARI (mm/hr)	2 year ARI (mm/hr)	5 year ARI (mm/hr)	10 year ARI (mm/hr)	20 year ARI (mm/hr)	50 year ARI (mm/hr)	100 year ARI (mm/hr)
5.00	101.0	127.0	157.0	186.0	215.0	253.0	282.0

6.2.6 Stormwater Design Flows

Table 11 shows the stormwater runoff flows for the pre-development case calculated using the rational method.

Table 11: Stormwater flows generated by the pre-development catchments

Catchment	Q1 (l/s)	Q2 (l/s)	Q5 (l/s)	Q10 (l/s)	Q20 (l/s)	Q50 (l/s)	Q100 (l/s)
Pre-development	78.9	104.8	145.8	180.9	218.6	283.4	328.35

Table 12 shows the stormwater runoff flows for the post-development case calculated using the rational method

Table 12: Stormwater flows generated by the post-development catchments

Catchment	Q1 (l/s)	Q2 (l/s)	Q5 (l/s)	Q10 (l/s)	Q20 (l/s)	Q50 (l/s)	Q100 (l/s)
Post-development	98.2	131.0	182.8	227.5	275.7	354.2	411.4

As can be seen from Table 13 below, the development will increase stormwater runoff for the catchment for the nominated ARI's, therefore onsite stormwater detention will be required to mitigate the peak discharge and achieve the "no worsening" of the stormwater drainage conditions external to the site.

Table 13: Stormwater flow differences between post and pre-development for standard ARI's

Catchment	Q1 (l/s)	Q2 (l/s)	Q5 (l/s)	Q10 (l/s)	Q20 (l/s)	Q50 (l/s)	Q100 (l/s)
"Post"- "Pre"	19.3	26.2	37.0	46.6	57.0	70.8	83.12

6.2.7 Required Detention Volume

The onsite detention volume will restrict the post-development flows to pre-development conditions. The required detention volume and outlet arrangement was modelled, designed and sized using computer software (DRAINS V2020.041). Table 14 below show the required detention volume for a range of design storms for the development's catchments. The table also compares the pre & post development flows to the designed output flows from DRAINS based on the detention storage volume. A snapshot of the DRAINS model is shown in Figure 6 below.

Based on Table 14, the minimum required detention volume to mitigate post-development flows is 75,300(litres).

6.2.8 Proposed On-Site Detention System

It is proposed to provide the required detention via underground concrete tanks to restrict post-development flows to pre-development conditions.

The detention system was modelled with the following geometry and outlet arrangements:

11 x 7KL precast Australian Tanks (2250W x 3250L x 1450H) fitted with 3x $\varnothing$ 300mm orifice plates. Invert levels of corresponding orifices are as follows:

- First $\varnothing$ 300 orifice at 30.37m AHD (bottom of the OSD system)
- Second $\varnothing$ 300 orifice at 30.95m AHD
- Third $\varnothing$ 300 orifice at 31.15m AHD

The first two orifices aim to mitigate up to 20 years ARI events and, an additional 1x $\varnothing$ 300mm orifice plate outlet is added to mitigate up to 100 years ARI event inclusive (all outlets discharging simultaneously). The mitigated flows are conveyed to the proposed lawful point of discharge via a $\varnothing$ 450 RCP pipe fitted at the bottom of the OSD system.

Refer to **Appendix D** for inflow-outflow hydrograph and storage volume graphs outputs from DRAINS software.

7.0 WATER QUALITY ASSESSMENT

7.1 Construction Phase

Impacts on receiving waters and surrounding areas will be minimised during the construction phase with measures as outlined in this SBSMP and the Erosion and Sediment Control Plan to be developed for the Operational works.

The Water quality assessment has been undertaken for a combined Stage 1 and Stage 2, which yields more conservative results in comparison to Stage 1 only, considering the fraction impervious ratio of the stages 1 and 2 combined are higher than Stage 1 alone.

Furthermore, it should be noted that the proposed stormwater quality measures for both Stage 1 and 2 will be implemented during Stage 1 of the development.

7.1.1 Pollutants

Typical pollutants generated during the construction phase of the development are shown below in Table 15.

Table 15: Pollutant typically generated during the construction phase

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, off-cuts
Sediment	Unprotected exposed soils and stockpiles during earthworks and building
Hydrocarbons	Fuel and oil spills, leaks from construction equipment
Toxic materials	Cement slurry, asphalt prime, solvents, cleaning agents, wash-waters
pH altering substances	Acid sulphate soils, cement slurry and wash-waters

7.1.2 Performance objectives

The objectives are:

- Minimise the amount of sediment entering waterways and stormwater drains;
- Minimise or prevent environmental harm to waterways and associated ecosystems;
- Minimise localised flooding caused by sediment runoff;
- Minimise exposure of soils.

Table 16: Construction phase performance criteria

Indicator	Water Quality Objectives
pH	6.5 – 8.5
Suspended Solids	Annual Mean < 10mg/L
Oils and Grease	No visible films or odour
Litter/ Gross pollutants	No anthropogenic (man-made) materials greater than 5mm in any dimension
Dissolved oxygen	80-100% saturation

7.1.3 Monitoring and maintenance

The general requirement of monitoring during the construction phase will be:

- Work activities are restricted to designated construction areas;
- Earthworks and site clearing are undertaken in accordance with an Erosion and Sediment Control Plan;
- Erosion and sediment control devices are to be constructed/installed in accordance with an Erosion and Sediment Control Plan;
- Inspection of sediment fences, erosion and sediment control structures/devices on a weekly basis as well as after any rain event exceeding 25mm in 24hrs (major storm event);
- Stormwater discharges from the site are not having any adverse effect on the downstream environment;
- Monitoring and recording of the performance of the drainage control devices including water quality testing where required;
- Any failure in the stormwater system shall be immediately rectified to prevent uncontrolled discharge from the site;
- Any failure to the stormwater system causing damage to surroundings should implement immediate remedial work to the damaged area.

7.1.4 Responsibility and reporting

- The contractor shall be responsible for monitoring the performance of all drainage control and erosion and sediment control devices;
- Records of any failures to devices should be kept and reported to the Construction Manager;
- Regular inspections of the devices shall be reported to the Construction Manager;
- Inspections of the devices after heavy rainfall shall be reported to the Construction Manager;

7.2 Operational Phase

7.2.1 Pollutants

The key pollutants typically generated during this phase for the entire catchment are shown in Table 17.

Table 17: Pollutant typically generated during the operational phase

Pollutant	Potential Source
Litter / Gross Pollutants	Waste materials, food, food packaging etc.
Hydrocarbons	Fuel and oil spills, dispensing areas, car park
Nutrients (N & P)	Nitrogen, Phosphorus
Sediments	Aggregates bins, wind deposits and car trails
Surfactants	Detergents, cleaning agents

7.2.2 Water Quality Objectives

Based on Yarrabilba – Stormwater Infrastructure Master Plan (Designflow, 2012), which are consistent with the State Planning Policy (2017), the development is required to achieve the TN, TP and TSS pollutant reductions outlined in Table 18.

Table 18: Operational Phase water quality objectives

Pollutant	Reduction*
Total Suspended Solids	80%
Total Phosphorus	60%
Total Nitrogen	45%
Gross Pollutants >5mm	90%

*These values represent the minimum required reductions in the average annual pollutant loads generated from an unmitigated development.

7.3 Proposed Stormwater Treatment

7.3.1 Stormwater treatment philosophy

Waterways and other aquatic environments are valued by the community for their social, cultural, economic and environmental benefits. Urban runoff, contaminated with nutrients, sediment and other pollutants adversely impacts these valued resources. Water Sensitive Urban Design (WSUD) is a holistic approach to the planning and design of urban landscapes that minimises these negative impacts. This approach is used on this project to select the treatment options that considers the civil, landscape and ecological aspects of the site.

7.3.2 Source Controls

Rubbish bins can be an effective source control for litter and are appropriate for most developments. Bins will be placed in appropriate areas (such as buildings and staff amenity) to encourage thoughtful waste disposal.

7.3.3 In Ground Proprietary Treatment Devices

In ground proprietary stormwater treatment devices are useful for treatment of stormwater on sites that are constrained by available area for stormwater treatment. These devices are installed underground and can remove a full range of pollutants from stormwater, including TSS, soluble heavy metals, oil, grease and nutrients.

7.3.3.1 Stormwater Treatment Device:

All the fuel dispensing areas and remote fill point bunded area will discharge into the proposed Enviro MR60 unit for treatment at all times. Similarly, runoff generated from low risk areas (refer section 5.2) up to 2 years ARI will discharge into the MR60 unit. The Enviro MR60 is a unique integrated Class 1 oil/water Separator as well as Stormwater Quality Improvement Device (SQID) with a 142L/s treatment capacity and achieves reduction of gross pollutants (GP) 95%, suspended solids (TSS) 90%, total phosphorus (TP) 97%, total nitrogen (TN) 85% and total hydrocarbons 99.95%. Refer to section 7.5 for the proposed development MUSIC modelling assessment.

7.4 Fuel Related Stormwater Treatment

The treatment train shown in Figures 7 use the best management guidelines to treat stormwater runoff from the site.

7.4.1 Oily water treatment philosophy- Fuel Dispensing Areas

The fuel dispensing areas will be concrete surfaced, covered by a canopy and bunded to prevent stormwater runoff from other catchments flowing into the dispensing areas and to ensure that any spills are contained within the bund.

The perimeter of the canopy will overhang the dispensing containment areas by 10 degrees to reduce windblown rain into the dispensing area. Any flows/spills in the containment area will be captured and conveyed by gully pits and underground pipes to an Enviro MR60 unit with a minimum containment capacity of 10,000 litres.

Bulk fuel transfers from a road tanker to underground tanks will take place in a remote Fill Point located outside the canopy within a bunded concrete area. A gully pit will be located within this area to capture and convey any possible spill to the Enviro MR60 unit. A spill containment box at the fill point will capture any minor fuel spills that may occur during unloading; the spilt fuel will then drain from the containment box into the fuel storage tanks.

7.4.1.1 Enviro Australis Environmental Protection System (EPS) MR60 unit

The Enviro MR60 device is a fully integrated in-line device capable of removing pollutants including oils from run-off. The device does not require any power, utilising the energy of the water flow to separate and contain pollutants for periodical removal by evacuation equipment. Internal surface can be inspected and washed as required, whilst screens can be removed and cleaned if and as required.

The device has a design service life of 100 years for fixed parts and 25 years for replacement parts. The Enviro MR60 unit claims a performance which can reach reductions of 95% for Gross Pollutants (GP), a 90% of Suspended Solids (TSS), a 97% of Total Phosphorous (TP), a 85% of total Nitrogen (TN), a 99.95%. Hydrocarbon retention occurs in a separate chamber which operates as a best practice oil and grease arrestor. The MR60 will remove hydrocarbons, gross pollutants, and total suspended solids. Refer to **Appendix E** for the Enviro MR60 unit details.

7.4.2 Underground Fuel Storage Tanks

Underground fuel storage tanks, piping and fuel dispensers will be installed in accordance with the Australian Institute of Petroleum (AIP) standards.

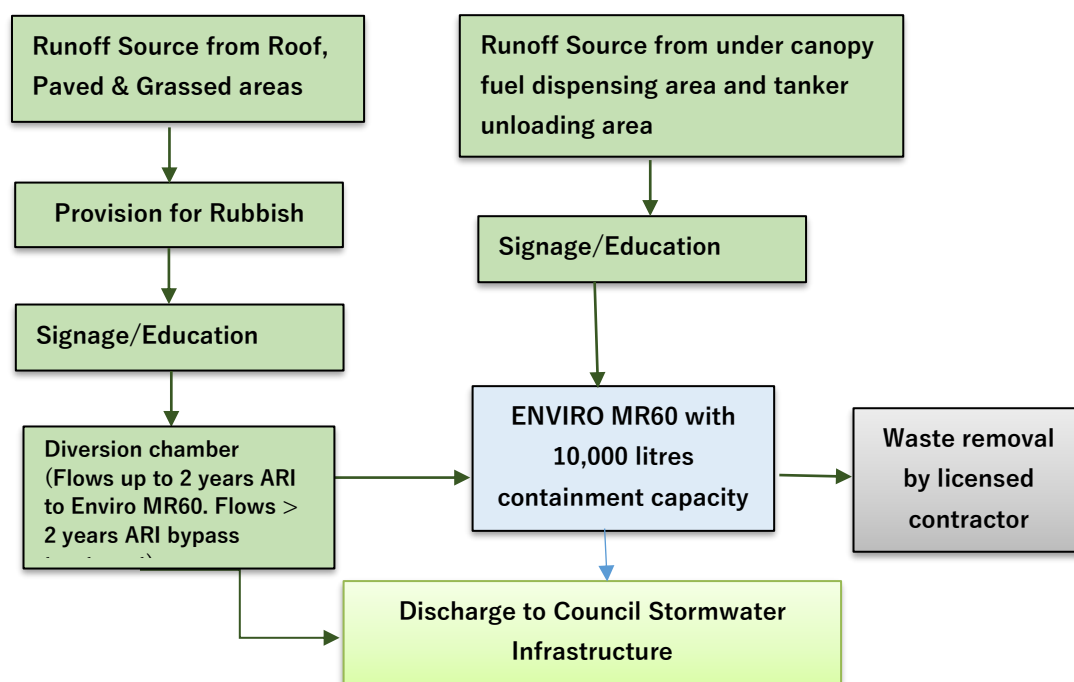


Figure 7: Fuel related stormwater treatment philosophy

7.5 MUSIC Modelling

7.5.1 Introduction

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC - Version 6.3) was used to assess the performance of the proposed stormwater treatment measures required to achieve statutory pollutant reduction targets for the operational phase of the project.

7.5.2 Music Model Setup

The input parameters for source node, soil behaviour and pollutant generation characteristics are based on Table A1.2 and 3.9 of MUSIC Modelling Guidelines Version 3.0 - 2018, WaterByDesign (2018). The following inputs were used:

- MUSIC Modelling Guidelines Version 3.0 - 2018, WaterbyDesign
- Queensland Urban Drainage Manual (QUDM), Second Edition 2016
- Ormeau Station No: 40863

The details of the catchments/source nodes used in the MUSIC model and the proposed treatment train modelled are shown in Table 19 below.

Table 19: MUSIC catchment parameters

Catchment	Total Area (m ²)	Split Catchment Area (m ²)	Land Use	% Impervious	Proposed treatment train
Proposed Development	5,306	839	Roof areas	100	Enviro MR60
		3482	Paved areas	100	
		985	Landscaped areas	0	

The proposed stormwater treatment train modelled in MUSIC consists of an Enviro Australis MR60 (Enviro MR60) for the site. Figure 8 below shows a schematic representation of the models analysed and Table 21 demonstrates that the pollutant load reduction objectives for the site have been achieved, i.e. the treatment methods proposed are adequate.

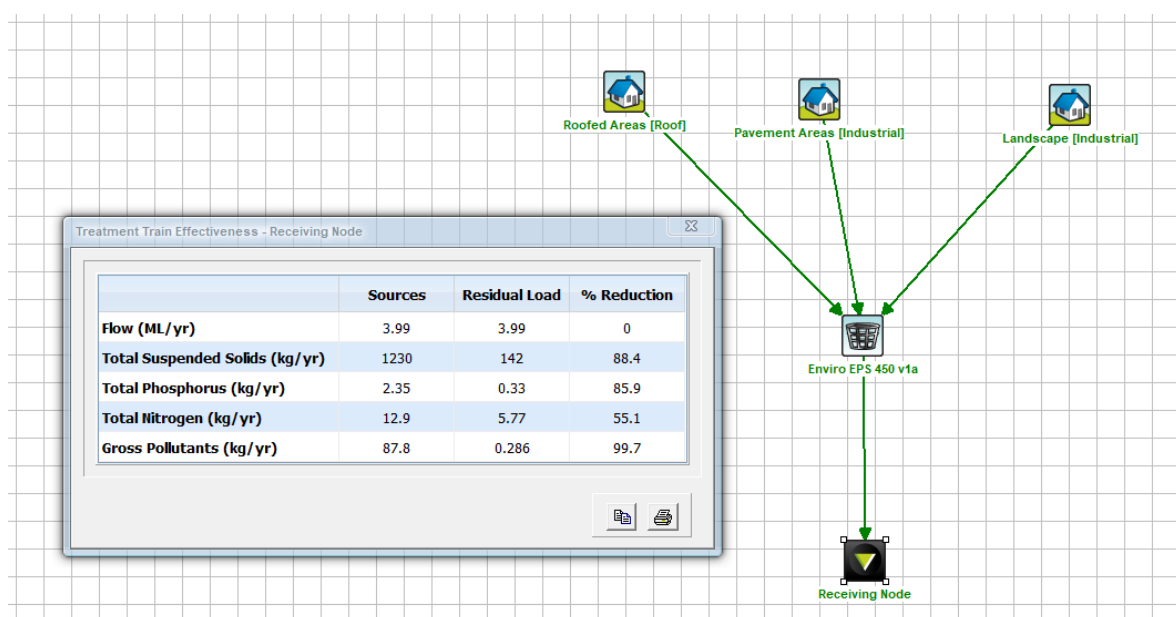


Figure 8: MUSIC model schematic Cnr Yarrabilba Drive & Mill Street, Yarrabilba Qld 4207

7.5.3 Music Modelling Results

The proposed stormwater treatment measures were modelled in MUSIC as a treatment train consisting of an Enviro MR60 unit for the post-development catchment. The generic nodes in MUSIC have been developed by the University of South Australia based on a series of pollutant removal tests undertaken on the Enviro EPS 450 (process and performance exactly the same as the Enviro M series) by Enviro Australia, Ecological Consultants Australia, SESL Australia and Manly Hydraulics Laboratories (MHL) in 2014. The Developing MUSIC Model report prepared by the University of South Australia is available upon request.

Table 20 below show details of proprietary products modelled in MUSIC.

Table 20: Details of proprietary treatment systems as modelled in MUSIC

Catchment	System Used	Number of Units
Post-Dev.	Enviro MR-60	1

Table 21 below, demonstrates that the pollutant load reduction objectives for the site have been achieved, i.e. the treatment methods proposed are adequate.

Table 21: MUSIC model treatment effectiveness

Parameter	Required Load Reduction	Music Results	Objective Achieved
Total Suspended Solids	80.0%	88.4%	Yes
Total Phosphorus	60.0%	85.9%	Yes
Total Nitrogen	45.0%	55.1%	Yes
Gross Pollutants	90.0%	99.7%	Yes

8.0 SITE MAINTENANCE AND MANAGEMENT PROCEDURES

8.1 Petrol Station Maintenance and Management Procedure

The service station operator will have a Petrol Handling Manual that will set out all requirements for the safe handling of combustible and flammable materials. This manual will dictate weekly, monthly and annual checking procedures with checklists, which will be completed, and the records stored.

The manual will also set out dry cleaning methods to be employed within the fuel dispensing area in lieu of washing down to reduce possible contaminated runoff. Emergency procedures will be also clearly set out detailing actions to be taken by site personnel in the case of varying possible emergencies such as spills, fire or risk of fire, vehicle accidents, etc.

In addition a regular cleaning, maintenance program/contract is to be established for emptying of rubbish bins located around the site, removal of general litter from the site, inspection of stormwater gully pits and removal of any captured litter from the pit grates. The Enviro MR60 unit will be inspected and maintained in accordance with the manufacturer's instructions. Refer to **Appendix F** for maintenance plans.

The maintenance plan will address the following:

- Inspection frequency;
- Maintenance frequency;
- Data collection/storage requirements;
- Detailed cleanout procedures.

The plan will include inspection procedures covering aspects such as equipment needs, maintenance techniques, occupational health and safety, public safety, environmental management considerations, disposal requirements of pollutants collected and access issues.

8.2 Maintenance Plans for Stormwater treatment devices

All stormwater quality improvement systems require regular maintenance in order to function adequately. Table 22 details the basic maintenance requirements for each type of stormwater quality improvements systems. A detailed maintenance schedule will be developed as part of the detailed design of the site.

Table 22: Maintenance Requirements

Control	Maintenance Requirement	Maintenance Period
Enviro MR60	Generally, comprehensive maintenance is performed from the surface via vacuum truck. No personnel access required to enter the device for service and maintenance. All surfaces inside the units are visible from the service covers, negating the need for personnel to enter the device. If required, screens can be removed manually to wash them down if required without entering the device.	Design service intervals are 12 months. Service by evacuation trucks is typically completed in less than one hour.

For operational and maintenance guidelines refer to **Appendix F** and relevant manufacturer's documentation.

9.0 LIFECYCLE COSTS

A lifecycle cost analysis is not part of the scope of this report. All the recommended water quality treatment infrastructure lies within the development site and it shall be maintained and serviced by the owners of the development at no cost to Council.

10.0 CONCLUSION

A Site Based Stormwater Management Plan has been prepared with respect to the proposed service station and food & drink premises. The location of the site is shown on Figure 1 and the proposed development site layout is shown in **Appendix A**.

- Stormwater Quantity

To mitigate post development flows from the proposed development and to achieve a “no worsening” of stormwater conditions external to the site, an assessment of the water quantity has been undertaken for the post development case resulting in the requirement of onsite detention tanks.

The required detention volume and outlet arrangement was modelled, designed and sized using computer software (DRAINS V2020.041) resulting in the requirement of 75.3KL detention system. Refer section 6 of this report for the Water Quantity Assessment details, section 6.2.7 for the DRAINS modelling outlet arrangements and **Appendix D** for inflow-outflow hydrographs outputs from DRAINS software.

- Stormwater Quality- Construction Phase

An Erosion and Sediment Control Plan aimed at minimising unacceptable impacts during the construction phase will be developed at the Operational Works stage, in accordance with Council Guidelines and Standards aiming to minimise unacceptable impacts to occur during the construction phase.

- Stormwater Quality- Operational Phase

Conceptual MUSIC models for the site indicated that the proposed treatment measures will achieve the statutory water quality objectives for the site. Refer section 7.5 of this report for details. The proposed treatment is shown in **Appendix C**.

This Site Based Stormwater Management Plan has demonstrated that adequate stormwater quantity and quality management principles and techniques will be employed during the construction and operational of this development to comply with the Queensland State Planning Policy 2017, Yarrabilba Stormwater Infrastructure Master Plan (DesignFlow, 2012) and Queensland Urban Drainage Manual 2016. The methods proposed are considered current best management practice for a development of this type, on this site.

Yours faithfully



Hasan Dalgic
BEng,
Civil Engineer

For and on behalf of TfA Group

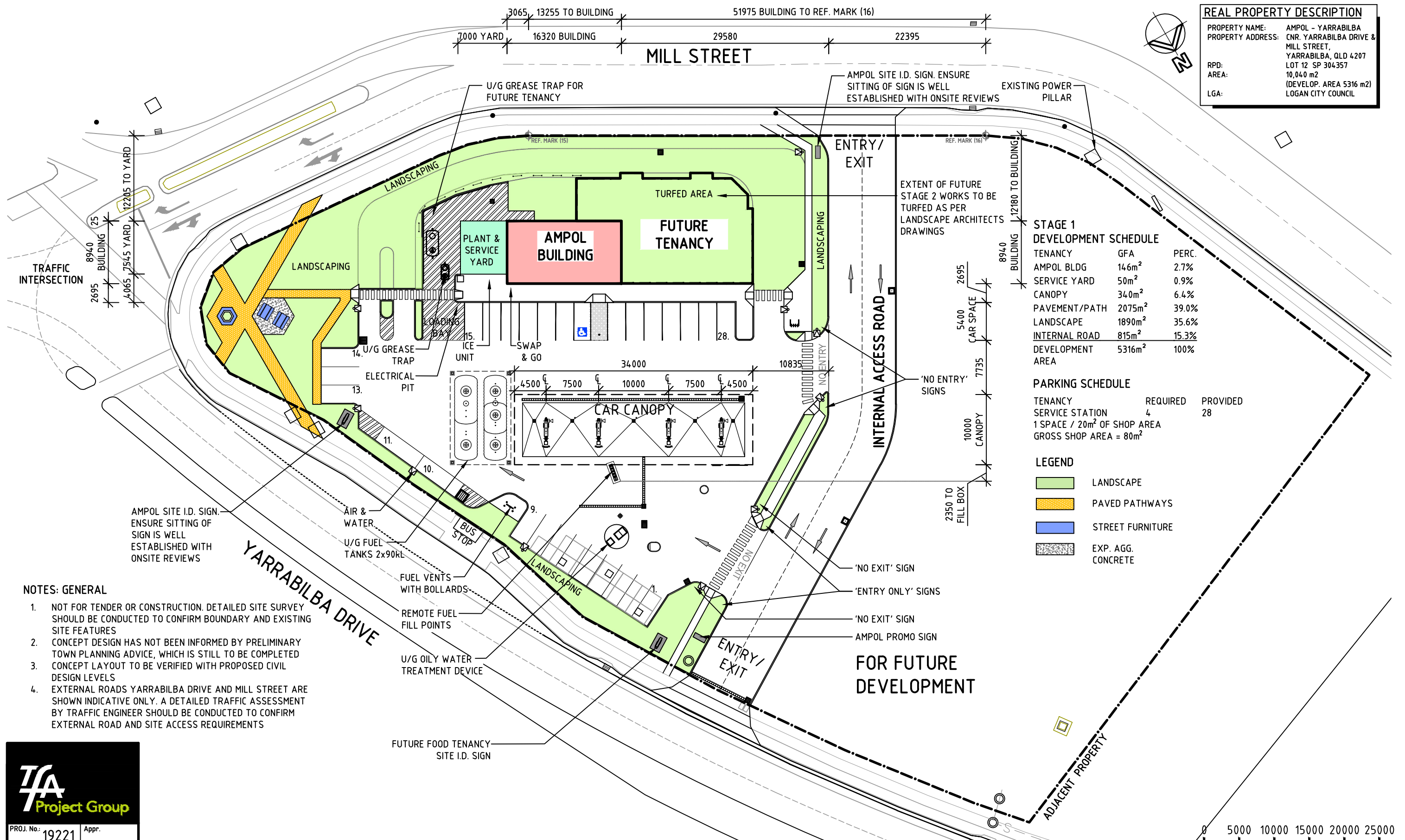
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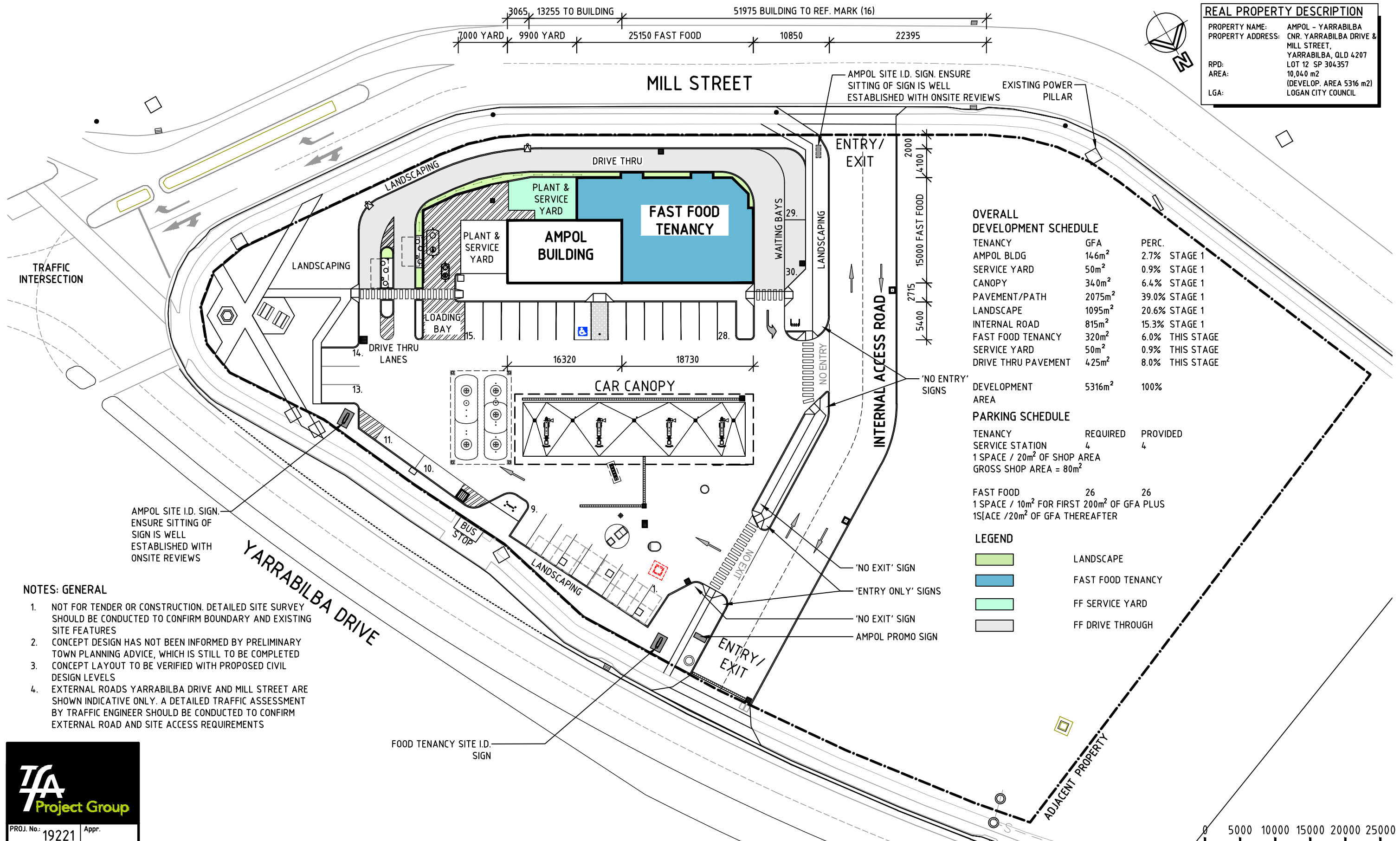
Juan Avella (RPEQ 11899)
BEng, MIEAust, CPEng, RPEQ, NER
Director Civil/Structural Engineering

For and on behalf of TfA Group

APPENDIX A – PROPOSED SITE LAYOUT PLAN



	REV.	BY	DATE	DESCRIPTION OF CHANGE	PROJECT YARRABILBA SOUTH - QLD CNR YARRABILBA DRIVE & MILL STREET	TITLE PROPOSED SITE PLAN STAGE 1	SCALE 1:500 SIZE A3	DA ISSUE	
	A	EEK	13.04.21	DA ISSUE				APPROVED	DATE
								DRAWING No.	REV.
								19221-D03-1	A



REAL PROPERTY DESCRIPTION	
PROPERTY NAME:	AMPOL - YARRABILBA
PROPERTY ADDRESS:	CNR. YARRABILBA DRIVE & MILL STREET, YARRABILBA, QLD 4207
RPD:	LOT 12 SP 304357
AREA:	10,040 m2
LGA:	(DEVELOP. AREA 5316 m2) LOGAN CITY COUNCIL

OVERALL DEVELOPMENT SCHEDULE		
TENANCY	GFA	PERC.
AMPOL BLDG	146m ²	2.7% STAGE 1
SERVICE YARD	50m ²	0.9% STAGE 1
CANOPY	340m ²	6.4% STAGE 1
PAVEMENT/PATH	2075m ²	39.0% STAGE 1
LANDSCAPE	1095m ²	20.6% STAGE 1
INTERNAL ROAD	815m ²	15.3% STAGE 1
FAST FOOD TENANCY	320m ²	6.0% THIS STAGE
SERVICE YARD	50m ²	0.9% THIS STAGE
DRIVE THRU PAVEMENT	425m ²	8.0% THIS STAGE

PARKING SCHEDULE		
TENANCY	REQUIRED	PROVIDED
SERVICE STATION	4	4
1 SPACE / 20m ² OF SHOP AREA		
GROSS SHOP AREA = 80m ²		

FAST FOOD	26	26
1 SPACE / 10m ² FOR FIRST 200m ² OF GFA PLUS 1SPACE / 20m ² OF GFA THEREAFTER		

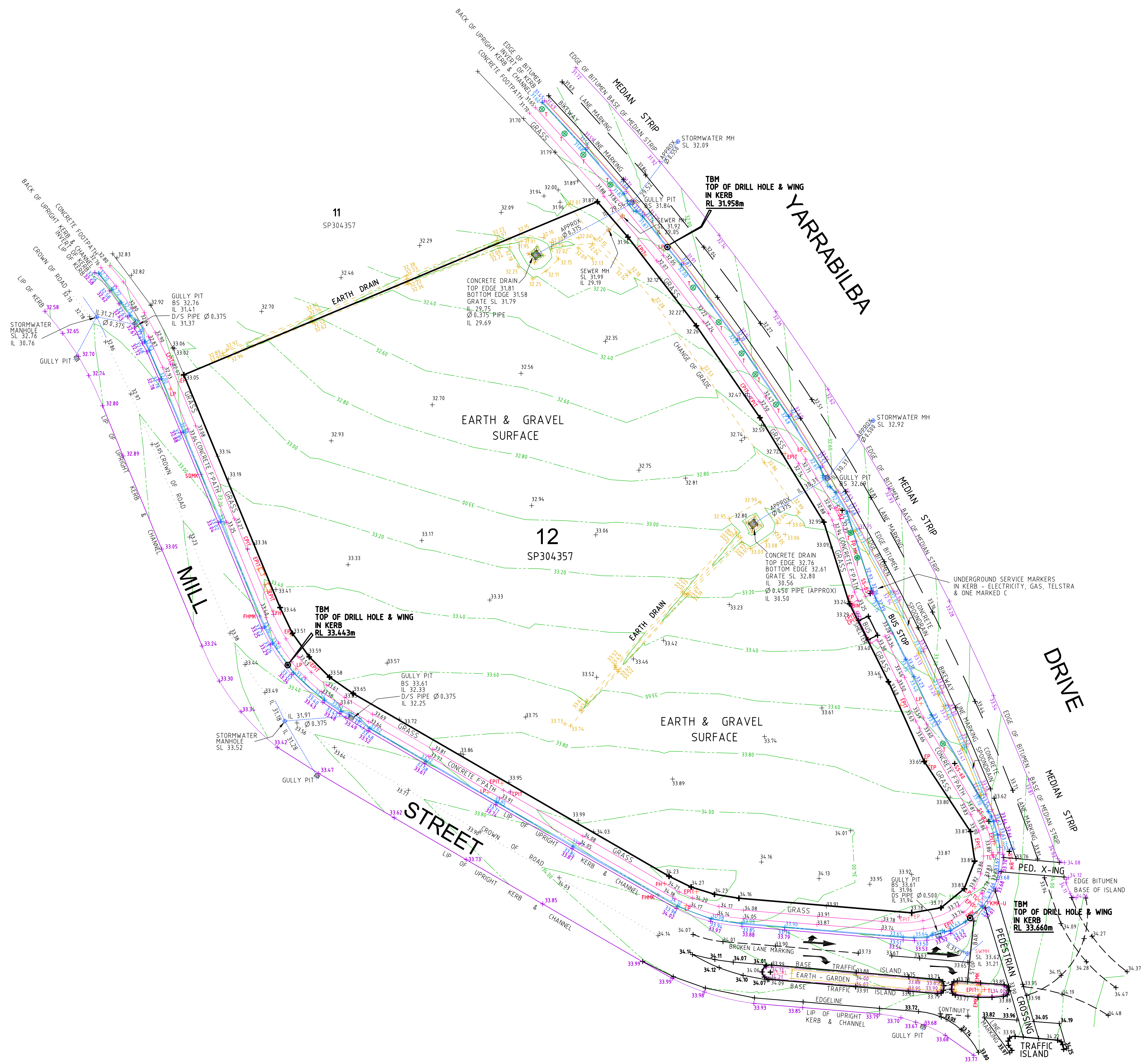
LEGEND	
	LANDSCAPE
	FAST FOOD TENANCY
	FF SERVICE YARD
	FF DRIVE THROUGH

- NOTES: GENERAL
1. NOT FOR TENDER OR CONSTRUCTION. DETAILED SITE SURVEY SHOULD BE CONDUCTED TO CONFIRM BOUNDARY AND EXISTING SITE FEATURES
 2. CONCEPT DESIGN HAS NOT BEEN INFORMED BY PRELIMINARY TOWN PLANNING ADVICE, WHICH IS STILL TO BE COMPLETED
 3. CONCEPT LAYOUT TO BE VERIFIED WITH PROPOSED CIVIL DESIGN LEVELS
 4. EXTERNAL ROADS YARRABILBA DRIVE AND MILL STREET ARE SHOWN INDICATIVE ONLY. A DETAILED TRAFFIC ASSESSMENT BY TRAFFIC ENGINEER SHOULD BE CONDUCTED TO CONFIRM EXTERNAL ROAD AND SITE ACCESS REQUIREMENTS



	REV.	BY	DATE	DESCRIPTION OF CHANGE	PROJECT YARRABILBA SOUTH - QLD CNR YARRABILBA DRIVE & MILL STREET	TITLE PROPOSED SITE PLAN STAGE 2	SCALE	DA ISSUE	
	A	EEK	13.04.21	DA ISSUE			1:500	APPROVED	DATE
							SIZE	DRAWING No.	REV.
							A3	19221-D03-2	A
REVISION									

APPENDIX B – SITE SURVEY PLAN



LEGEND

- BIN
- CPIT
- EMK
- EP
- EPIT
- FH
- FHMK
- FPKM
- KMK-U
- LP
- SDMK
- SS-B
- SS-B
- SS-B
- SS-BW
- SS-KL
- SS-60
- SWMH
- T
- TL
- BUS STOP RUBBISH BIN
- COMMUNICATION CABLE PIT
- ELECTRICITY KERB MARKER
- ELECTRICITY PILLAR
- ELECTRICITY PIT
- FIRE HYDRANT
- FIRE HYDRANT KERB MARKER
- KERB MARKER STAMPED 'FP'
- KERB MARKER - UNKNOWN ORIGIN
- LIGHT POLE
- KERB MARKER - SERVICES DUCT
- BUS STOP SIGN
- BUS ZONE SIGN
- PAINTED BIKEWAY SIGN ON ROAD
- KEEP LEFT SIGN
- 600MM SIGN
- STORMWATER MANHOLE
- SAPLING TREE
- TRAFFIC LIGHTS

NOTES:

- LEVELS TO A.H.D.
- LEVEL ORIGIN IS PSM No.201257 RL 34.095m AHD.
- TBM TOPS ARE SHOWN ON THE PLAN.
- CONTOURS ARE SHOWN TO 0.200m TO INDICATE THE FALL OF THE GROUND, REFER TO THE SPOT HEIGHTS SHOWN FOR ACCURATE HEIGHT INFORMATION.
- PIPE SIZES ARE APPROXIMATE DUE TO DEPTH OF STORMWATER STRUCTURES
- DEFINED FLOOD LEVEL : NOT DETERMINED
- NO FLOOD SEARCH HAS BEEN CARRIED OUT AS PART OF THIS SURVEY
- ALL SERVICES ARE TO BE LOCATED AND FIELD CHECKED BY THE RELEVANT AUTHORITY PRIOR TO ANY EXCAVATION OR CONSTRUCTION
- VISIBLE SERVICES HAVE BEEN LOCATED AND SHOWN. THE EXISTENCE OF OTHER SERVICES SHOULD BE CHECKED WITH THE RELEVANT AUTHORITY.
- BOUNDARIES SHOWN ON THIS PLAN ARE APPROXIMATE ONLY, ARE NOT TO BE RELIED UPON FOR DESIGN PURPOSES AND ARE SUBJECT TO SEPARATE IDENTIFICATION SURVEY.
- BOUNDARIES HAVE NOT BEEN MARKED BY THIS SURVEY.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SITE PHOTOS AND AS-CONSTRUCTED SEARCHES (PROVIDED).
- THE FULL DETAIL ON THIS PLAN CAN BE VIEWED IN MODEL SPACE AT 1:1000

A	20-12-2019	ORIGINAL ISSUE	JRC			
ISSUE	DATE	AMENDMENTS	DRN	CKD	APPD.	REFERENCE DRAWINGS

 **QUEENSLAND
PLANNING & SURVEY Pty Ltd**

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Email : qps@ecn.net.au

PROJECT
**OVER LOT 12 ON SP304357
CORNER OF YARRABILBA DRIVE AND
MILL STREET, YARRABILBA.**

PLOT SCALE 1:1 DRAWING SCALE 1:400 @ A1 SHEET 1 OF 1

CONTOUR AND DETAIL PLAN

JOB No.	6255/B	DWG NO		ISSUE	
DATE	19-12-19	DRAWN	JRC	6255D0101	A

APPENDIX C – CONCEPTUAL STORMWATER MANAGEMENT PLAN

LEGEND

	PROPERTY BOUNDARY
	MINOR CONTOURS (0.1m INTERVALS)
	MAJOR CONTOURS (0.5m INTERVALS)
	EXISTING CONTOURS (0.1m INTERVALS)
	STORMWATER PIPE
	OILY WATER PIPE
	ROOF WATER PIPE
	DESIGN SEWER PIPE
MR60	ENVIRO AUSTRALIS MR60 OILY WATER TREATMENT DEVICE
EGP	EXISTING GULLY PIT
GP/GP1	GULLY PIT/OILY WATER GULLY PIT
TD	TRENCH DRAIN
	TEMPORARY LANDSCAPE (FUTURE FOOD & DRINK BUILDING - STAGE 2)

1/A

MH

DP

x33.00

*33.00

o33.00

STRUCTURE NAMES

MANHOLE

PROPOSED DOWN PIPES

DIRECTION OF SURFACE FALL

FINISHED SURFACE LEVEL

EXISTING SURFACE LEVEL

FINISHED SURFACE LEVEL ON TOP OF TANK TURRET & FUEL FILL BOX. THIS INCLUDES AN ADDITIONAL 25mm COVE UP OVER 300mm TO PERIMETER FROM SURROUNDING SLAB LEVEL. TANK & TURRET LOCATIONS TO BE CONFIRMED BY CONTRACTOR TO SUPERINTENDENT FOR CHECKING LEVEL PRIOR TO PAVEMENT CONSTRUCTION

SERVICES LEGEND

SW

S

CP

EP

EXISTING STORMWATER PIPE

EXISTING SEWER PIPE

EXISTING LIGHTING POLE

EXISTING ELECTRICITY PILLAR

EXISTING FIRE HYDRANT

EXISTING COMMS. PIT

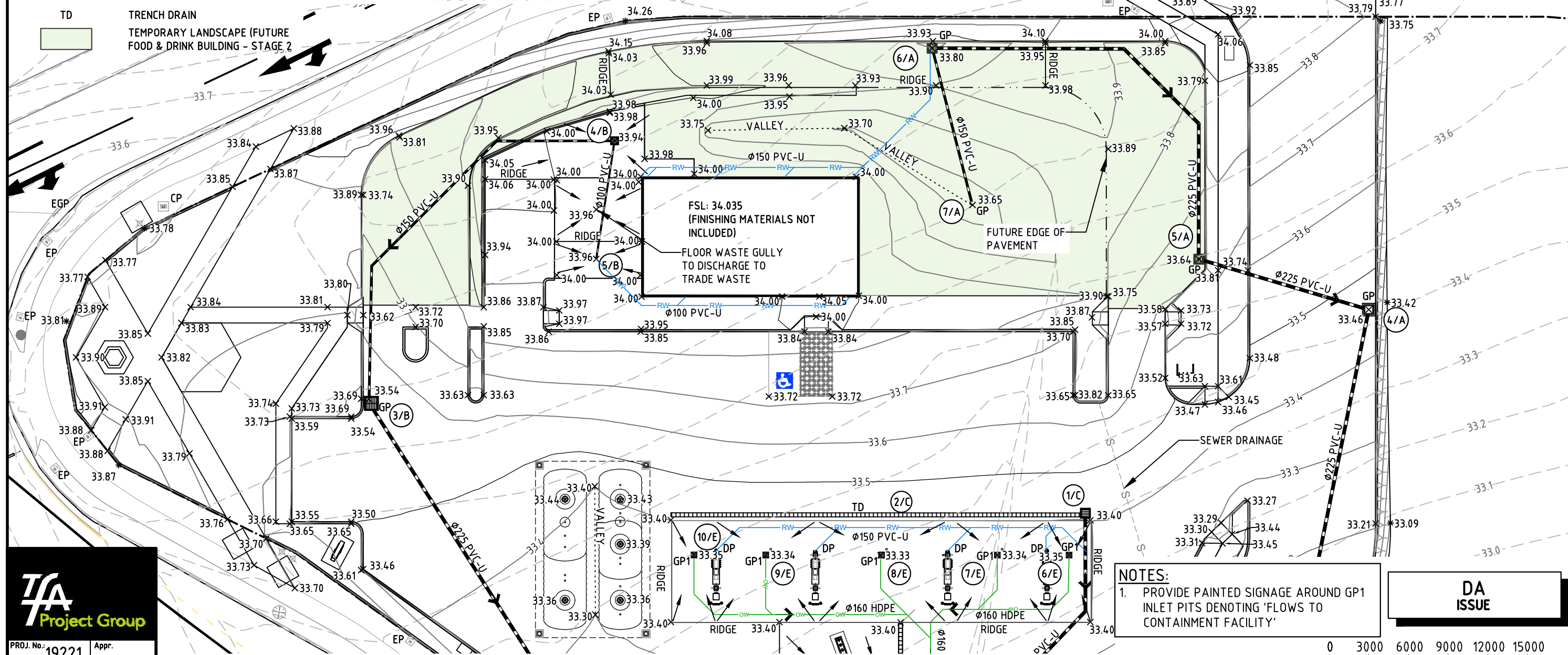
EXISTING ELECTRICAL PIT



MILL STREET

KEY PLAN

SCALE NTS



NOTES:

1. PROVIDE PAINTED SIGNAGE AROUND GP1 INLET PITS DENOTING 'FLOWS TO CONTAINMENT FACILITY'

DA
ISSUE

TFA
Project Group

PROJ. No. 19221 Appr.

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B	HD	15.04.21	DA AMENDMENT

REVISION

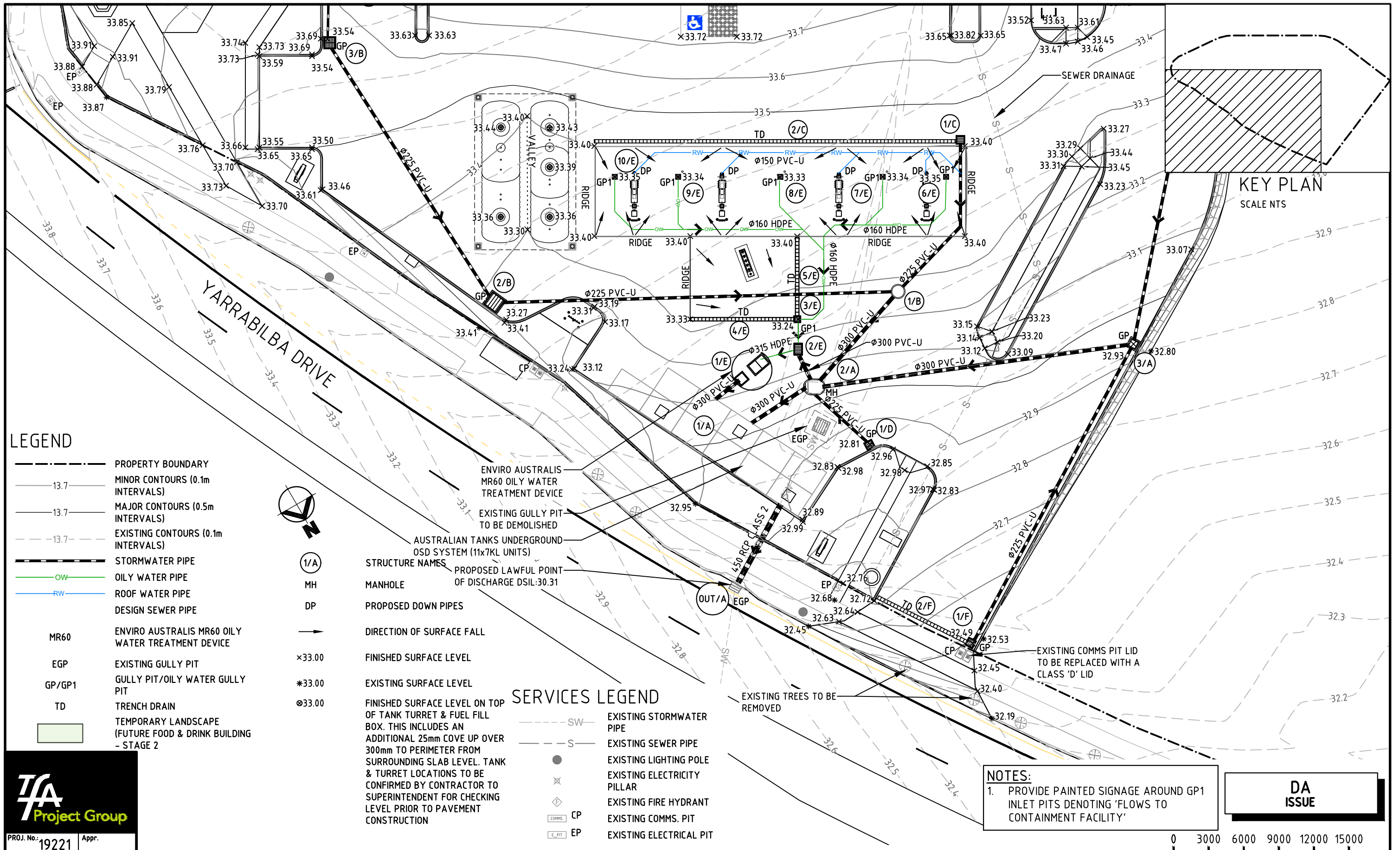
PROJECT

YARRABILBA SOUTH - QLD
CNR YARRABILBA DRIVE
& MILL STREET

TITLE

**CONCEPTUAL SITE GRADING
& DRAINAGE PLAN-STAGE 1**
SHEET 1 OF 2

DRAWN	DATE	APPROVED	DATE
HD	18.01.21	J.A.	31.03.21
SCALE	SIZE	DRAWING No.	REV.
1:300	A3	19221-D24	B



	REV.	BY	DATE	DESCRIPTION OF CHANGE	PROJECT YARRABILBA SOUTH - QLD CNR YARRABILBA DRIVE & MILL STREET	TITLE CONCEPTUAL SITE GRADING & DRAINAGE PLAN-STAGE 1 SHEET 2 OF 2	DRAWN	DATE	APPROVED	DATE
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LEGEND

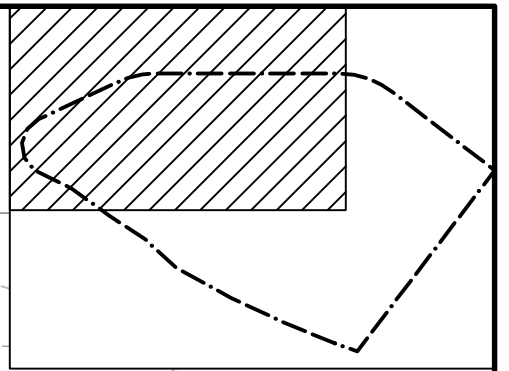
- PROPERTY BOUNDARY
- 13.7 MINOR CONTOURS (0.1m INTERVALS)
- 13.7 MAJOR CONTOURS (0.5m INTERVALS)
- 13.7 EXISTING CONTOURS (0.1m INTERVALS)
- STORMWATER PIPE
- OW OILY WATER PIPE
- RW ROOF WATER PIPE
- S S DESIGN SEWER PIPE
- MR60 ENVIRO AUSTRALIS MR60 OILY WATER TREATMENT DEVICE
- EGP EXISTING GULLY PIT
- GP/GP1 GULLY PIT/OILY WATER GULLY PIT
- TD TRENCH DRAIN

1/A

- MH MANHOLE
- DP PROPOSED DOWN PIPES
- DIRECTION OF SURFACE FALL
- x33.00 FINISHED SURFACE LEVEL
- *33.00 EXISTING SURFACE LEVEL
- o33.00 FINISHED SURFACE LEVEL ON TOP OF TANK TURRET & FUEL FILL BOX. THIS INCLUDES AN ADDITIONAL 25mm COVE UP OVER 300mm TO PERIMETER FROM SURROUNDING SLAB LEVEL. TANK & TURRET LOCATIONS TO BE CONFIRMED BY CONTRACTOR TO SUPERINTENDENT FOR CHECKING LEVEL PRIOR TO PAVEMENT CONSTRUCTION

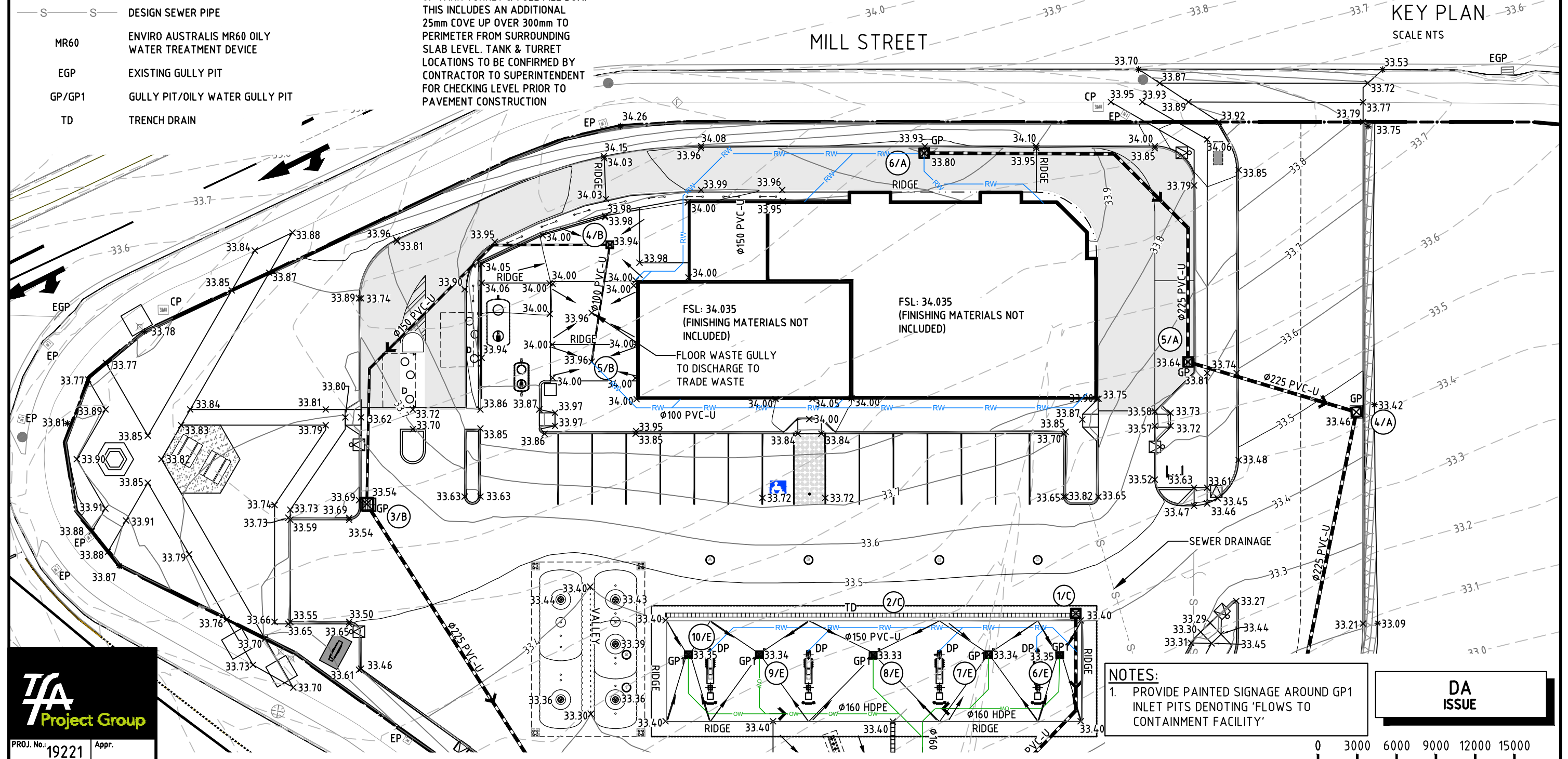
SERVICES LEGEND

- SW EXISTING STORMWATER PIPE
- S EXISTING SEWER PIPE
- EXISTING LIGHTING POLE
- ⊗ EXISTING ELECTRICITY PILLAR
- ⬢ EXISTING FIRE HYDRANT
- COMMS CP EXISTING COMMS. PIT
- E PIT EP EXISTING ELECTRICAL PIT



KEY PLAN

SCALE NTS

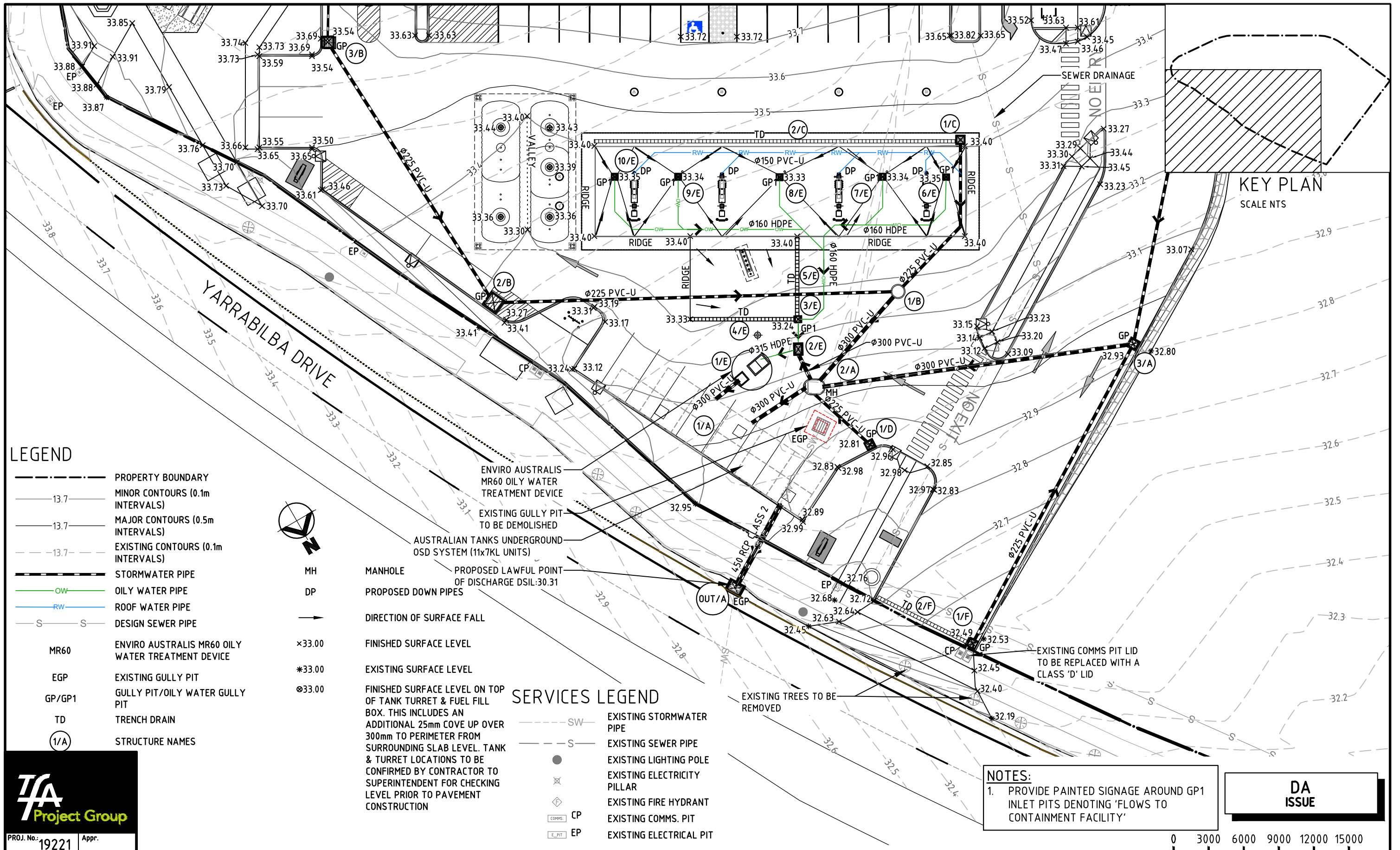


NOTES:
1. PROVIDE PAINTED SIGNAGE AROUND GP1 INLET PITS DENOTING 'FLOWS TO CONTAINMENT FACILITY'

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	A	HD	15.04.21	DA ISSUE	YARRABILBA SOUTH - QLD CNR YARRABILBA DRIVE & MILL STREET	CONCEPTUAL SITE GRADING & DRAINAGE PLAN - STAGE 2 SHEET 1 OF 2	HD	18.01.21	 J.A.	31.03.21
							SCALE	SIZE		
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REVISION									DRAWING No.	REV.
									19221-D26	A



PROJ. No.: 19221

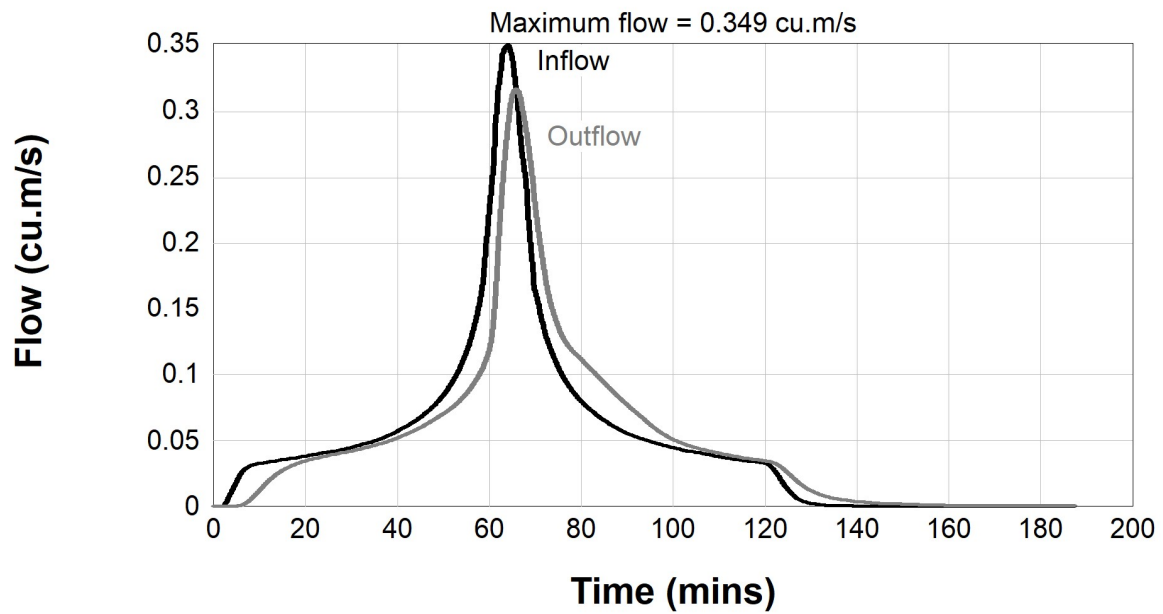
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	A	HD	15.04.21	DA ISSUE			HD	18.01.21	 J.A.	24.02.21
	REVISION									

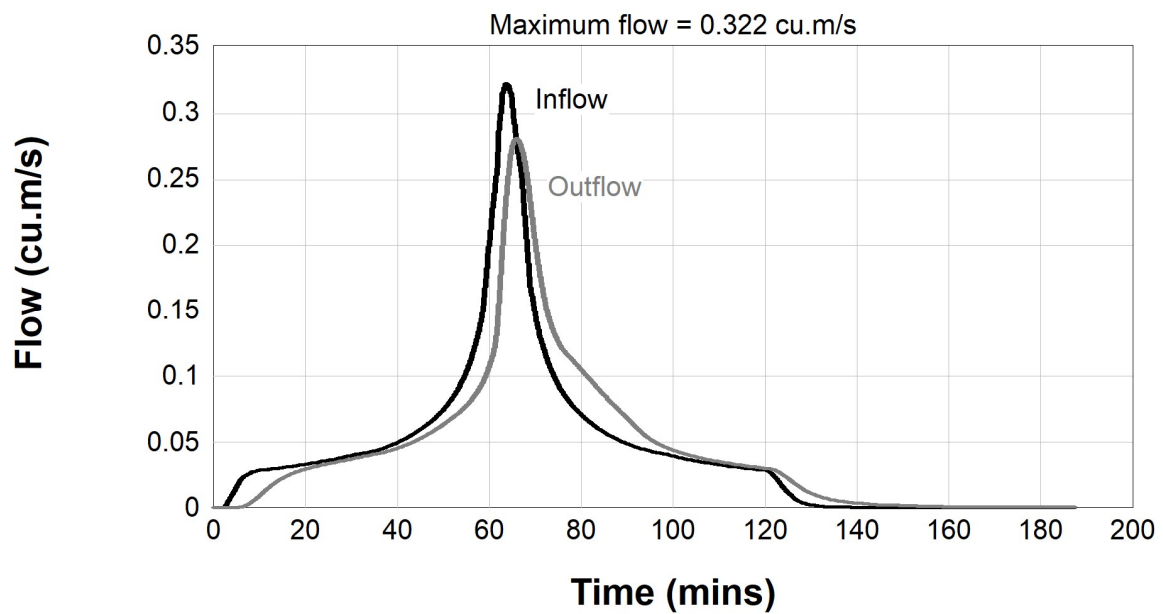
APPENDIX D – DRAINS STORMWATER MODELLING SOFTWARE OUTPUTS

DRAINS OUTPUTS

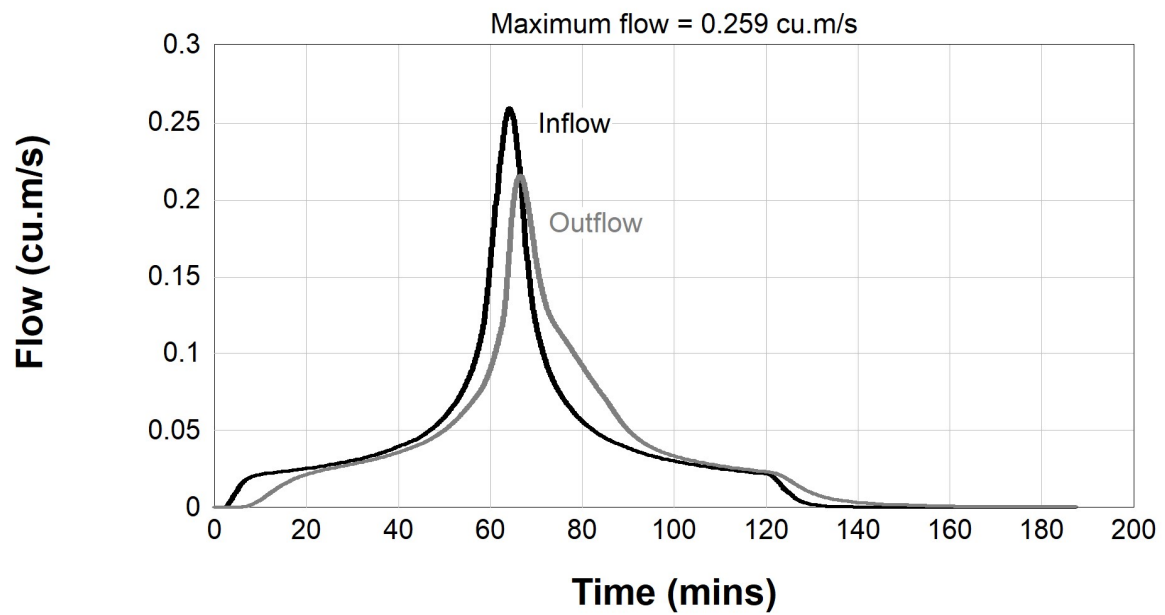
Detention Inflow/Outflow Hydrographs – 100 year ARI synthetic storm



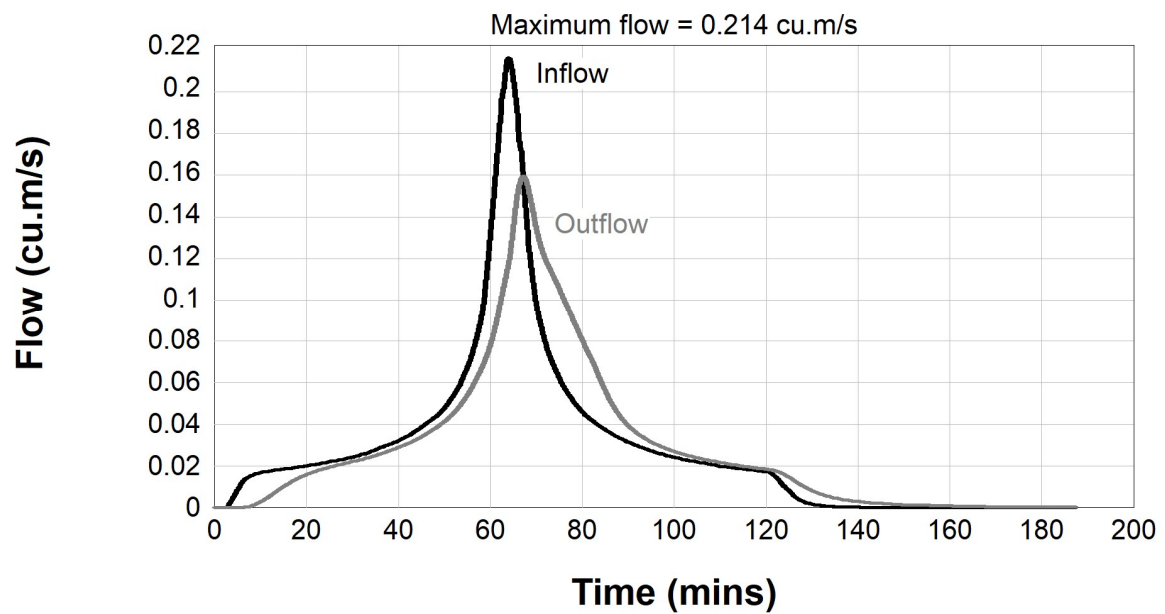
Detention Inflow/Outflow Hydrographs – 50 year ARI synthetic storm



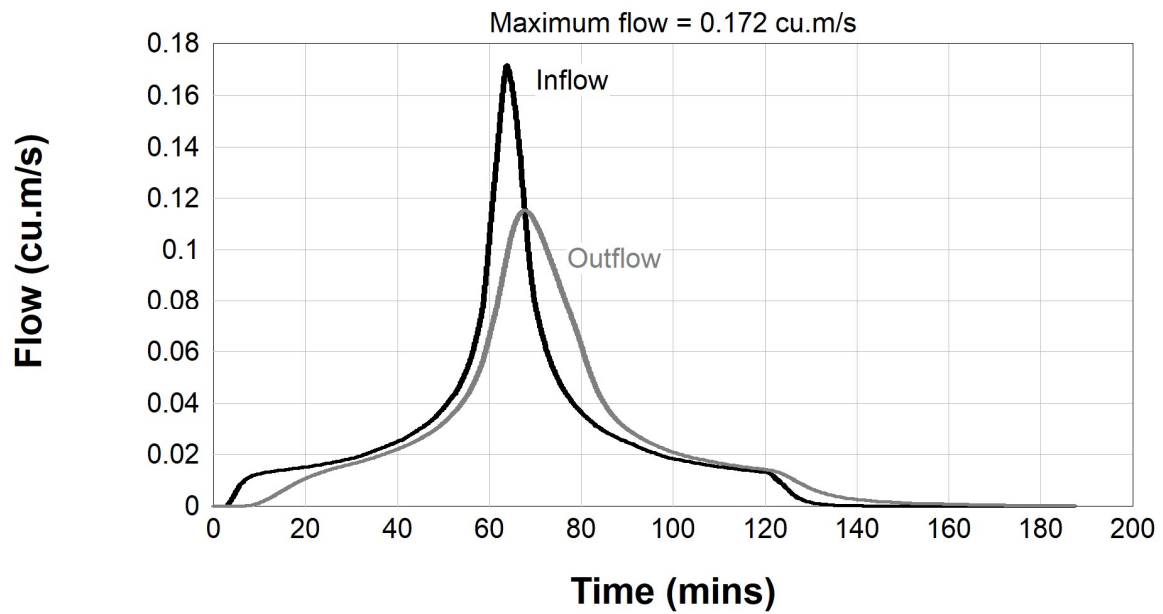
Detention Inflow/Outflow Hydrographs – 20 year ARI synthetic storm



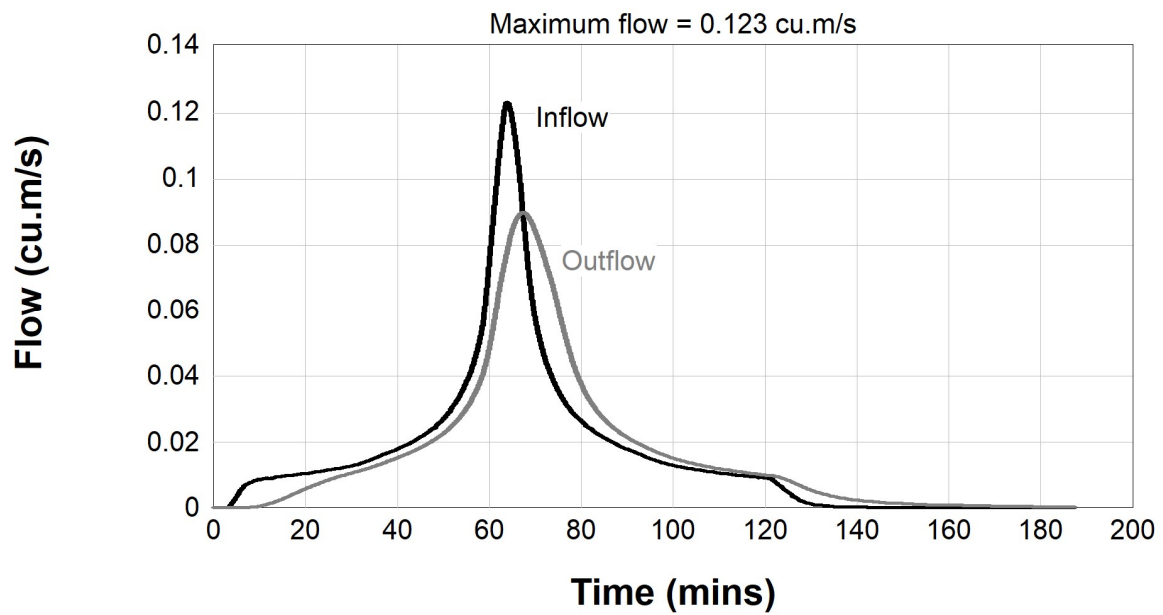
Detention Inflow/Outflow Hydrographs – 10 year ARI synthetic storm



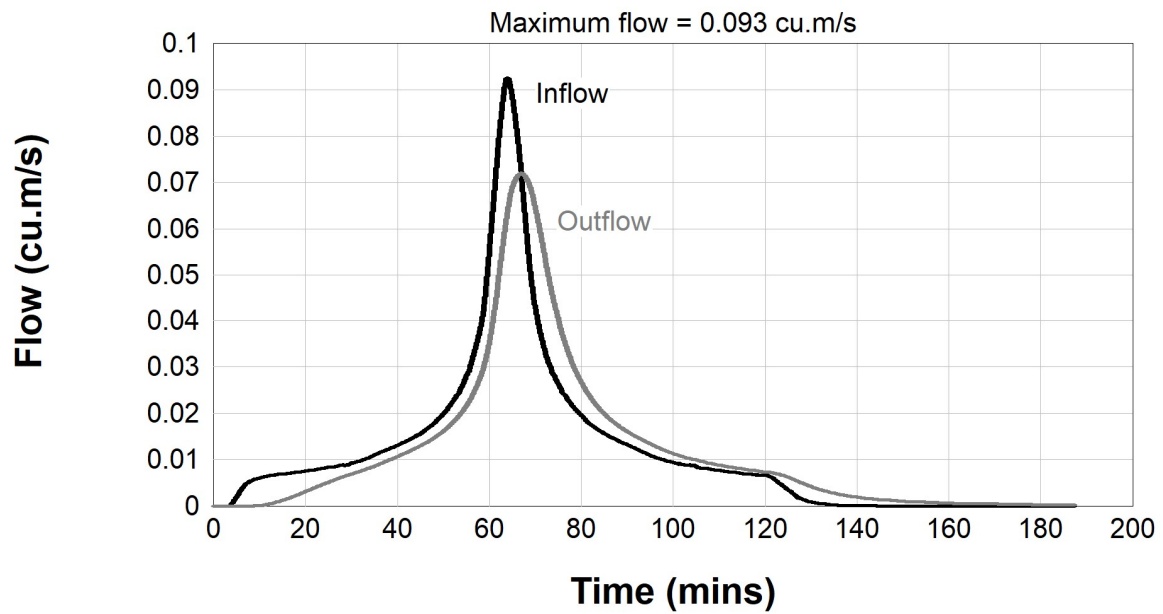
Detention Inflow/Outflow Hydrographs – 5 year ARI synthetic storm



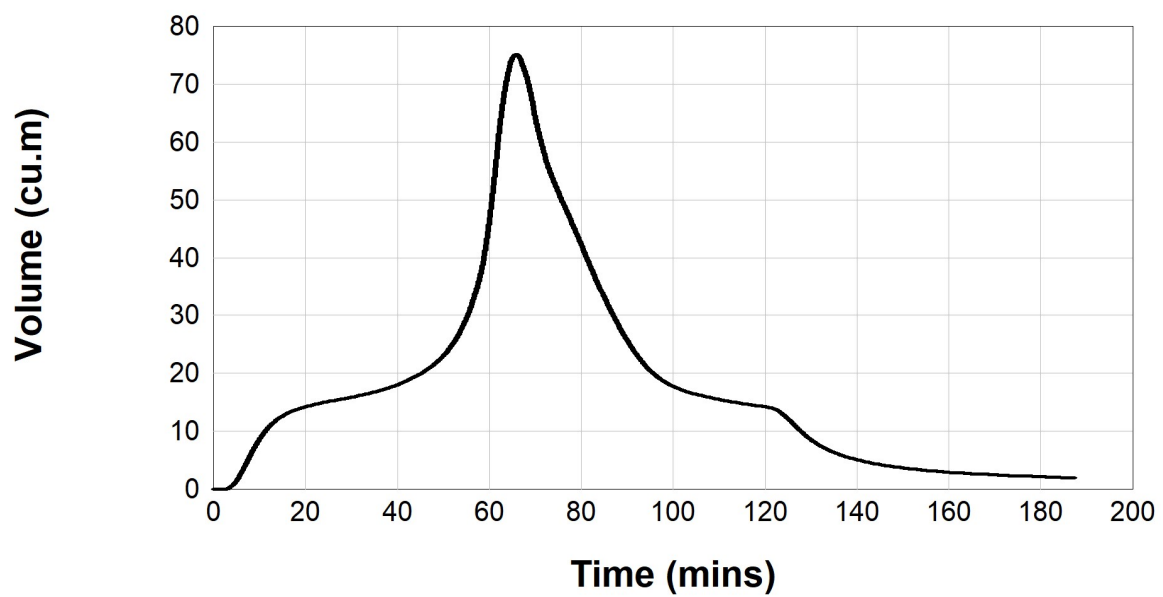
Detention Inflow/Outflow Hydrographs – 2 year ARI synthetic storm



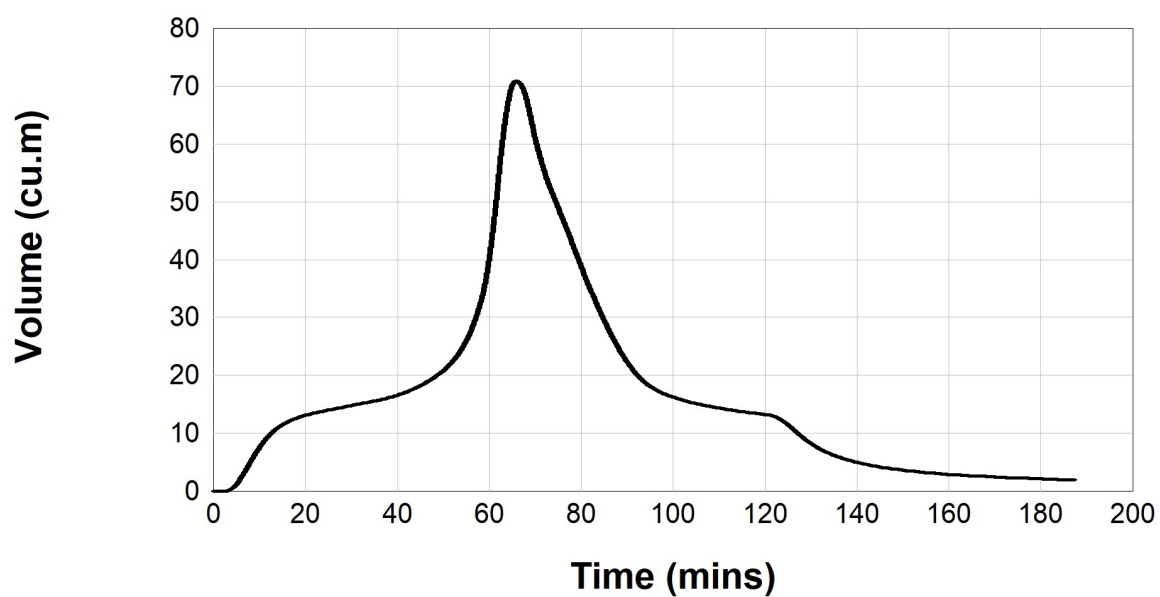
Detention Inflow/Outflow Hydrographs – 1 year ARI synthetic storm



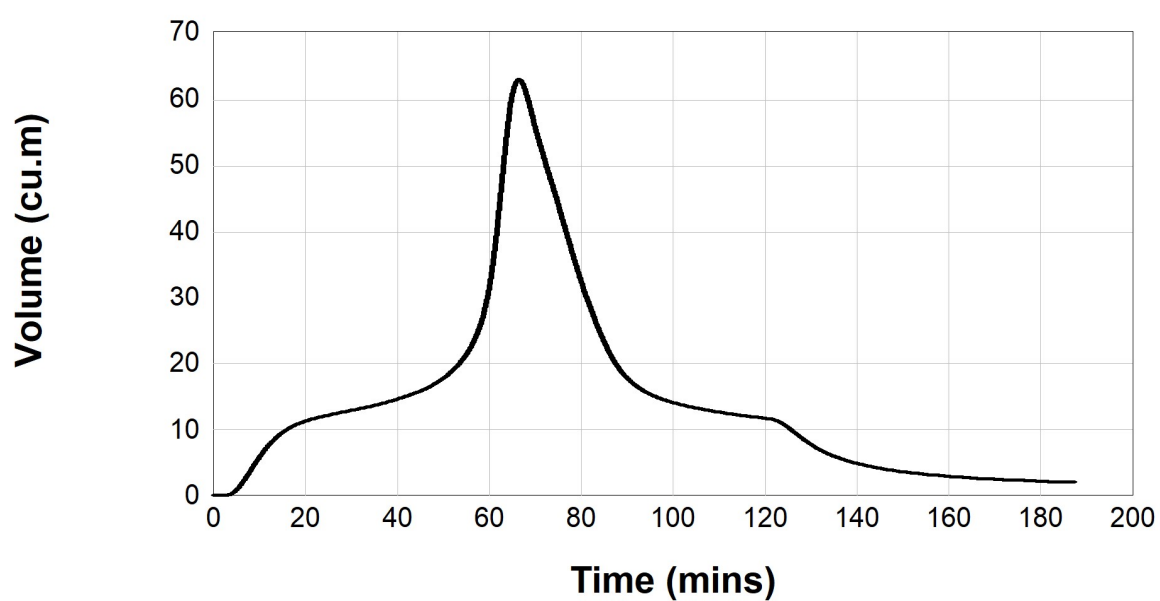
Storage Volume – 100 year ARI synthetic storm



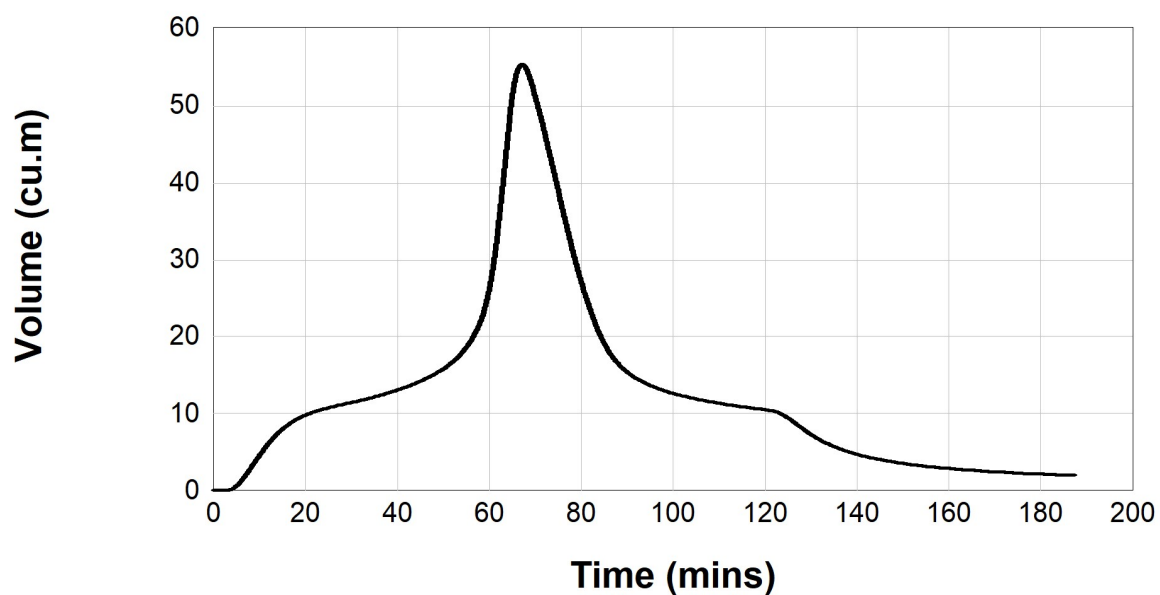
Storage Volume – 50 year ARI synthetic storm



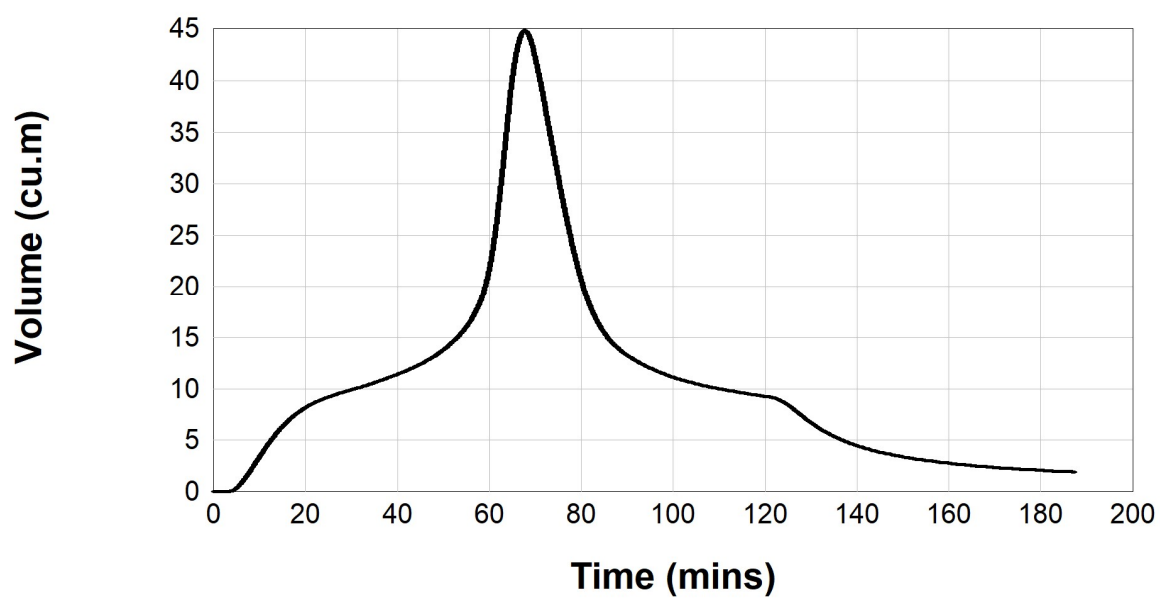
Storage Volume – 20 year ARI synthetic storm



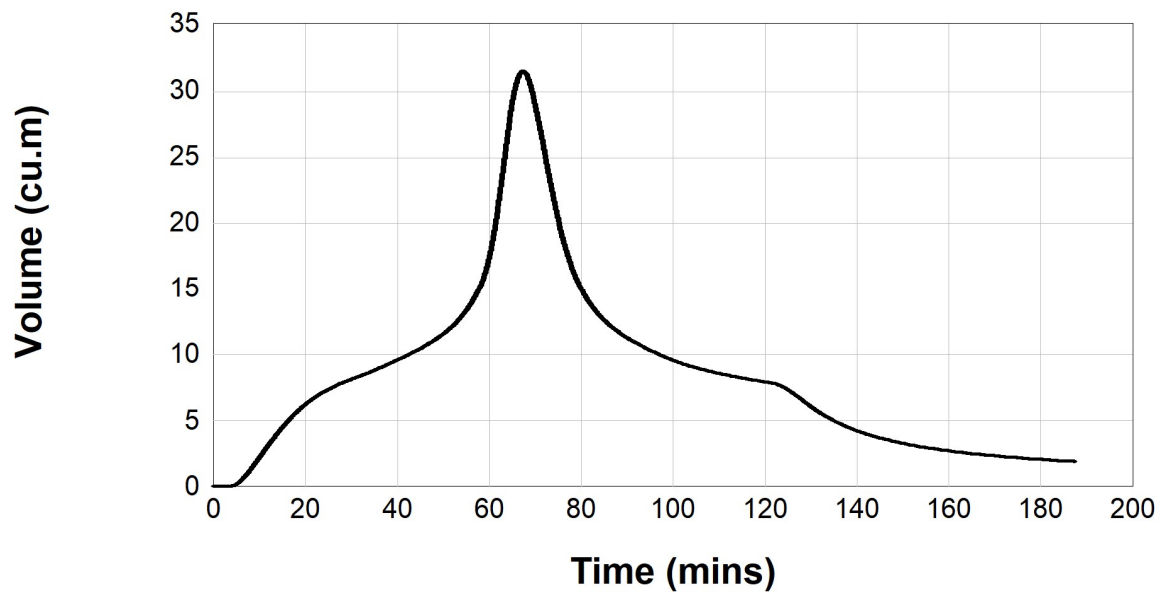
Storage Volume – 10 year ARI synthetic storm



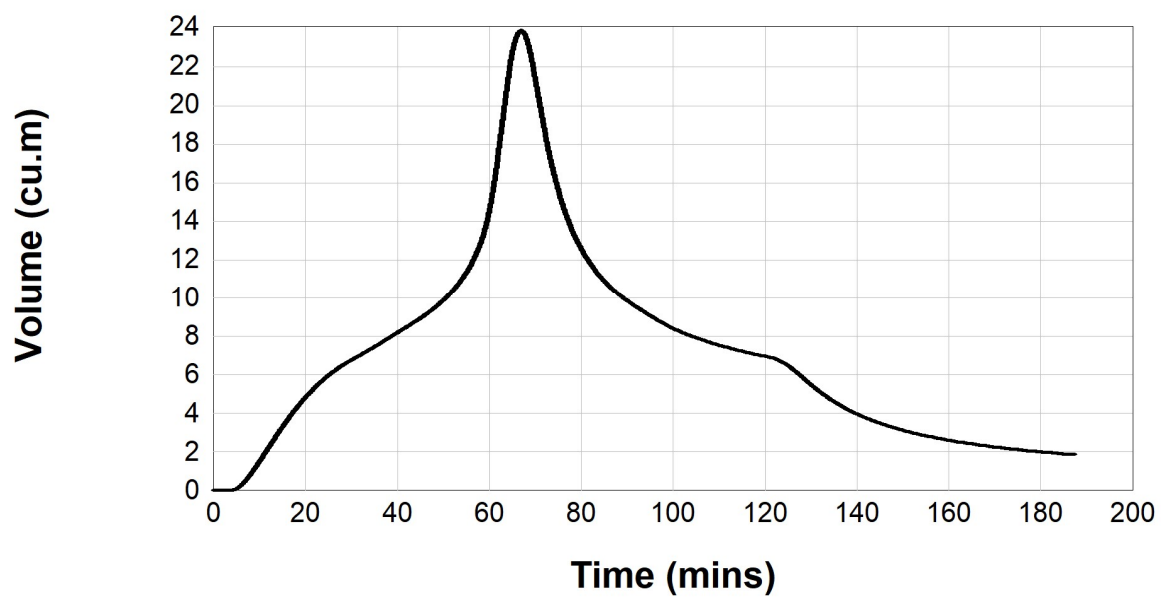
Storage Volume – 5 year ARI synthetic storm



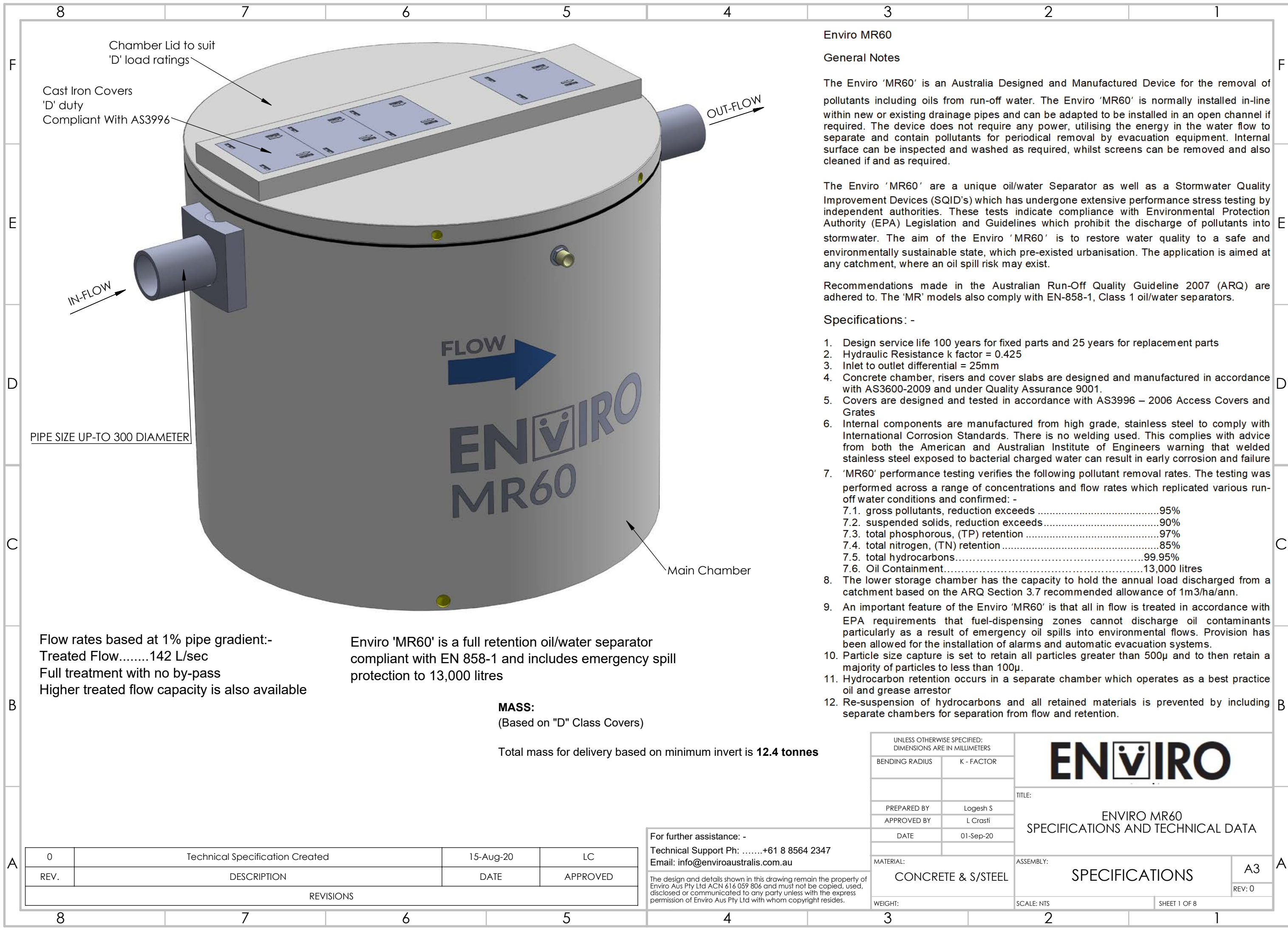
Storage Volume – 2 year ARI synthetic storm

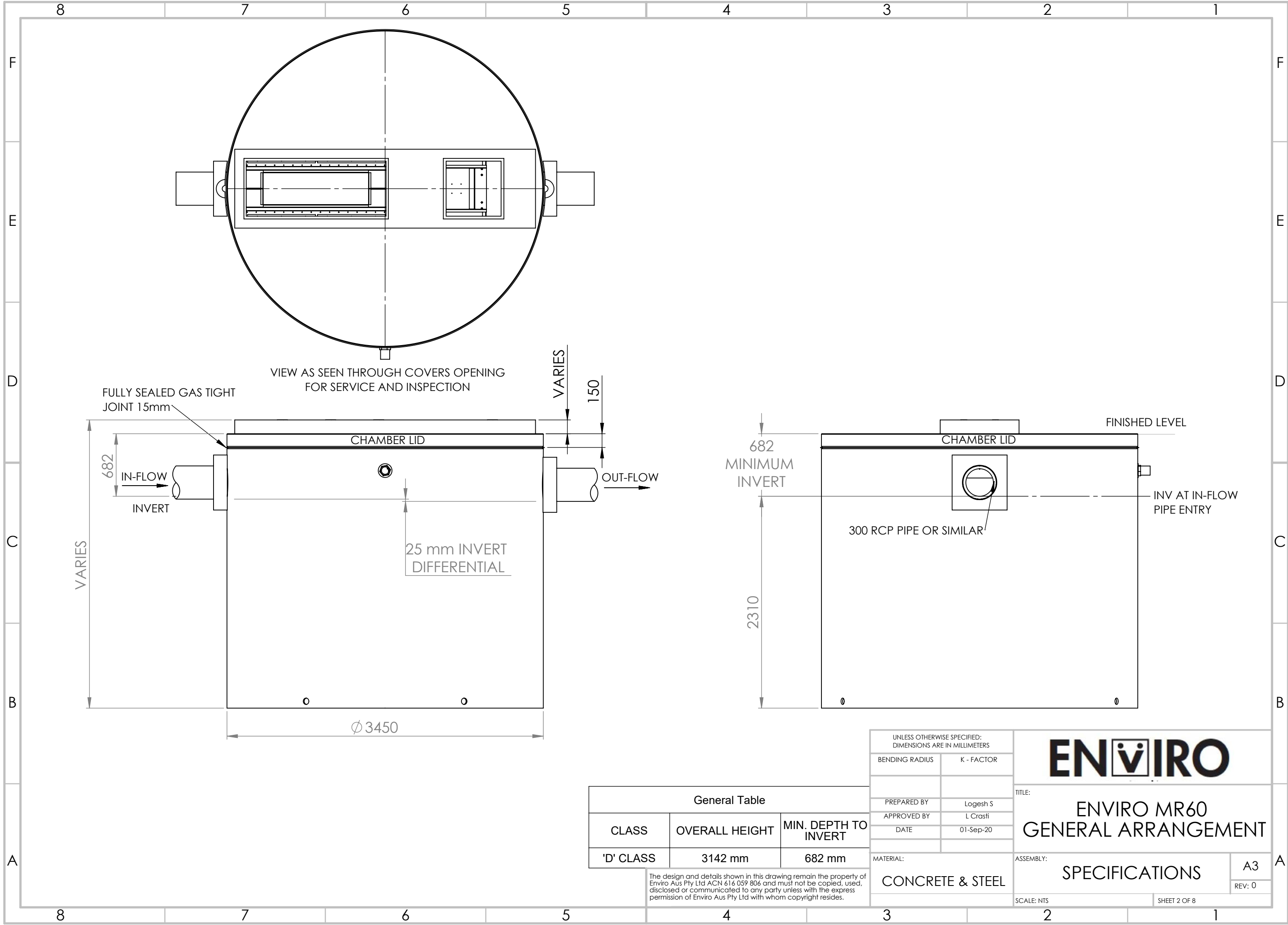


Storage Volume – 1 year ARI synthetic storm



APPENDIX E– STORMWATER & OILY WATER TREATMENT SYSTEMS





VIEW AS SEEN THROUGH COVERS OPENING
FOR SERVICE AND INSPECTION

FULLY SEALED GAS TIGHT
JOINT 15mm

CHAMBER LID

IN-FLOW
INVERT

OUT-FLOW

25 mm INVERT
DIFFERENTIAL

Ø 3450

682
MINIMUM
INVERT

CHAMBER LID

FINISHED LEVEL

INV AT IN-FLOW
PIPE ENTRY

300 RCP PIPE OR SIMILAR

General Table		
CLASS	OVERALL HEIGHT	MIN. DEPTH TO INVERT
'D' CLASS	3142 mm	682 mm

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UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	
BENDING RADIUS	K - FACTOR
PREPARED BY	Logesh S
APPROVED BY	L Crasti
DATE	01-Sep-20
MATERIAL:	
CONCRETE & STEEL	



TITLE:
**ENVIRO MR60
GENERAL ARRANGEMENT**

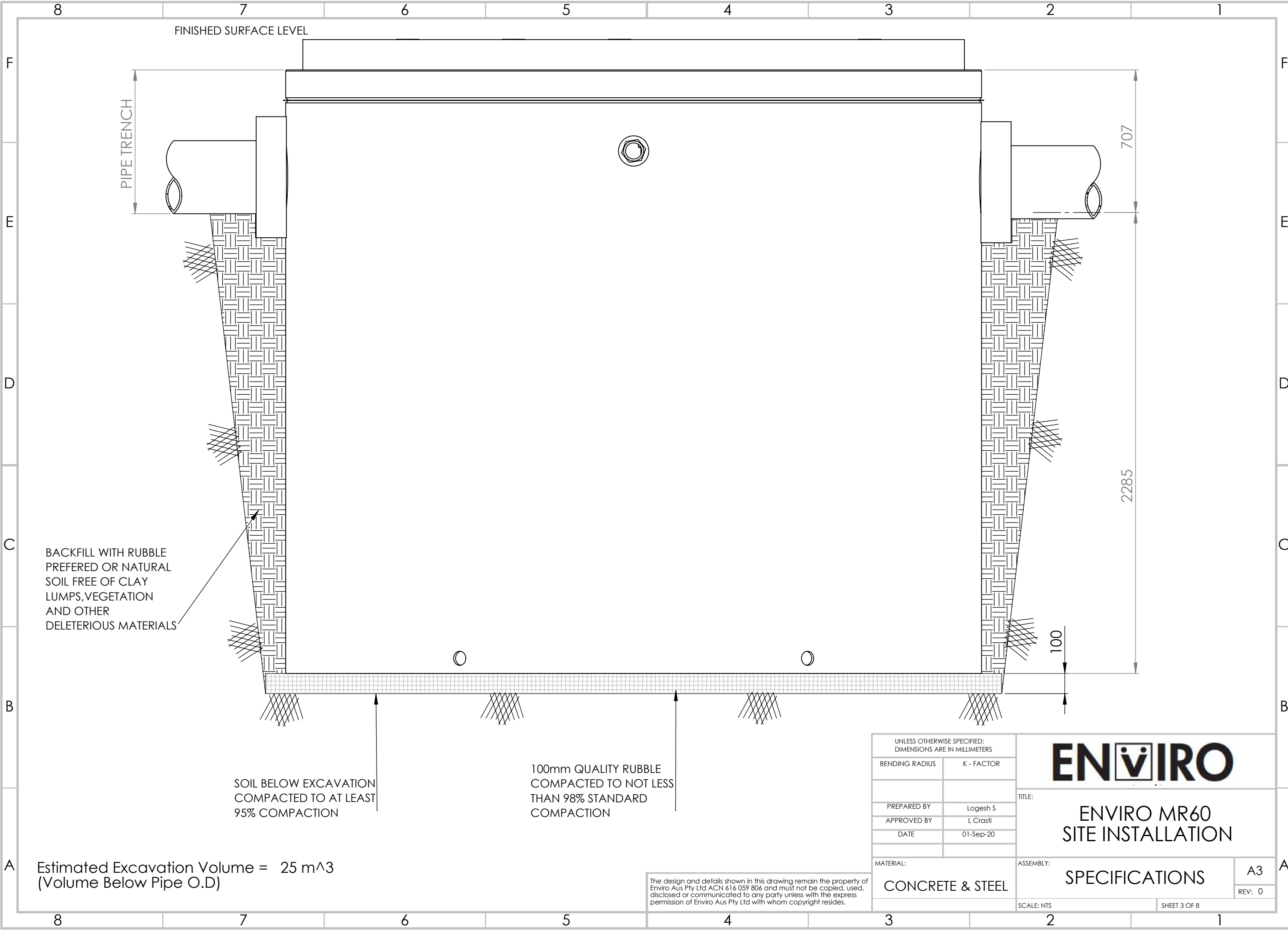
ASSEMBLY:
SPECIFICATIONS

SCALE: NTS

SHEET 2 OF 8

A3

REV: 0



BACKFILL WITH RUBBLE
PREFERRED OR NATURAL
SOIL FREE OF CLAY
LUMPS, VEGETATION
AND OTHER
DELETERIOUS MATERIALS

SOIL BELOW EXCAVATION
COMPACTED TO AT LEAST
95% COMPACTION

100mm QUALITY RUBBLE
COMPACTED TO NOT LESS
THAN 98% STANDARD
COMPACTION

Estimated Excavation Volume = 25 m³
(Volume Below Pipe O.D)

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UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS	
BENDING RADIUS	K - FACTOR
PREPARED BY	Logesh S
APPROVED BY	L Crasti
DATE	01-Sep-20
MATERIAL:	
CONCRETE & STEEL	



TITLE:
**ENVIRO MR60
SITE INSTALLATION**

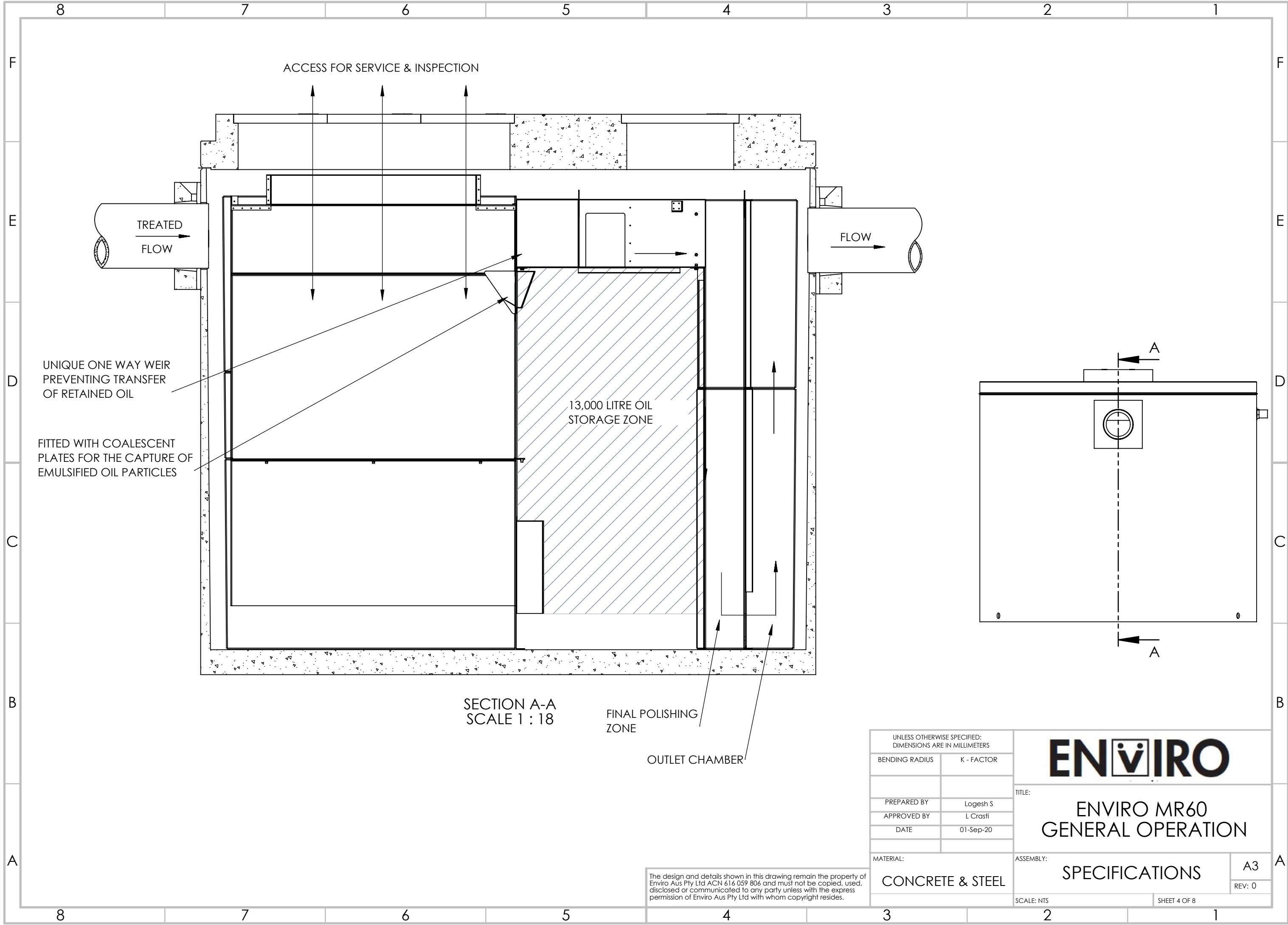
ASSEMBLY:
SPECIFICATIONS

SCALE: NTS

SHEET 3 OF 8

A3

REV: 0



SECTION A-A
SCALE 1 : 18

FINAL POLISHING
ZONE

OUTLET CHAMBER

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS			
BENDING RADIUS	K - FACTOR		
PREPARED BY	Logesh S	TITLE: ENVIRO MR60 GENERAL OPERATION	
APPROVED BY	L Crasti		
DATE	01-Sep-20		
MATERIAL:		ASSEMBLY:	SPECIFICATIONS
CONCRETE & STEEL			
The design and details shown in this drawing remain the property of Enviro Aus Pty Ltd ACN 616 059 806 and must not be copied, used, disclosed or communicated to any party unless with the express permission of Enviro Aus Pty Ltd with whom copyright resides.		SCALE: NTS	SHEET 4 OF 8
			A3 REV: 0

Mass Properties

MR60 VOLUME.SLDPRT

Override Mass Properties...

Recalculate

☐ Include hidden bodies/components

☐ Create Center of Mass feature

☐ Show weld bead mass

Report coordinate values relative to: -- default --

Mass properties of MR60 VOLUME

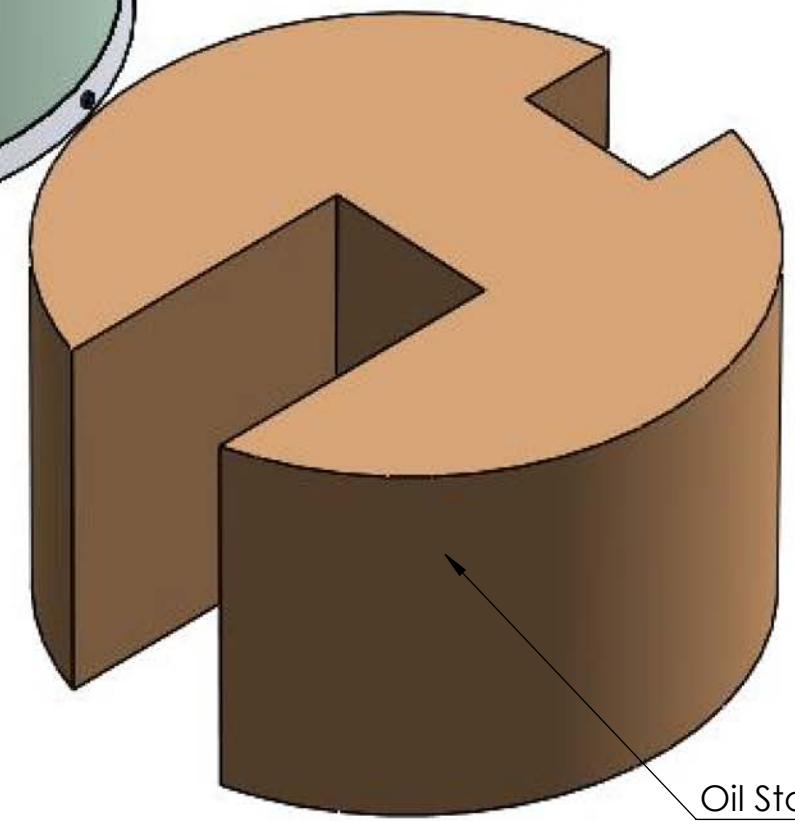
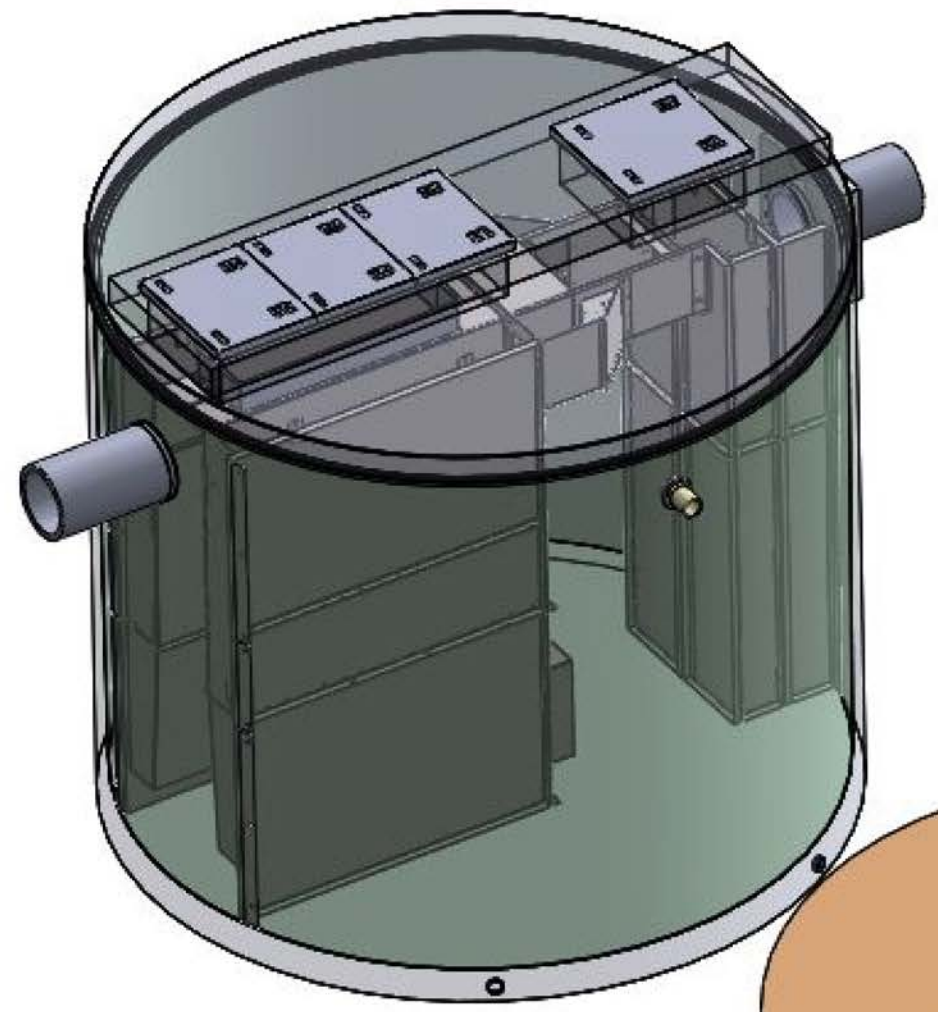
Configuration: Default

Coordinate system: -- default --

Density = 1000.00 grams per liter

Mass = 13238714.97 grams

Volume = 13238.71 liters



Oil Storage Volume

NOTE:
SHAPE OF THE 13,000 LITRE INTERNAL STORAGE VOLUME REMOVES FROM THE CHAMBER FOR CLARITY

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UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS		ENVIRO		
BENDING RADIUS	K - FACTOR			
		TITLE: ENVIRO MR60 STORAGE VOLUME		
PREPARED BY	Logesh S			
APPROVED BY	L Crasti			
DATE	01-Sep-20			
MATERIAL:		ASSEMBLY:		
CONCRETE & STEEL		SPECIFICATIONS		A3
				REV: 0
		SCALE: NTS		SHEET 5 OF 8

APPENDIX F – STORMWATER & OILY WATER TREATMENT SYSTEMS MANAGEMENT PLAN

Fully integrated Environmental Protection
includes: -

Zero By-Pass - Class 1, Oil/Water Separator
10,000 Litres spill containment
Plus

The ENVIRO 'MR' Series is a Zero By-Pass integrated Class 1, Oil/Water Separator with an internal oil storage capacity of 10,000 litres. These features are coupled with the latest broad spectrum pollutant removal technology.

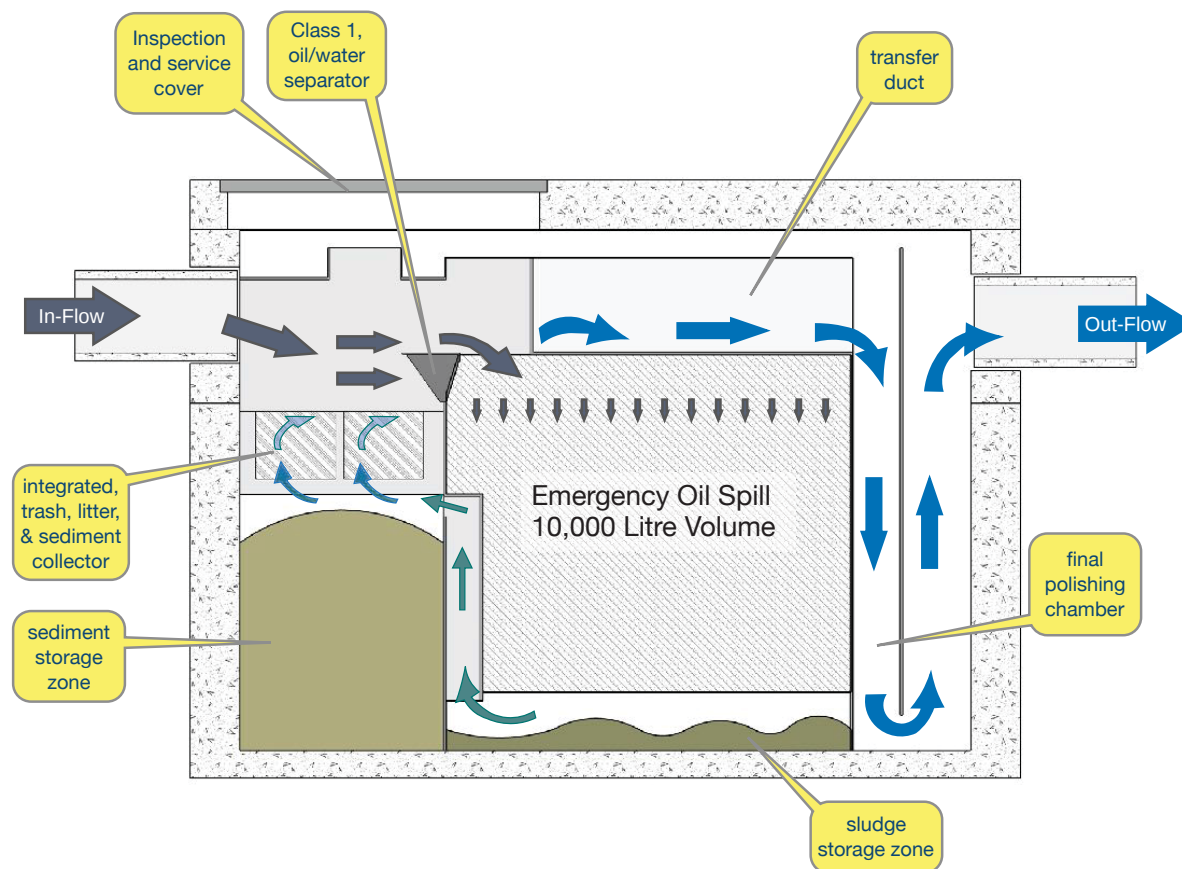
Australian designed for Australian Conditions.

The following removal rates have been established during ten (10) years of research and testing with all claims supported by peer review and independent certification. These features can be witnessed at the Enviro full scale testing facility, believed to be the only such facility in Australia and potentially worldwide.

- Oil Removal as per EN 858-199.95%
- 10,000 litre separate oil containment chamber
- Gross Pollutants removal100%
- Suspended Solids removal94%
- Total Nitrogen removal85%
- Total Phosphorous removal.....97%

Other factors include: -

- Treated flow of pipe diameter100%
- Hydraulic Resistance, k factor.....0.425
- Nominal service intervals1 year
- Max particle size by-pass500 μ
- Nominal particle size capture100 μ
- Design service life100 years
- Fully removable internal screens



The ENVIRO 'MR' Series Models

The 'MR' Series expands on the tested and accredited oil/water separation performance of the 'H' Series. The secondary chamber capacity is increased to 10,000 litres of storage capacity.

Th 'M' Series models can be supplied as either Zero By-pass being the 'MR' series or with by-pass to suit the catchment conditions.

The 'MR' Series, has no by-pass, causing 100% of the influent to pass through the treatment chambers. This increases the performance and provides certainty that all oils, including emergency spills are retained for safe processing.

All 'H' and 'M' series are assembled complete, fitted with approved lifting studs for direct unloading into the final site location with lifting studs included as shown below.



Detailed Technical Specifications for all Enviro Environmental Protection Systems are available on-line or on request. The 'MR' Series models include: -

MR45

- pipe diameter300mm
- treated flow66 l/sec
- overall diameter3.35m
- overall height.....2.7m
- invert depth715mm
- structural lid and coverD Class
- overall mass13.5 tonnes

MR30

- pipe diameter300mm
- treated flow22 l/sec
- diameter3.35m
- overall height.....2.45m
- invert depth715mm
- structural lid and coverD Class
- overall mass13.4 tonnes

The difference between the models is treated flow and processing capacity.



The ENVIRO 'M' Series Alarms

All 'M' and 'MR' Series models can be fitted with the latest alarm systems capable of detecting water, oil and sludge levels.

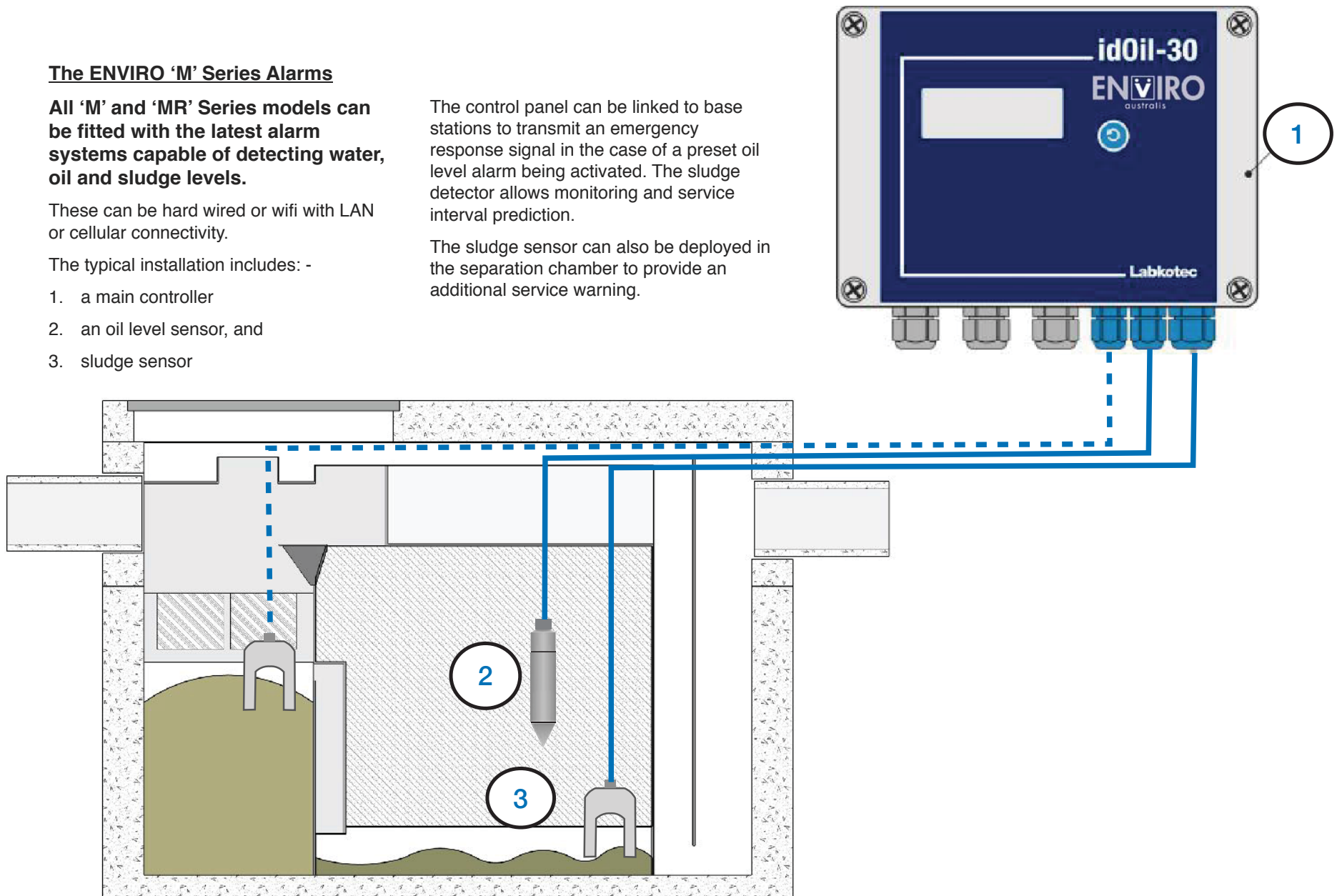
These can be hard wired or wifi with LAN or cellular connectivity.

The typical installation includes: -

1. a main controller
2. an oil level sensor, and
3. sludge sensor

The control panel can be linked to base stations to transmit an emergency response signal in the case of a preset oil level alarm being activated. The sludge detector allows monitoring and service interval prediction.

The sludge sensor can also be deployed in the separation chamber to provide an additional service warning.



The ENVIRO EPS Installation

All Enviro EPS Series models are delivered to site complete ready for installation. Subject to client's needs, cover slabs can be supplied loose allowing site contractors to reduce the installation handling mass and provides some internal access, for pipe installation and sealing, as shown below.



Fig 1

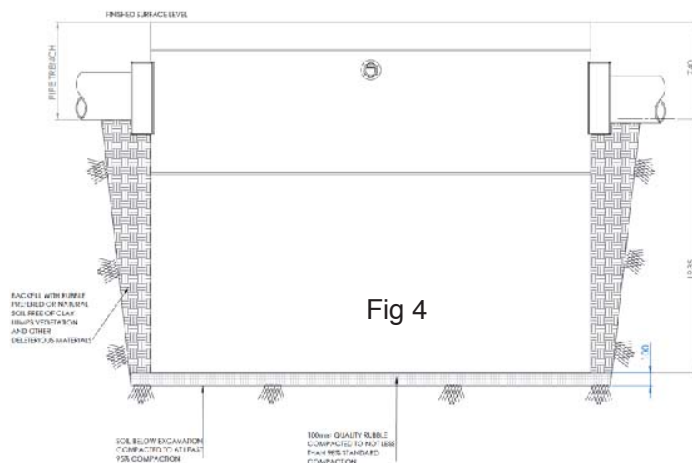


Fig 4

The ENVIRO 'M' and 'MR' Series Installation

The 'M' and 'MR' Series models are delivered to site completely sealed to ensure gas tight joints as shown in Fig 2.

Lifting studs as shown in Fig 3 are installed during the casting process in accordance with manufacturer's specifications and in compliance with AS3850



Fig 2

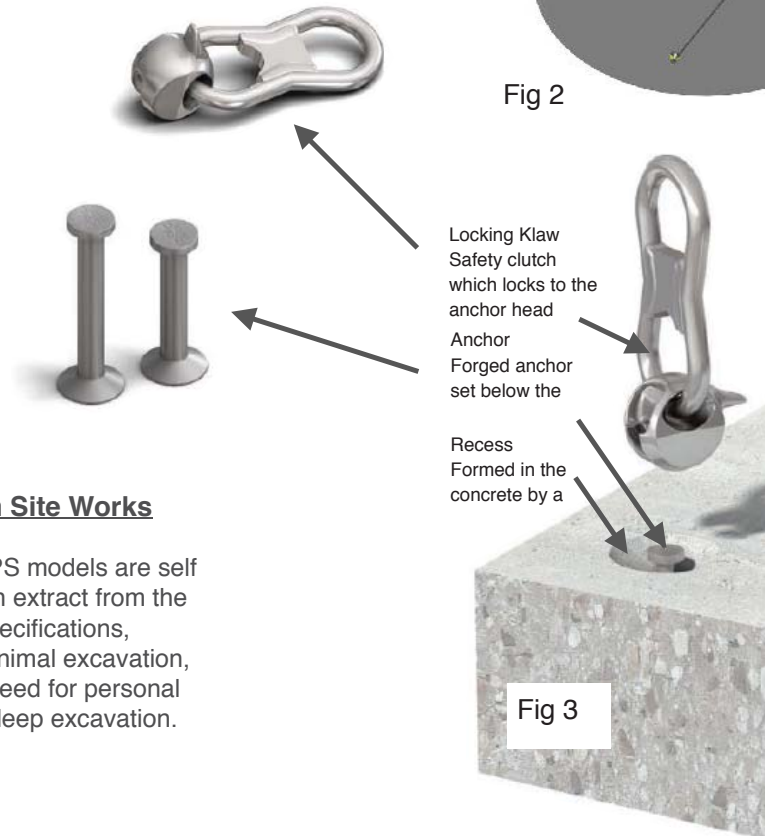


Fig 3

Installation Site Works

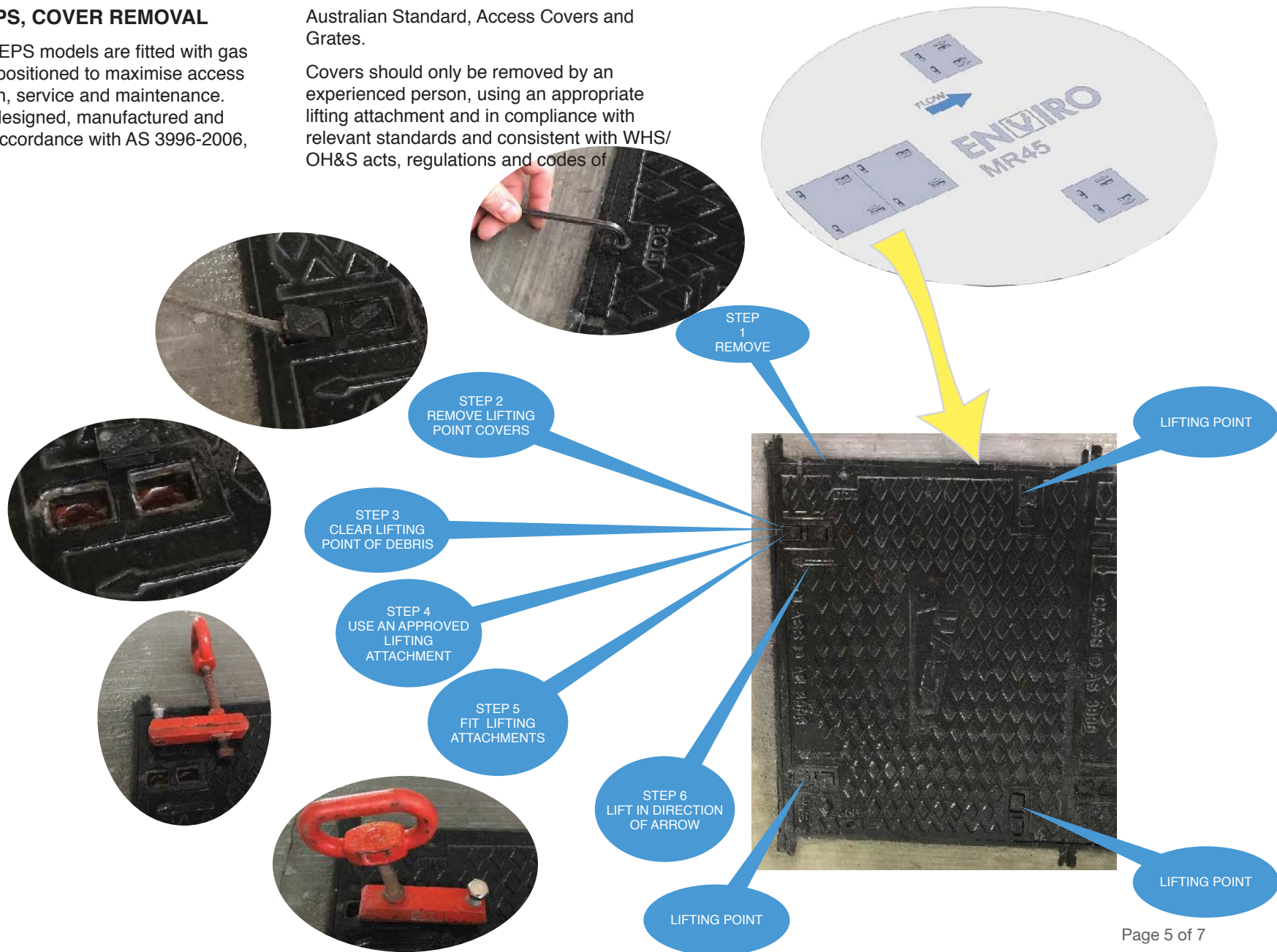
All Enviro EPS models are self ballasting. An extract from the Technical Specifications, illustrates minimal excavation, without the need for personal entry into a deep excavation.

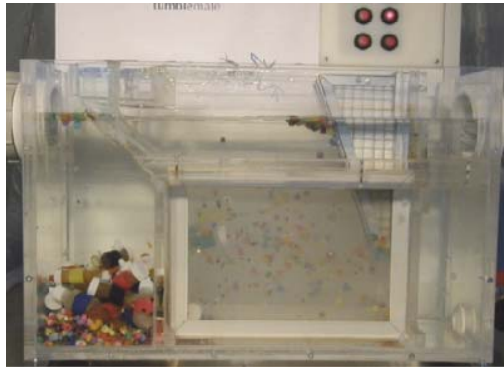
ENVIRO EPS, COVER REMOVAL

All ENVIRO EPS models are fitted with gas tight covers positioned to maximise access for inspection, service and maintenance. Covers are designed, manufactured and installed in accordance with AS 3996-2006,

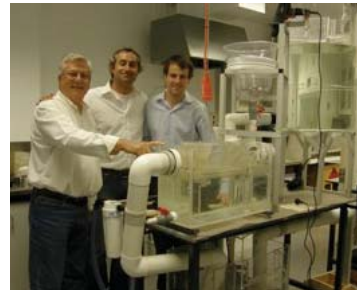
Australian Standard, Access Covers and Grates.

Covers should only be removed by an experienced person, using an appropriate lifting attachment and in compliance with relevant standards and consistent with WHS/ OH&S acts, regulations and codes of

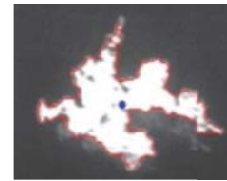




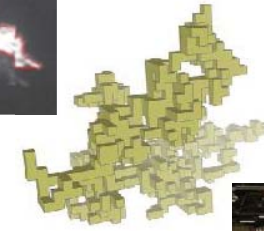
2010, development of the hydraulic separation process



Sydney University testing, analysis and



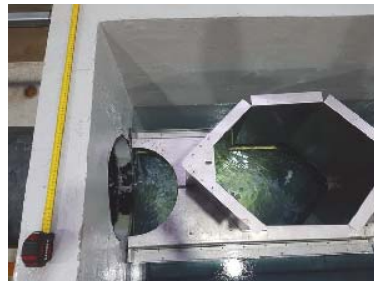
3 year program includes particle studies, field and laboratory evaluation



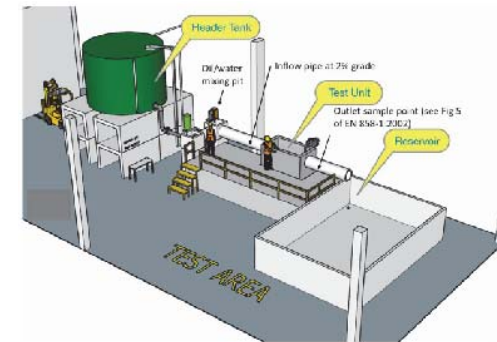
2014-15, field evaluation and full scale testing at MHL, replicating 2 years of continuous service



2020, nutrient and fine sediment stress testing, comprises influent dosed with decomposed litter and potting mix



2018, EN 858-1 oil/water separation compliance testing



2017-18, construction of full scale testing and performance evaluation facility

ENVIRO's
10 years of research

ENVIRO Testing and Proof of Performance

'M' Series has evolved from over the (10) years of development and testing by independent authorities, some are shown below: -

- **Sydney University**; model testing, mathematical analysis, particle analysis, nutrient removal analysis
- **Manly Hydraulics Laboratory**; full scale process testing simulating over 30 rainfall events
- **University of Western Sydney**; peer review of Internationally Published Paper and contributing author to Urban Developer Publication
- **University of South Australia**; testing review, MUSIC Node development and certification under EN 858-1 Oil/water separation

ENVIRO EPS Acceptance

Enviro EPS Series has been installed in over 25 Council Precincts as well as Defence Department projects.

Due diligence has been conducted by leading International Engineering Firms.

ENVIRO EPS MUSIC Nodes

MUSIC Nodes have been independently developed by UniSA.

The node development included due reference to the MUSIC Manual, testing data and reports as well the conduct of full scale testing.

Enviro also provided supporting evidence of compliance with recommendations in the Australian Run-Off Quality Guide (ARQ).

ENVIRO Technical and Sales Support

Technical: 08 8 564 2347

After Hours : 0419 555 514

www.enviroaustralis.com.au

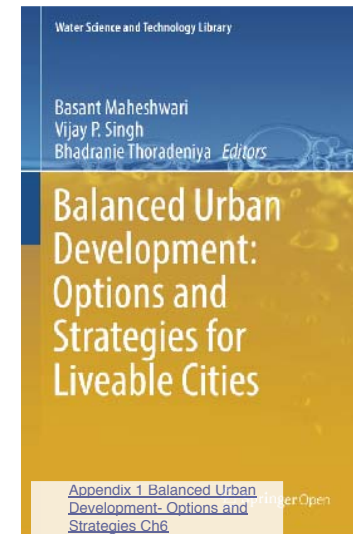
info@enviroaustralis.com.au



[Enviro EPS Technical Manual](#)

A comprehensive Technical Manual and supporting studies are available and can be downloaded by following the links below.

- [Enviro EPS Technical Manual](#)
- [Appendix 1 Balanced Urban Development- Options and Strategies Ch6](#)
- [Appendix 2 Enviro Process Testing](#)
- [Appendix 3 EN858-EnviroAus Final Report](#)
- [Appendix 4 MUSIC Node](#)
- [Appendix 5 Deep Sea Pollution Paper](#)
- [Appendix 6 Adsorption of Nutrients to Particles](#)
- [Appendix 7 Manning BE Thesis 2013](#)
- [Appendix 8 EPA Vic Stormwater Discharge Standards](#)
- [Appendix 9 Email from Baden Myers UniSA](#)



[Appendix 1 Balanced Urban Development- Options and Strategies Ch6](#)



[Appendix 3 EN858-EnviroAus Final Report](#)