

STORMWATER MANAGEMENT PLAN

19 River Road, Bundamba

Tel: (07) 3829 1399 • Email: mail@hce-engineers.com.au
PO Box 7214, Redland Bay Qld 4165

www.hce-engineers.com.au

HCE ENGINEERS

REPORT CONTROL SHEET

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1. Introduction

An approval for Reconfiguring a Lot and Operational Works (earthworks, clearing vegetation) (Council Ref: 8605/2025/CA) was recently issued by Ipswich City Council to subdivide 19 River Road to create one residential (Lot 4) and one commercial master lot (Lot 2), suitable for further development.

This report has been prepared to support the development application for a Material Change of Use, over the proposed residential master lot (Lot 2) by Economic Development Queensland. The proposed development is for the construction of residential townhouses, consisting of 212 units, over 5 stages.

This report identifies stormwater quality and quantity management measures proposed to be incorporated within the development, to satisfy the required standards of the Land Activation Program (Tranche 2) Provisional Development Area draft Provisional Land Use Plan (PLUP) and associated guidance material in the Ipswich City Plan 2025.

This report has been prepared expressly to provide commentary regarding compliance with Economic Development Queensland (EDQ) requirements for the proposed development on the subject site. Information presented in this report should not be applied to properties or developments other than the subject development. No responsibility is accepted for use of any part of this report in any other context or for any other purposes or by any third party.

2. Existing Site and Catchment Description

The existing site is partially developed, containing some dwellings and impervious areas, however the majority of the site is undeveloped. The existing site falls to the north at an approximate grade of 5%. The site is bound by residential development to the east, with existing units to the north and west.



Image– Existing Site Conditions (Nearmap.com)

2.1 Existing Drainage Conditions

Stormwater runoff from the existing site is conveyed as surface flow and is current discharged to River Road, Bird Street and to existing stormwater infrastructure located in private property to the north.

All stormwater runoff from the site ultimately discharges to the Bremer River.

2.2 External Catchments

Land to the south generally falls towards the development site, via Mary Street acting as the limit of the watershed directed towards the site. This land consists of the proposed Commercial master lot and the existing TAFE site.

As part of the preceding subdivision (Council approval reference: 8605/2025/CA), a stormwater drainage pipe connection will be provided to Commercial Master lot, extended from infrastructure in River Road. Additionally, the new private road separating the commercial lot from the development site will direct major storm surface flows to River Road. As such, the development site will not receive any runoff from the proposed commercial lot.

Stormwater runoff from the existing TAFE site is proposed to be managed within the development site as required. Flows are to be directed to existing stormwater in Bird Street as per existing conditions.

Stormwater catchment plans indicate the existing and proposed external catchments and direction of flows relative to the proposed development.

2.3 Flood Assessment

With reference to Section 4.1.4.1 - Flood Assessment of the draft PLUP, the proposed development is not located within a mapped flood area and is not subject to flooding. Accordingly, there is no identifiable flood risk to life, property, critical infrastructure or the environment associated with the development.

As the site is unaffected by flooding, flood immunity measures, flood-resilient building design, evacuation planning and flood management infrastructure are not required to achieve an acceptable level of risk. The proposed development will not alter flood storage, flood conveyance, flood levels or flood behaviour and therefore will not result in adverse flood impacts on surrounding properties or infrastructure.

In alignment with the draft PLUP's use of Council's Planning Scheme Code as guidance material, an assessment against Council's Planning Scheme is outline as follows.

The site is burdened by the Very Low Flood & Overland Flow Risk overlay under the Ipswich City Plan 2025. Refer to image below:

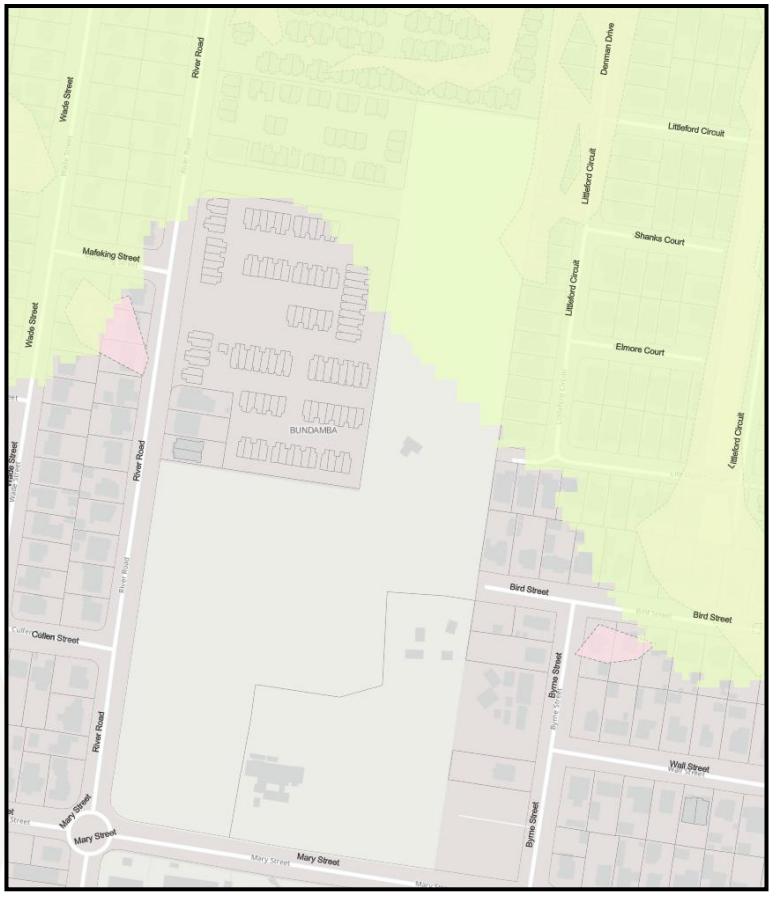


Image : OV12 Flood Risk and Overland Flow (From Ipswich City Plan 2025)

The proposed use is compatible with the flood risk as outlined in Councils Flood Risk and Overland Flow Overlay Code. The site has not been historically subject to river flooding.

Overlay flow mapping indicates some potential areas of inundation in the north-eastern corner of the development site. On review of topography, it is evident that this overland flow emanates from runoff from the development site. The proposed development will control site runoff and lawfully discharge to existing stormwater infrastructure. Runoff will not discharge over the eastern boundary where the overland flow path is mapped and hence there is no need to retain this area on the site for the passage of overland flow.

3. Water Quantity Management

3.1 Overview and Objectives

It is proposed to discharge stormwater to three locations as shown on the accompanying design drawings. These locations are:

1. Existing Stormwater Infrastructure in River Road
2. Existing Stormwater Infrastructure in Bird Street
3. Existing Stormwater Infrastructure to the North

The management of stormwater discharge for all three discharge locations has been considered separately. Stormwater runoff is to be controlled to achieve development objectives, without unreasonable impact and in accordance with relevant safety parameters.

3.2 River Road Catchment Management Overview

Under existing conditions, site runoff is discharged as broad sheet flow to the existing kerb and channel on River Road.

It is proposed to formalise road and kerb construction along River Road as part of the preceding subdivision (Council approval reference: 8605/2025/CA).

Units 1-12 are proposed to gain access off River Road and it is proposed stormwater runoff will discharge to directly connect to the new kerb and channel in River Road.

An assessment of the existing and developed peak flow discharge to River Road has been undertaken.

3.2.1 Existing Conditions

Table 1 below summarises the input parameters for the Rational Method for the existing scenario.

Catchment ID	C_{10}	Time of Concentration (min)	Area (ha)
River Road Ex	0.70	12	0.677

Table 1 - Rational Methods Inputs for Existing Catchment conditions

Table 2 below summarises the IFD data used for the Rational Method calculation from the BOM design rainfall data system.

Time of Concentration (minutes)	1EY ARI (mm/hour)	0.5EY ARI (mm/hour)	0.2EY ARI (mm/hour)	10% AEP (mm/hour)	5% AEP (mm/hour)	2% AEP (mm/hour)	1% AEP (mm/hour)
12	77.1	97.4	123	143	164	192	213

Table 2 – Rainfall Data

Table 3 below tabulates park discharges for existing conditions over a range of recurrence intervals

ARI/AEP	Rational Method Existing Peak Discharge (m^3/s)
1EY	0.081
0.5EY	0.109
0.2EY	0.154
10%	0.188
5%	0.227
2%	0.291
1%	0.336

Table 3 – Existing Peak Discharge

3.2.2 Proposed Conditions

Table 4 below summarises the input parameters for the developed, not mitigated, scenario.

Catchment ID	C_{10}	Time of Concentration (min)	Area (ha)
River Road Dev	0.87	8	0.201

Table 4 - Rational Methods Inputs for the Developed Catchment conditions

Table 5 below summarises the IFD data used for the Rational Method calculation from the BOM design rainfall data system.

Time of Concentration (minutes)	1EY ARI (mm/hour)	0.5EY ARI (mm/hour)	0.2EY ARI (mm/hour)	10% AEP (mm/hour)	5% AEP (mm/hour)	2% AEP (mm/hour)	1% AEP (mm/hour)
8	89.1	113	142	164	190	222	246

Table 5 – Rainfall Data

Table 6 below tabulates park discharges for proposed conditions over a range of recurrence intervals

ARI/AEP	Rational Method Developed Peak Discharge (m^3/s)
1EY	0.035
0.5EY	0.047
0.2EY	0.066
10%	0.080
5%	0.097
2%	0.124
1%	0.137

Table 6 – Developed Peak Discharge

3.2.3 River Road Comparison

The pre-development and post-development peak discharge rates, over a range of AEPs calculated by The Rational Method, for the eastern catchment are outlined below.

ARI/AEP	Rational Method Existing Peak Discharge (m^3/s)	Rational Method Developed Peak Discharge (m^3/s)	Change (m^3/s)
1EY	0.081	0.035	-0.046
0.5EY	0.109	0.047	-0.062
0.2EY	0.154	0.066	-0.088
10%	0.188	0.080	-0.108
5%	0.227	0.097	-0.130
2%	0.291	0.124	-0.167
1%	0.336	0.137	-0.199

Table 7 - Existing and Developed Mitigated Peak Discharge Rates

Refer to appendices for Rational Method Calculations.

Accordingly, the proposed peak flow discharge to River Road will be reduced under the proposed development. No adverse impacts to existing stormwater drainage infrastructure in River Road is expected.

3.3 Bird Street Catchment Management Overview

Under existing conditions, site runoff is captured by the existing stormwater infrastructure within the development site, and conveyed underground within the stormwater drainage network in Bird Street. In major storm events, some flow may bypass capture and be conveyed down Bird Street as surface flow.

It is proposed to formalise the termination of Bird Street with a new cul-de-sac as part of the preceding subdivision (Council approval reference: 8605/2025/CA).

Units 101-108 are proposed to gain access off the Bird Street cul-de-sac and proposed to discharge stormwater runoff to connect to the new infrastructure constructed as part of the preceding subdivision.

An assessment of the existing and developed peak flow discharge to Bird Street has been undertaken.

3.3.1 Existing Conditions

The Rational Method Input table summarises the input parameters for the existing scenario.

Catchment ID	C_{10}	Time of Concentration (min)	Area (ha)
Bird Street Ex	0.70	15	0.906

Table 8 - Rational Methods Inputs for Existing Catchment conditions

The Rainfall Data table summarises the IFD data used for the Rational Method calculation from the BOM design rainfall data system.

Time of Concentration (minutes)	1EY ARI (mm/hour)	0.5EY ARI (mm/hour)	0.2EY ARI (mm/hour)	10% AEP (mm/hour)	5% AEP (mm/hour)	2% AEP (mm/hour)	1% AEP (mm/hour)
15	69.9	88.4	112	130	149	174	193

Table 9 – Rainfall Data

ARI/AEP	Rational Method Existing Peak Discharge (m^3/s)
1EY	0.099
0.5EY	0.132
0.2EY	0.187
10%	0.229
5%	0.276
2%	0.353
1%	0.408

Table 10 – Existing Peak Discharge

3.3.2 Proposed Conditions

The Rational Method Inputs table summarises the input parameters for the developed, not mitigated, scenario.

Catchment ID	C_{10}	Time of Concentration (min)	Area (ha)
Bird Street Dev	0.81	15	1.101

Table 11 - Rational Methods Inputs for the Developed Catchment conditions

The Rainfall Data table summarises the IFD data used for the Rational Method calculation from the BOM design rainfall data system.

Time of Concentration (minutes)	1EY ARI (mm/hour)	0.5EY ARI (mm/hour)	0.2EY ARI (mm/hour)	10% AEP (mm/hour)	5% AEP (mm/hour)	2% AEP (mm/hour)	1% AEP (mm/hour)
15	69.9	88.4	112	130	149	174	193

Table 12 – Rainfall Data

Table 13 below tabulates park discharges for proposed conditions over a range of recurrence intervals.

ARI/AEP	Rational Method Developed Peak Discharge (m^3/s)
1EY	0.139
0.5EY	0.186
0.2EY	0.264
10%	0.322
5%	0.388
2%	0.496
1%	0.574

Table 13 – Developed Peak Dischargesa

3.3.3 Bird Street Comparison

The pre-development and post-development peak discharge rates, over a range of AEPs calculated by The Rational Method, for the Bird Street catchment are outlined below.

ARI/AEP	Rational Method Existing Peak Discharge (m^3/s)	Rational Method Developed Peak Discharge (m^3/s)	Change (m^3/s)
1EY	0.099	0.139	+0.040
0.5EY	0.132	0.186	+0.054
0.2EY	0.187	0.264	+0.077
10%	0.229	0.322	+0.093
5%	0.276	0.388	+0.112
2%	0.353	0.496	+0.143
1%	0.408	0.574	+0.166

Table 14 - Existing and Developed Mitigated Peak Discharge Rates

Refer to appendices for Rational Method Calculations.

The proposed peak flow discharge to Bird Street is increased as a result of the proposed development.

A review of the existing stormwater infrastructure in Bird Street indicates an existing 600mm pipe extends into the development site at the future termination of Bird Street. An estimate of the existing pipe capacity has been undertaken using Manning's Equation.

Pipe Capacity Calculations	
Pipe Diameter	0.600m
No. Pipes	1
Grade	0.033
Pipe Velocity	3.0m/s
On-Grade Capacity	0.848m^3/s

Table 15 – Existing Pipe Capacity

As outlined above the existing pipe in Bird Street has an estimate capacity of 0.848m3/s, well in excess of the major storm peak flow of 0.574m3/s. As such, the increase in discharge proposed to Bird Street should not result in any adverse impacts.

3.4 North Catchment Management Overview

As part of the preceding subdivision (Council approval reference: 8605/2025/CA), it is proposed that a stormwater pipe connection be extended into the site from existing infrastructure within private property to the north.

It is proposed to collect and convey development site runoff to this new connection,

In accordance with the draft PLUP and the associated nominated guidance material, on site detention is proposed to meet the requirements that achieve the desired performance outcomes Councils General Works and Infrastructure Code.

Stormwater runoff will be collected internally and mitigated in proposed on site detention tanks within the proposed development. Due to the size of detention required, this has been split into multiple tanks located within the site.

It is proposed that roofwater and surface water flows up to and included the 5% AEP storm event are captured within the proposed detention tanks. Major flows exceeding the 5% AEP storm event will bypass detention and be managed within the internal driveway network and lawfully discharge to the proposed stormwater infrastructure (2 x 750mm pipes).

A model has been set up using XP-RAFTS software package to determine existing runoff hydrographs and to determine the effectiveness of the proposed detention tanks.

3.4.1 Lawful Discharge

The lawful discharge point is proposed to be the existing stormwater infrastructure.

3.4.2 Design Storms

Design Storms for the development have been determined in accordance with Table 7.3.1 of the Queensland Urban Drainage Manual.

Storm Event	AEP
Minor	20%
Major	1.0%

Table 16 - Design Storms

3.4.3 Hydrologic Modelling

3.4.3.1 Losses

Initial and continuing rainfall losses for pervious and impervious are as tabulated below:

	Initial Loss (mm/hr)	Continuing Loss (mm/hr)
Pervious	10	2
Impervious	2	0

Table 17 - Rainfall Losses

3.4.3.2 Hydraulic Roughness

Manning's 'n' values have been used to represent the pervious and impervious surface. The following values were adopted.

Mannings 'n'	
Pervious	0.045
Impervious	0.025

Table 18 - Hydraulic Roughness

3.4.3.3 Existing Conditions

The XP RAFTS Source Node Parameters table summarises the input parameters for the XP-RAFTS model for the existing scenario.

Catchment ID	Area (ha)	Percentage Impervious (%)	Slope (%)
North Ex	4.28	5	5

Table 19 - XP-RAFTS Source Node Parameters for Existing North Catchment conditions

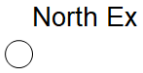


Image – XP-RAFTS Model set up for Existing North Catchment conditions

Although most of the existing site is undeveloped, a 5% fraction impervious has been selected for the existing site node as per the recommendations of the user manual.

RAFTS is an empirical runoff routing model recognised as a suitable method to predict runoff hydrographs in the urban environments. Rational Method is a simple hand calculation broadly accepted as being able to provide reasonable peak flow estimates in small urban catchments. Rational Method has been undertaken to verify the suitability of the RAFTS predicted flows.

The Rational Method Inputs table summarises the input parameters for the existing scenario.

Catchment ID	C_{10}	Time of Concentration (min)	Area (ha)
North Site Ex	0.70	18	4.28

Table 20 - Rational Methods Inputs for Existing North Catchment conditions

The Rainfall Data table summarises the IFD data used for the Rational Method calculation from the BOM design rainfall data system.

Time of Concentration (minutes)	1EY ARI (mm/hour)	0.5EY ARI (mm/hour)	0.2EY ARI (mm/hour)	10% AEP (mm/hour)	5% AEP (mm/hour)	2% AEP (mm/hour)	1% AEP (mm/hour)
18	64.2	81.1	100	119	136	159	177

Table 21 – Rainfall Data

XP-RAFTS computer software package was used to model the peak discharges immediately downstream of the subject site under existing conditions during the 1EY, 0.5EY, 0.2EY, 10%, 5%, 2% and 1% AEP rainfall events.

The below table compares peak discharges over a range of AEPs calculated by The Rational Method and the XP-RAFTS existing case model. It can be seen that good correlation is achieved and the XP-RAFTS model is therefore deemed suitable

ARI/AEP	XP-RAFTS Existing Peak Discharge (m^3/s)	Rational Method Existing Peak Discharge (m^3/s)
1EY	0.355	0.427
0.5EY	0.557	0.574
0.2EY	0.855	0.791
10%	1.049	0.990
5%	1.302	1.188
2%	1.592	1.522
1%	1.866	1.768

Table 22 - Existing North Catchment Peak Discharge Rates

Refer to appendices for Rational Method and XP-RAFTS outputs.

3.4.3.4 Proposed Conditions (No Detention)

The XP RAFTS Source Node Parameters table summarises the input parameters for the XP-RAFTS model for the developed, not mitigated, scenario.

Catchment ID	Area (ha)	Percentage Impervious (%)	Slope (%)
North Dev	4.50	75	4

Table 23 - XP-RAFTS Source Node Parameters for Developed North Catchment conditions

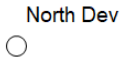


Image – XP-RAFTS Model set up for Developed North Catchment conditions

The Rational Method Inputs table summarises the input parameters for the developed, not mitigated, scenario.

Catchment ID	C_{10}	Time of Concentration (min)	Area (ha)
North Site Dev	0.87	8	4.50

Table 24 - Rational Methods Inputs for the Developed North Catchment conditions

The Rainfall Data table summarises the IFD data used for the Rational Method calculation from the BOM design rainfall data system.

Time of Concentration (minutes)	1EY ARI (mm/hour)	0.5EY ARI (mm/hour)	0.2EY ARI (mm/hour)	10% AEP (mm/hour)	5% AEP (mm/hour)	2% AEP (mm/hour)	1% AEP (mm/hour)
8	89.1	113	142	164	190	222	246

Table 25 – Rainfall Data

The below table compares peak discharges over a range of AEPs calculated by The Rational Method and the XP-RAFTS developed, not mitigated, case model. It can be seen that reasonable correlation is achieved and the XP-RAFTS model is therefore deemed suitable.

ARI/AEP	XP-RAFTS Existing Peak Discharge (m^3/s)	Rational Method Developed Peak Discharge (m^3/s)
1EY	1.059	0.778
0.5EY	1.404	1.045
0.2EY	1.860	1.446
10%	2.149	1.794
5%	2.542	2.158
2%	2.771	2.763
1%	3.164	3.075

Table 26 - Developed North Catchment Peak Discharge Rates

3.4.3.5 Proposed Mitigated Conditions

Input parameters under developed, mitigated conditions are summarised below in the XP RAFTS Source Node Parameters table, and the XP RAFTS model setup is below.

Catchment ID	Area (ha)	Percentage Impervious (%)	Slope (%)
Catch 2	0.683	75	4
Catch 3	1.194		
No Tank	0.820		
Catch 4a	0.415		
Catch 4b	0.415		
Catch 5a	0.555		
Catch 5b	0.419		

Table 27 - XP-RAFTS Source Node Parameters for Developed Mitigated North Catchment conditions

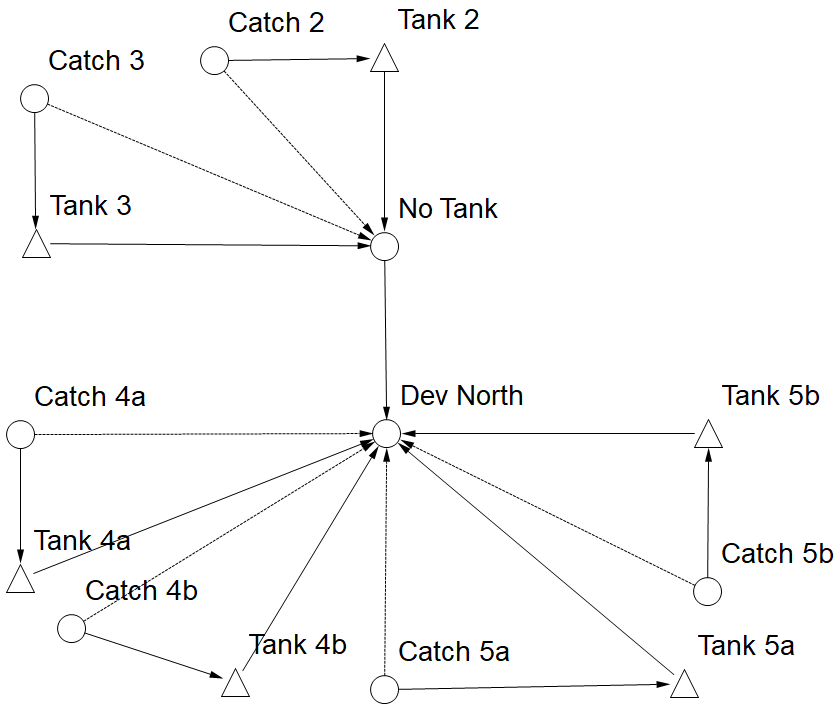


Image XP-RAFTS model set up for Developed Mitigated North Catchment conditions

The detention tank parameters are shown below.

Detention ID	Base RL (m AHD)	Depth (m)	Total Volume (m^3)	Low Flow Outlet Control	High Flow Outlet Control
Tank 2	0	2	280	Orifice 1: 0.125m diameter at tank base Orifice 2: 0.22m diameter at 0.85m	Weir: 0.50m wide at 1.80m
Tank 3	0	2	700	Orifice 1: 0.20m diameter at tank base Orifice 2: 0.22m diameter at 0.85m	Weir: 0.50m wide at 1.80m
Tank 4a	0	2	160	Orifice 1: 0.125m diameter at tank base Orifice 2: 0.22m diameter at 0.85m	Weir: 0.50m wide at 1.80m
Tank 4b	0	2	160		
Tank 5a	0	2	230		
Tank 5b	0	2	160		
Total			1690		

Table 28 - Detention tank parameters

The pre-development and post-development peak discharge rates for the whole northern catchment are outlined below.

ARI/AEP	XP-RAFTS Existing Peak Discharge (m^3/s)	XP-RAFTS Developed Peak Discharge (m^3/s)
1EY	0.355	0.346
0.5EY	0.557	0.530
0.2EY	0.855	0.779
10%	1.049	0.941
5%	1.302	1.139
2%	1.592	1.410
1%	1.866	1.866

Table 29 - Existing and Developed Mitigated Peak Discharge Rates

As it can be seen from Existing and Developed Mitigated peak discharge rates table, the proposed detention tanks will mitigate the peak discharge rates leaving the site to less than, or equal to, existing for the 1EY, 0.5EY, 0.2EY, 10%, 5%, 2% and 1% AEP rainfall events for the northern catchment. Refer to engineering design drawings attached.

Refer to appendices for XP-RAFTS outputs.

4. Water Quality Management

4.1 Construction Phase

4.1.1 Pollutants of Concern

The construction phase stormwater quality design objectives which may be relevant to this subdivision as set by the *Urban Stormwater Quality Planning Guidelines 2010* are as follows:

Objective	Measure
Drainage Control	Design life and design storm of temporary drainage works in accordance with time the disturbed area is exposed. <12 months – 1 in 2 ARI 12-24 months – 1 in 5 ARI >24 months – 1 in 10 ARI
Erosion Control	Minimise exposure of disturbed soils at any time. Avoid or minimise large construction activities in the wet season. Divert water run-off from undisturbed areas around disturbed areas. Use erosion risk ratings to determine appropriate erosion control measures.
Sediment Control	Use soil loss rates to determine appropriate sediment control measures. Design storm for sediment control basins should be based on retaining the maximum sediment quantity for the maximum volume of water runoff.
Water Quality Outcomes	Coarse sediment is retained on site. Nitrogen and phosphorus are managed through sediment control. Prevent litter/waste entering the site, the stormwater or watercourses that discharge from the site. Also minimise or sufficiently contain on-site litter and waste production and regularly clear waste bins. Hydrocarbons and other contaminants are prevented from entering the stormwater system or internal watercourses that discharge from the site. Washdown water is prevented from entering the stormwater system or internal watercourses that discharge from the site. Cations and anions including aluminium, iron and sulphate are managed as required under an approved acid sulphate soil management plan.
Stormwater Drainage / Flow Management	Take all reasonable and practicable measures to minimise significant changes to the natural waterway hydraulics and hydrology from: • Peak flow for the one year and the 100 year ARI event. • Runoff frequency and volumes entering receiving waters. • Uncontrolled release of contaminated stormwater.

Table 11 - Design objectives for Stormwater Quality Management Plan – Construction phase table

4.1.2 Water Quality Treatment

Appropriate erosion and sediment control measures can be prepared and implemented on site during construction activities to ensure 'best management practices' are achieved.

4.2 Operational Phase

4.2.1 Pollutants of Concern

Suspended Solids, Nutrients, Litter and Hydrocarbons are the common pollutants of concern for Urban Development projects.

4.2.2 Water Quality Treatment

Table 2.3.1 of the Planning Scheme Policy 3 – General Works, outlines the required Water Quality Objectives. The Water quality design objectives for Southeast Queensland Table identifies the minimum reductions required.

Pollutant	Minimum Reduction in Mean Annual load
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	60%
Total Nitrogen (TN)	45%
Gross Pollutants (>5mm)	90%

Table 12 - Water quality design objectives for Southeast Queensland table

Two devices are proposed to provide water quality treatment of the site.

A proprietary filter-based treatment system is proposed to be located at the northwestern boundary before discharging flow to River Road. Stormwater runoff to this device will only originate from the north part of the western catchment.

A proposed treatment device will also be located at the northern boundary of the development, treating the majority of the site, before discharging flows to the northern existing infrastructure.

The south part of the western catchment and eastern catchment are proposed to remain untreated.

Refer to 25376-SK09 for water quality catchment details.

4.2.3 Pollutant Export Modelling

4.2.3.1 Model Selection

To determine the onsite pollutant generation, and the effectiveness of the proposed stormwater quality improvement devices, the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) version 6.4 was used.

4.2.3.2 Model Setup

The MUSIC model was set up in accordance with the Health Waterways, Water by *Design's MUSIC Modelling Guidelines Version 3.0 – 2018*. The rainfall runoff parameters and pollutant export parameters have been set up according to Table 3.9 of this guideline.

Refer to the image for the schematic model setup and the MUSIC Rainfall data table for the rainfall data and modelling time step that were used.

Rainfall Period	Rainfall Station	Modelling Time Step
1990 - 1999	Amberly 40004	6 Minutes

Table 13 - MUSIC Rainfall data table

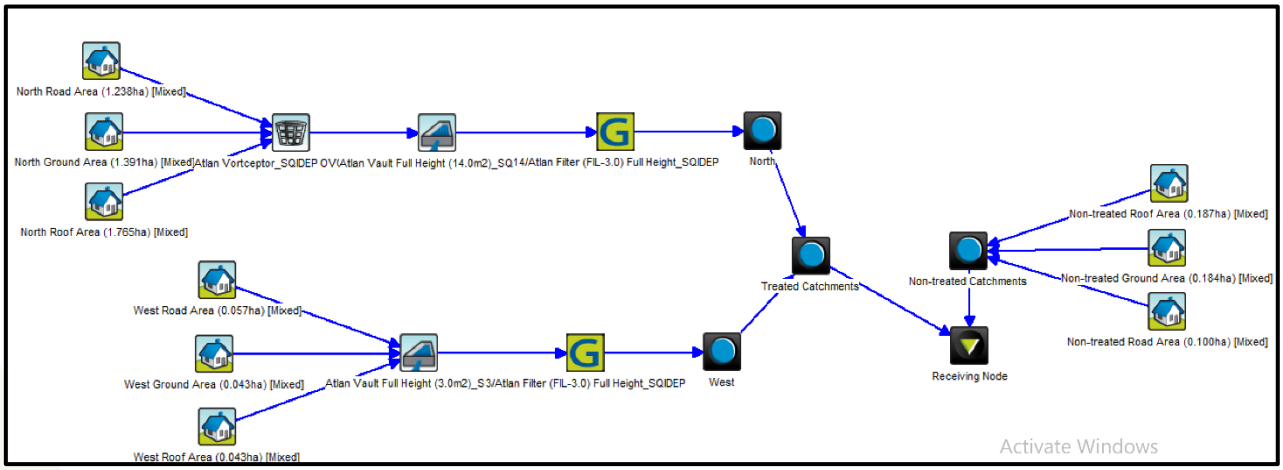


Image MUSIC Model setup

Source Node Catchment data as per the MUSIC model source nodes table.

Node	Catchment Area (ha)	Impervious Percentage
North Roof	1.765	100%
North Ground	1.391	20%
North Road	1.238	100%
West Roof	0.043	100%
West Ground	0.043	20%
West Road	0.057	100%
Non-treated Roof	0.187	100%
Non-treated Ground	0.184	20%
Non-treated Road	0.100	100%

Table 14 - MUSIC model source nodes table

4.2.3.3 Model Results

The above proposed treatment measures have been modelled using MUSIC version 6.4 and the following pollutant load-based reductions have been predicted for the site.

Target Pollutant	Required Load Based Reduction	Northern Catchment Achieved Reduction	Western Catchment Achieved Reduction	Total Catchment Achieved Reduction
Total Suspended Solids (TSS)	80%	81%	81%	74%
Total Phosphorus (TP)	60%	76%	71%	71%
Total Nitrogen (TN)	45%	59%	56%	54%
Gross Pollutants (GP)	90%	100%	100%	91%

Table 15 - MUSIC Modelling Results table

As the MUSIC modelling results table demonstrates, the installation of the proposed stormwater treatment measures achieves the required reduction requirements for Total Suspended Solids, Total Phosphorus, Total Nitrogen and Gross Pollutants for the Northern and Western Catchments. Refer to appendices for the MUSIC results.

Compliance with the Water Quality Objectives outlined SC6.2 General Works and Infrastructure Planning Scheme Policy, Part 3 - Stormwater Quantity, Quality and Floodplain Management are proposed to be achieved by installation of a proprietary treatment device.

Trace and heavy metals are usually associated with fine sediment. The proposed treatment train removes very significant proportions of suspended solids therefore it is expected that the removal of trace and heavy metals will be acceptable to adequately protect downstream habitats and ecosystems from heavy metal contamination. No major sources of hydrocarbons are expected on site.

4.2.4 Water Quality Monitoring

No monitoring of water quality of the runoff from the site is proposed. Untrialled stormwater quality management measures are not proposed. Additionally, the level of treatment proposed is considered best practice and little improvement in the treatment train proposed could be provided.

4.2.5 Maintenance

4.2.5.1 StormSack Maintenance

Maintenance and cleaning of the Atlan 'StormSack' is to be undertaken per the Operation and Maintenance manual. A copy of this can be viewed in the appendices for Maintenance Guidelines.

4.2.5.2 Vortceptor Maintenance

Maintenance and cleaning of the Atlan 'Vortceptor' is to be undertaken per the Operation and Maintenance manual. A copy of this can be viewed in the appendices for Maintenance Guidelines.

4.2.5.3 AtlanFilter Maintenance

Maintenance and cleaning of the Atlan 'AtlanFilter' is to be undertaken per the Operation and Maintenance manual. A copy of this can be viewed in the appendices for Maintenance Guidelines.

Inspection frequency and maintenance varies depending on rainfall events and the life span of the system. The inspection frequency outlined below provides a summary of inspection requirements while a detailed maintenance checklist is provided as per appendices for Maintenance Guidelines and should be followed to ensure the efficiency and life span of the bio-retention system.

Inspection frequency:

- Inspection after all significant rainfall events
- Monthly inspections during first six month of operation
- Bi-monthly inspections during 6-24 months of operation
- Bi-yearly inspections for the remainder of the operational phase
- Resetting (complete reconstruction) after 10 years of operation (or earlier if system starts failing to drain adequately)
- After large rainfall events.

5. Conclusions

Site runoff will discharge from the site in three discrete locations.

Stormwater will be discharged to River Road, Bird Street and to stormwater infrastructure to the north. For discharge to River Road and Bird Street, no mitigation of peak stormwater flow is required to meet the Performance Outcomes of Councils General Works and Infrastructure Code and therefore PLUP.

The majority of site runoff will be captured and conveyed to discharge to the existing stormwater infrastructure. Runoff is to be mitigated such that peak discharge does not exceed that currently discharged in this direction. A total of 6 detention tanks with a combined volume of 1690m^3 is proposed to suit the staging of the proposed development.

Compliance with the Water Quality Objectives outlined SC6.2 General Works and Infrastructure Planning Scheme Policy, Part 3 - Stormwater Quantity, Quality and Floodplain Management are proposed to be achieved by installation of a proprietary treatment device.

Stormwater drainage within the site can be designed in accordance with the requirements of the Queensland Urban Drainage Manual and Councils SC6.2 General Works and Infrastructure Planning Scheme Policy.

Proposed stormwater drainage layout is shown on the accompanying concept design drawings and is detailed in the Stormwater Management Plan prepared by HCE Engineers.

Engineering Drawings

212 UNIT SITE DEVELOPMENT

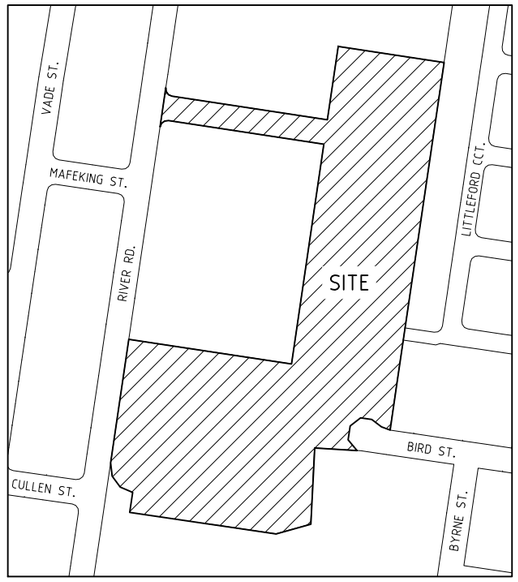
LOT 1 ON SP 354857

19 RIVER ROAD

BUNDAMBA, QLD 4304

DRAWING INDEX	
DRAWING No.	DESCRIPTION
25376-SK01	LOCALITY PLAN, DRAWING INDEX AND GENERAL NOTES
25376-SK02	CONCEPT LAYOUT PLAN AND TYPICAL SECTIONS
25376-SK03	CONCEPT SERVICES PLAN SHEET 1 OF 2
25376-SK04	CONCEPT SERVICES PLAN SHEET 2 OF 2
25376-SK05	CONCEPT BULK EARTHWORKS PLAN SHEET 1 OF 2
25376-SK06	CONCEPT BULK EARTHWORKS PLAN SHEET 2 OF 2
25376-SK07	CONCEPT EARTHWORKS SECTIONS SHEET 1 OF 3
25376-SK08	CONCEPT EARTHWORKS SECTIONS SHEET 2 OF 3
25376-SK09	CONCEPT EARTHWORKS SECTIONS SHEET 3 OF 3
25376-SK10	CONCEPT STORMWATER CATCHMENT PLAN
25376-SK11	CONCEPT STORMWATER QUALITY CATCHMENT PLAN

HCE STANDARD DRAWING INDEX	
DRAWING No.	DESCRIPTION
HCE-RW01	STANDARD CONCRETE SLEEPER RETAINING WALL DETAILS SHEET 1
HCE-RW02	STANDARD CONCRETE SLEEPER RETAINING WALL DETAILS SHEET 2



LOCALITY PLAN
SCALE 1:2500

SCALE 1:2500 (A1) 0 50 100 150m
(SCALE BEFORE REDUCTION)

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mail@hce-engineers.com.au
07 3829 1399

PROJECT	TITLE	CLIENT
19 RIVER ROAD BUNDAMBA QLD 4304 LOT 1 ON SP 354857	LOCALITY PLAN, DRAWING INDEX AND GENERAL NOTES	AR DEVELOPMENTS

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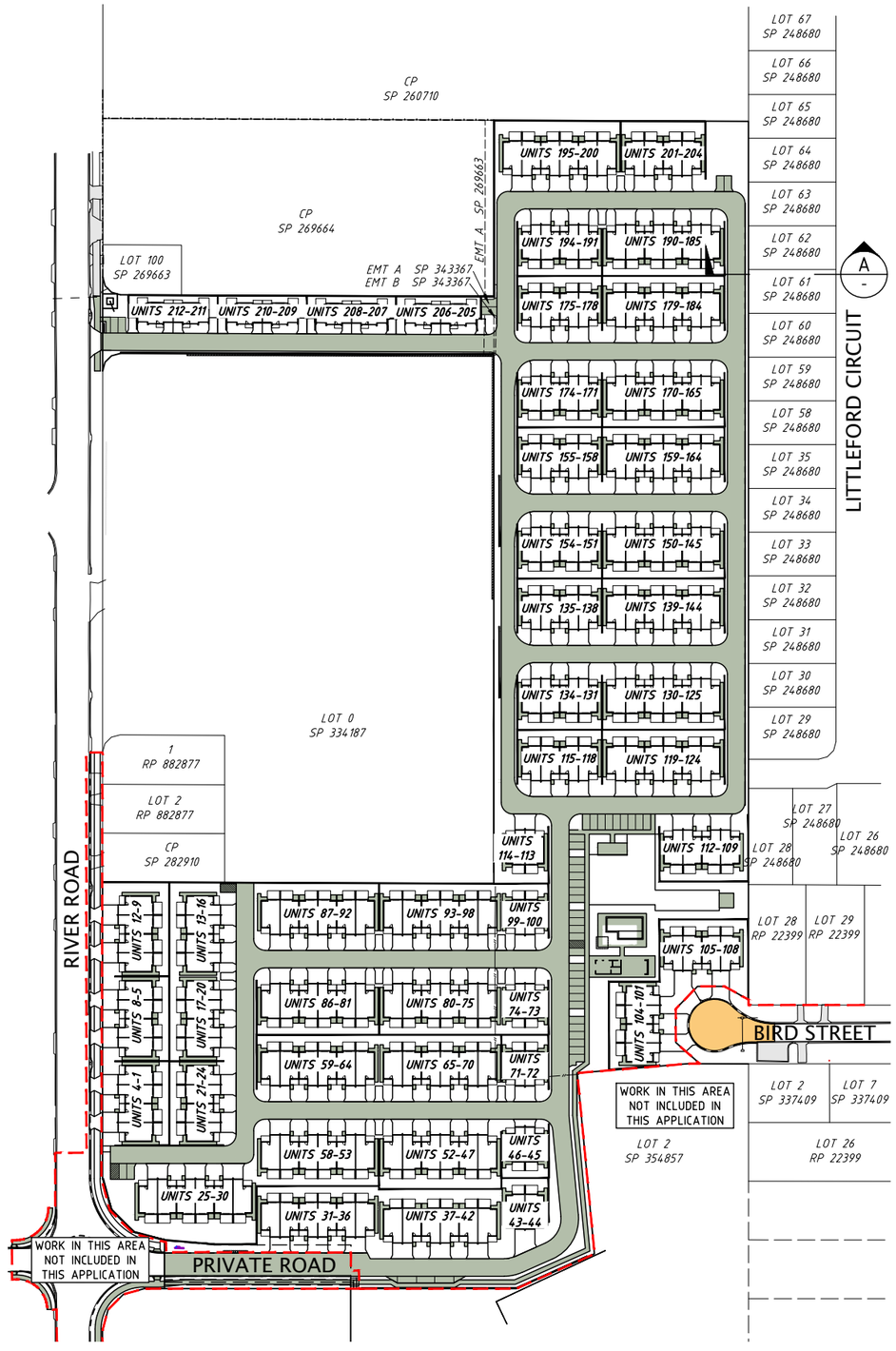
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A	REPORT ISSUE	21/07/26

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Drawing No.	Rev.
25376-SK01	A

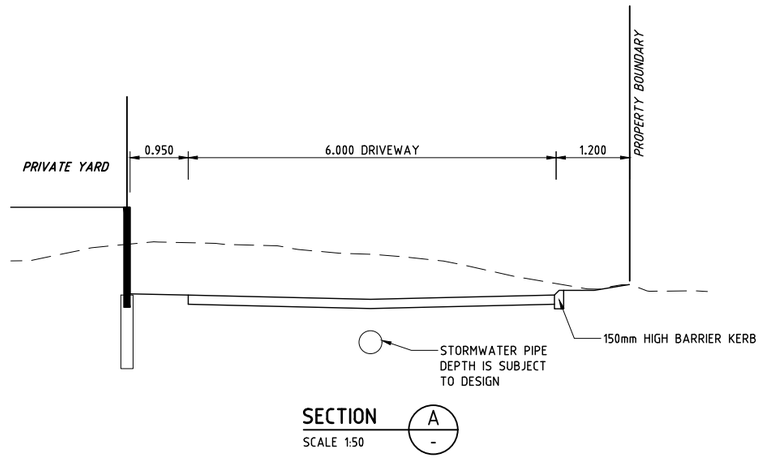


LEGEND

- EXISTING KERB AND CHANNEL
- PROPOSED KERB AND CHANNEL
- EXISTING CONCRETE
- PROPOSED CONCRETE
- ?? EASEMENT
- PROPOSED PAVEMENT
- EXTERNAL WORKS BOUNDARY

PLAN

SCALE 1:1000



SECTION A-A

SCALE 1:50

SCALE 1:1000 (A1)

0 20 40 60m

(SCALE BEFORE REDUCTION)

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mail@hce-engineers.com.au
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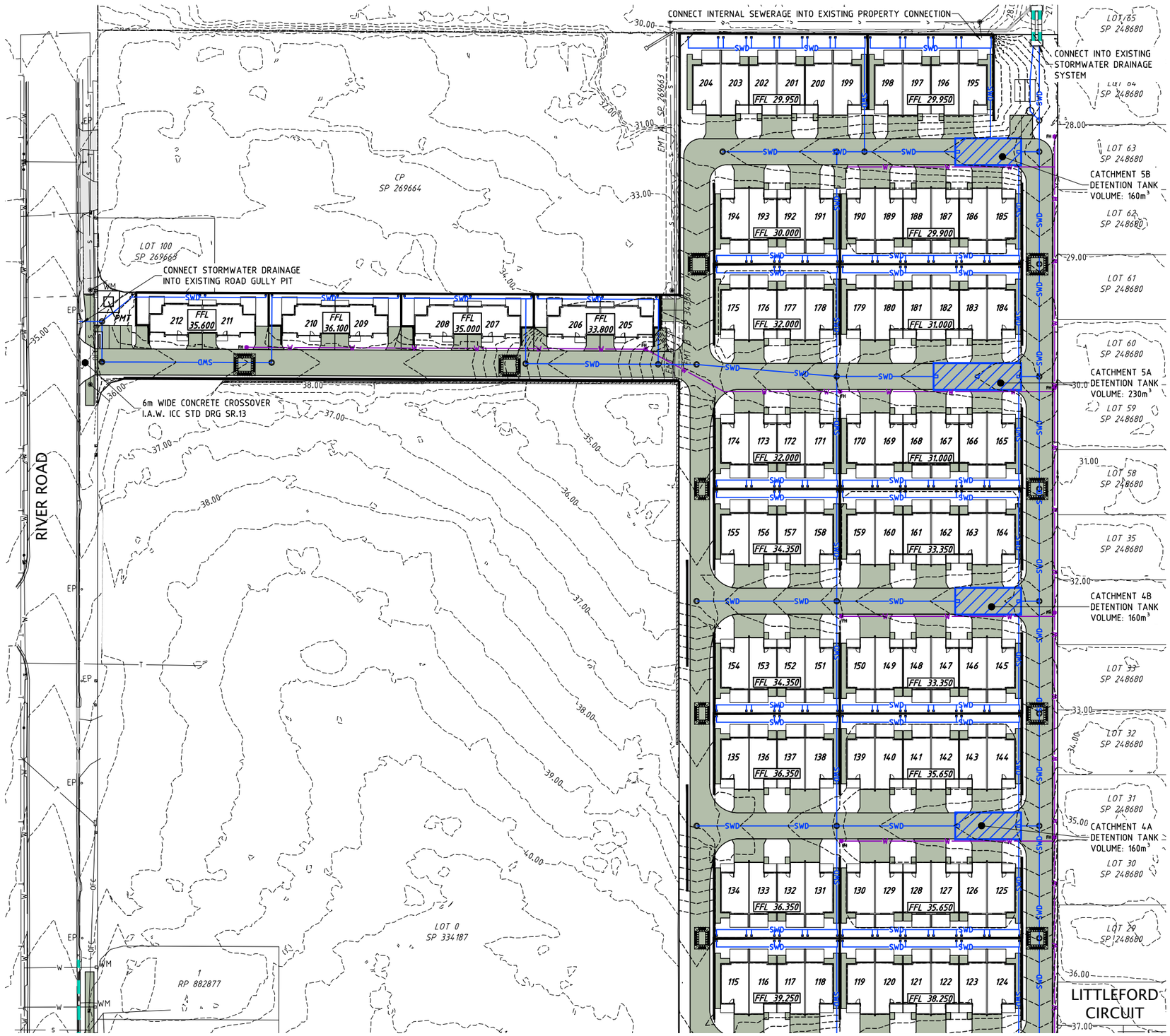
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Drawing No. 25376-SK02

Rev. B



FOR CONTINUATION REFER TO DRAWING 25376-SK04

PLAN

SCALE 1:500

LEGEND

- EXISTING SURFACE CONTOURS (0.50m INTERVAL)
- FINISHED SURFACE CONTOURS (0.25m INTERVAL)
- EXISTING STORMWATER DRAINAGE
- PROPOSED STORMWATER DRAINAGE (NOT PART OF THIS APPLICATION)
- PROPOSED STORMWATER DRAINAGE
- UNDERGROUND STORMWATER DETENTION TANK
- EXISTING SEWERAGE
- PROPOSED SEWERAGE
- EXISTING WATER RETICULATION
- PROPOSED WATER RETICULATION
- EXISTING UNDERGROUND ELECTRICAL
- PROPOSED ELECTRICAL
- EXISTING TELECOMMUNICATIONS
- EXISTING KERB AND CHANNEL
- PROPOSED KERB AND CHANNEL
- EXISTING RETAINING WALL
- PROPOSED RETAINING WALL
- EXISTING CONCRETE
- PROPOSED CONCRETE
- EXISTING WATER METER
- PROPOSED WATER METER
- PROPOSED FIRE HYDRANT

DETENTION TANK VOLUMES

NAME	TANK VOLUME (m³)
2	280
3	700
4A	160
4B	160
5A	230
5B	160
TOTAL	1690

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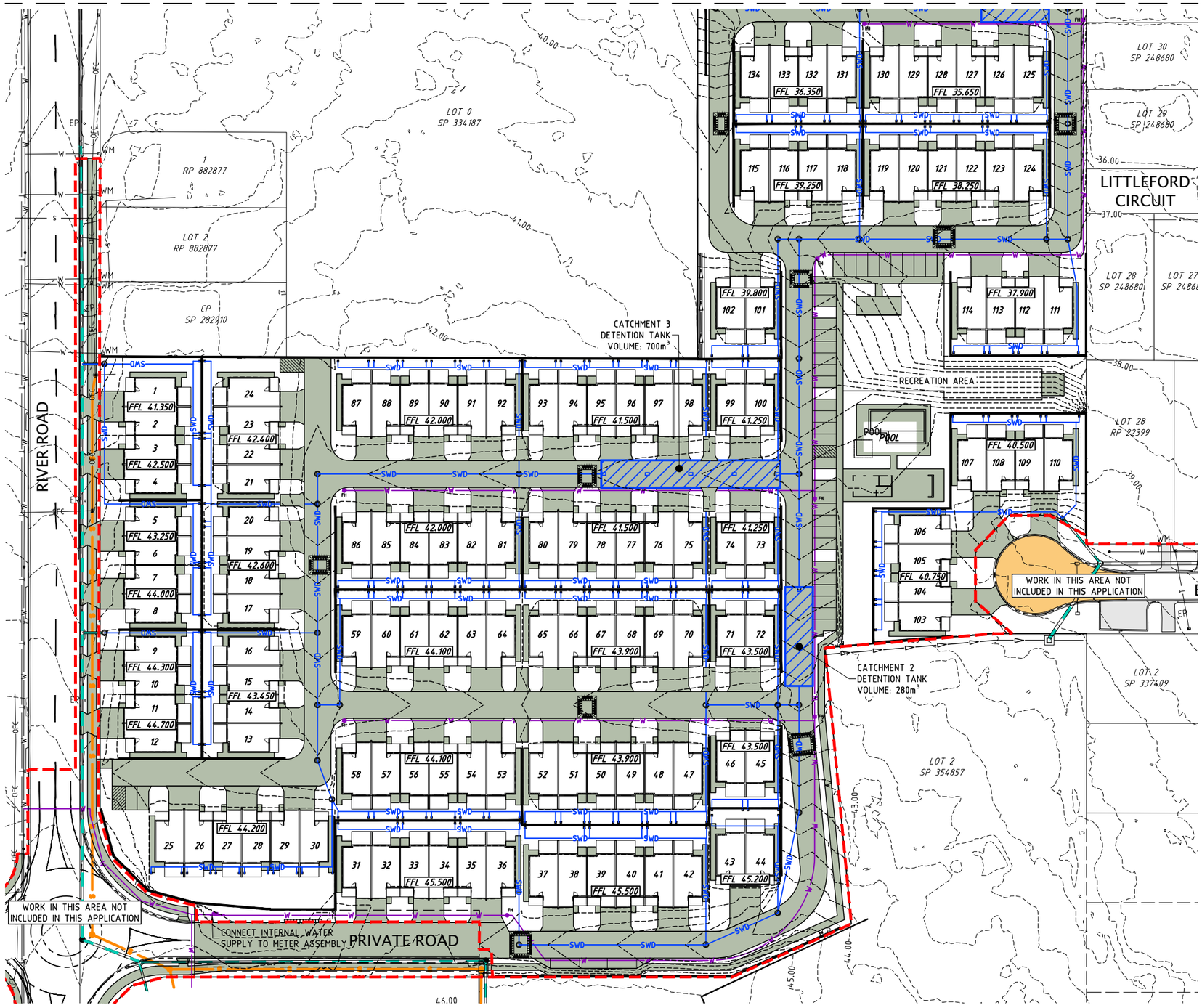
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LEGEND

- EXISTING SURFACE CONTOURS (0.50m INTERVAL)
- FINISHED SURFACE CONTOURS (0.25m INTERVAL)
- EXISTING STORMWATER DRAINAGE
- PROPOSED STORMWATER DRAINAGE (NOT PART OF THIS APPLICATION)
- PROPOSED STORMWATER DRAINAGE
- UNDERGROUND STORMWATER DETENTION TANK
- EXISTING SEWERAGE
- PROPOSED SEWERAGE
- EXISTING WATER RETICULATION
- PROPOSED WATER RETICULATION
- EXISTING UNDERGROUND ELECTRICAL
- PROPOSED ELECTRICAL
- EXISTING TELECOMMUNICATIONS
- EXISTING FIBRE OPTIC CABLE
- EXISTING KERB AND CHANNEL
- PROPOSED KERB AND CHANNEL
- EXISTING RETAINING WALL
- PROPOSED RETAINING WALL
- PROPOSED PAVEMENT
- EXISTING CONCRETE
- PROPOSED CONCRETE
- EXISTING WATER METER
- PROPOSED WATER METER
- PROPOSED FIRE HYDRANT
- EXTERNAL WORKS BOUNDARY

PLAN

SCALE 1:500

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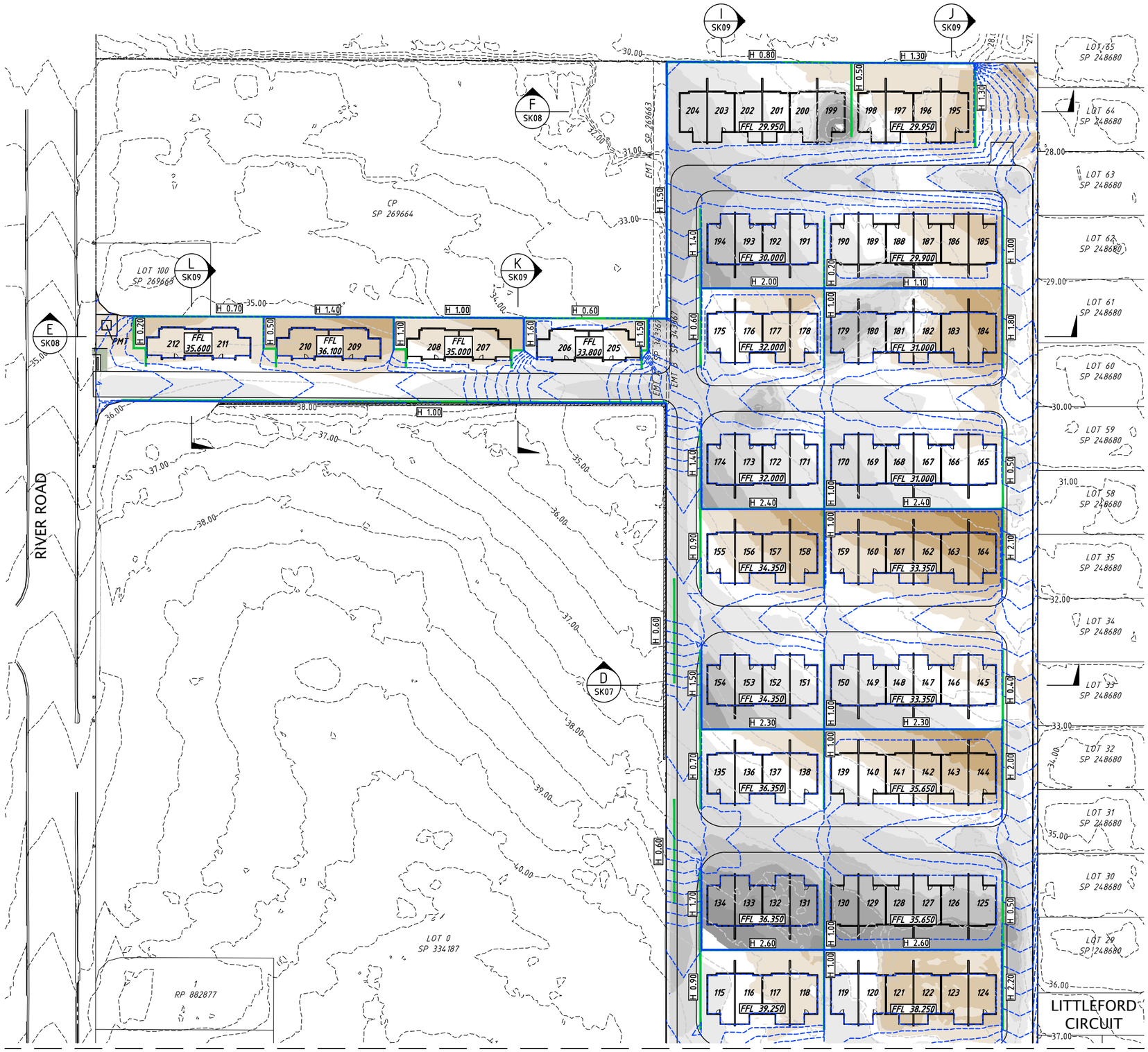
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PLAN

SCALE 1:500

LEGEND

- EXISTING SURFACE CONTOURS (0.50m INTERVAL)
- FINISHED SURFACE CONTOURS (0.25m INTERVAL)
- SWD — EXISTING STORMWATER DRAINAGE
- S — EXISTING SEWERAGE
- W — EXISTING WATER RETICULATION
- E — EXISTING UNDERGROUND ELECTRICAL
- OH — EXISTING OVERHEAD ELECTRICAL
- T — EXISTING TELECOMMUNICATIONS
- EXISTING KERB AND CHANNEL
- PROPOSED KERB AND CHANNEL
- EXISTING RETAINING WALL
- PROPOSED RETAINING WALL
- H 1.00 MAXIMUM RETAINING WALL HEIGHT

CUT FILL LEGEND

-3.00m TO -2.50m	
-2.50m TO -2.00m	
-2.00m TO -1.50m	
-1.50m TO -1.00m	
-1.00m TO -0.50m	
-0.50m TO 0.00m	
0.00m TO 0.50m	
0.50m TO 1.00m	
1.00m TO 1.50m	
1.50m TO 2.00m	
2.00m TO 2.50m	
2.50m TO 3.00m	

EARTHWORKS VOLUMES

TOTAL CUT	-31,500m³
TOTAL FILL	6,500m³
BALANCE	-25,000m³

SCALE 1:500 (A1) 0 10 20 30m (SCALE BEFORE REDUCTION)

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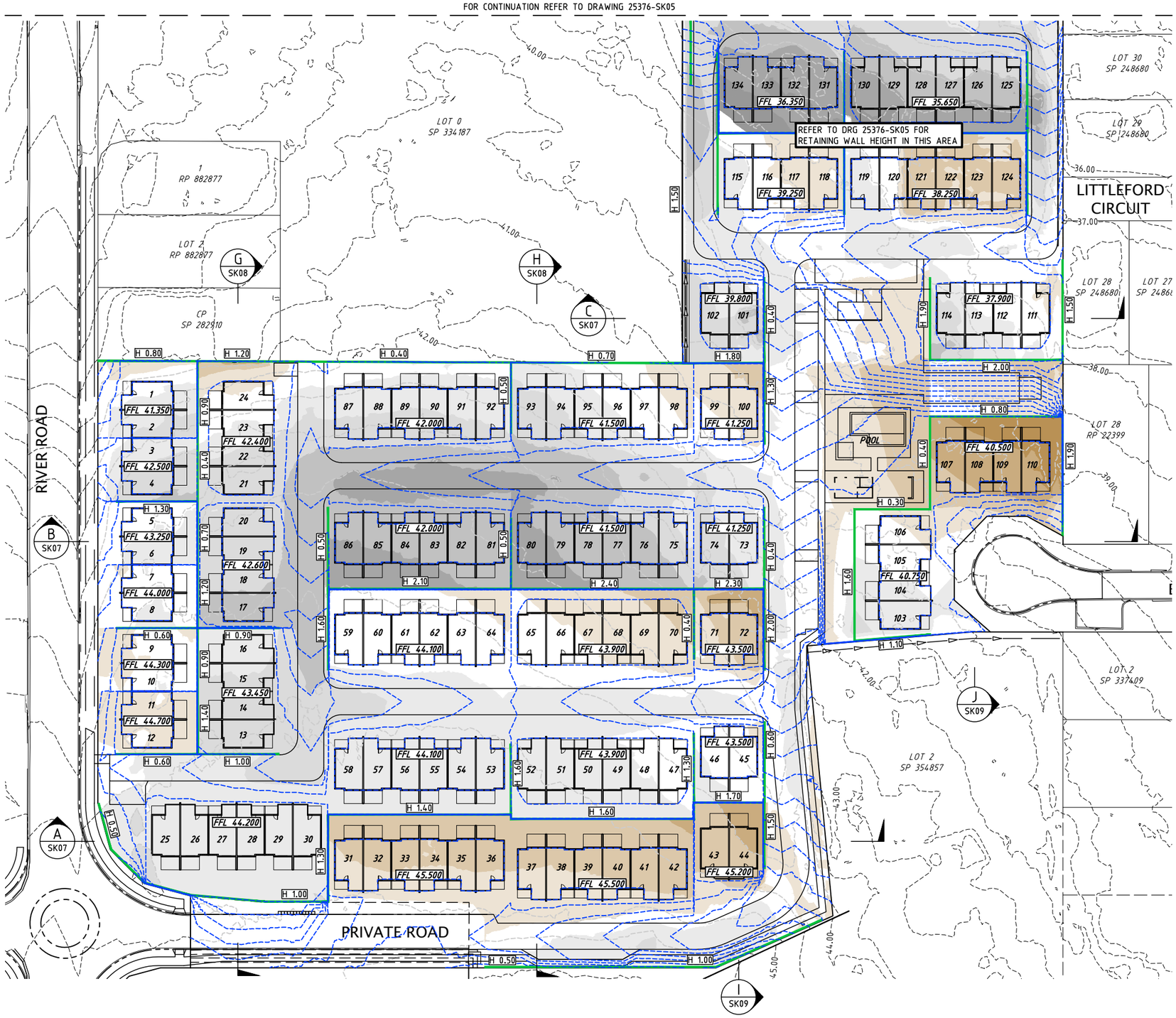
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LEGEND

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- FINISHED SURFACE CONTOURS (0.25m INTERVAL)
- EXISTING STORMWATER DRAINAGE
- EXISTING SEWERAGE
- EXISTING WATER RETICULATION
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING OVERHEAD ELECTRICAL
- EXISTING TELECOMMUNICATIONS
- EXISTING KERB AND CHANNEL
- PROPOSED KERB AND CHANNEL
- EXISTING RETAINING WALL
- PROPOSED RETAINING WALL
- H 1.00 MAXIMUM RETAINING WALL HEIGHT
- EXISTING CONCRETE
- WM EXISTING WATER METER

CUT FILL LEGEND

-3.00m TO -2.50m	
-2.50m TO -2.00m	
-2.00m TO -1.50m	
-1.50m TO -1.00m	
-1.00m TO -0.50m	
-0.50m TO 0.00m	
0.00m TO 0.50m	
0.50m TO 1.00m	
1.00m TO 1.50m	
1.50m TO 2.00m	
2.00m TO 2.50m	
2.50m TO 3.00m	

PLAN

SCALE 1:500

SCALE 1:500 (A1) 0 10 20 30m

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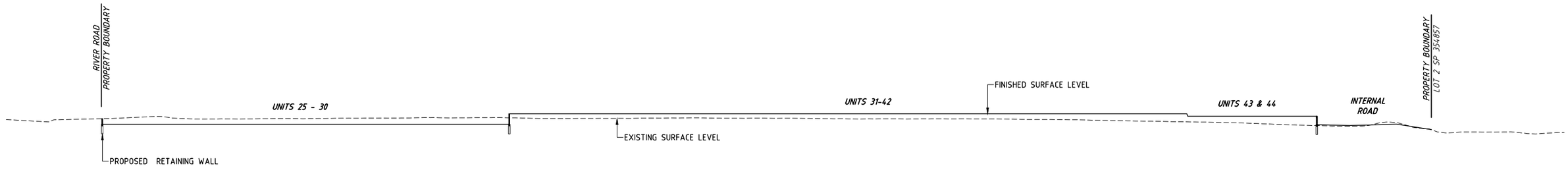
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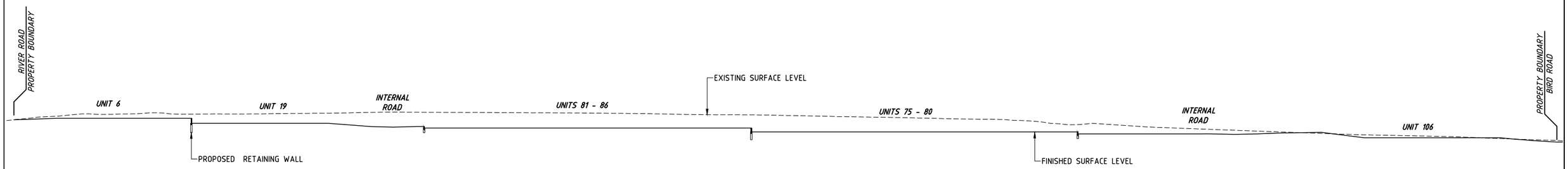
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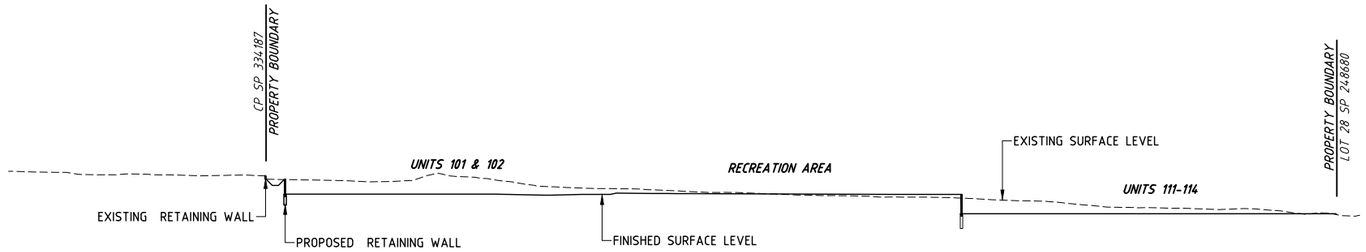
Drawing No.	Rev.
25376-SK06	B



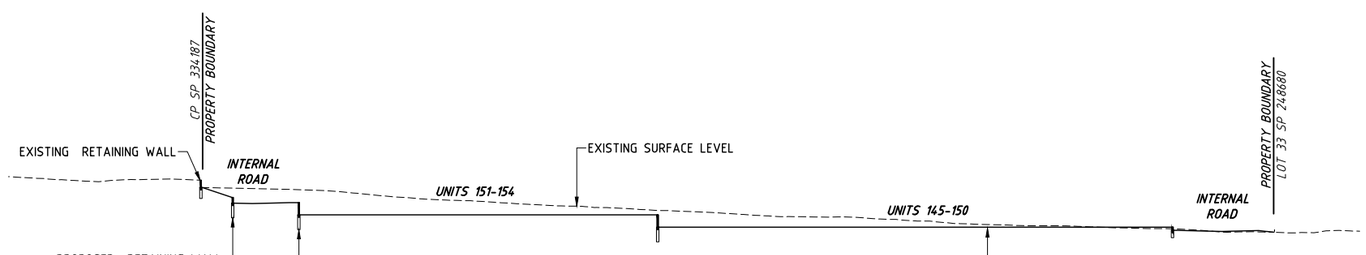
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SECTION B — SCALE 1:250 — SK06



SECTION C — SCALE 1:250 — SK06



SECTION D — SCALE 1:250 — SK05

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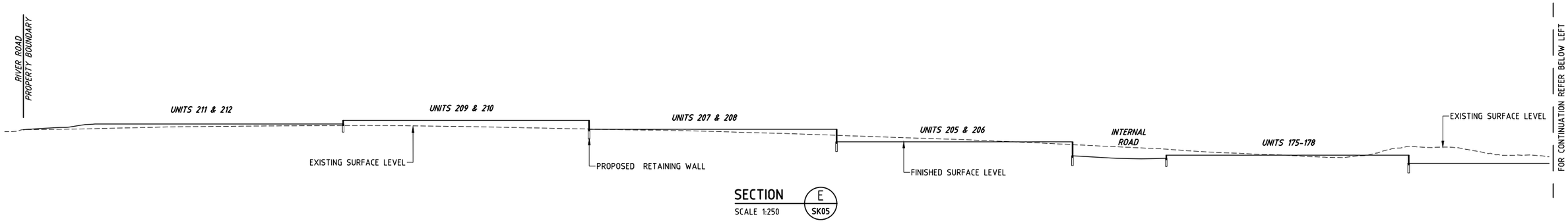
PROJECT	TITLE	CLIENT
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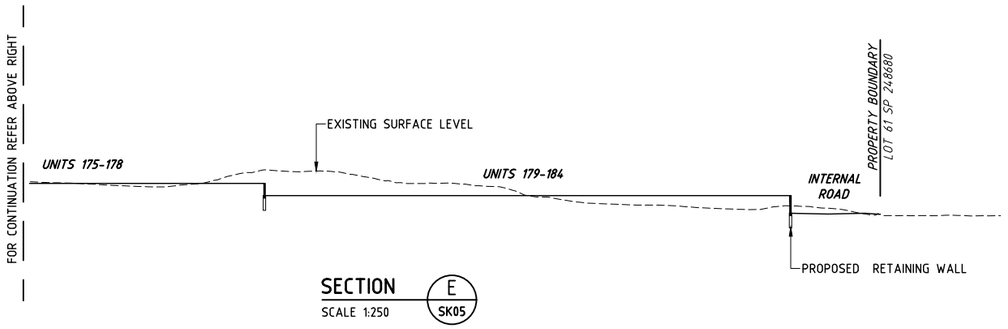
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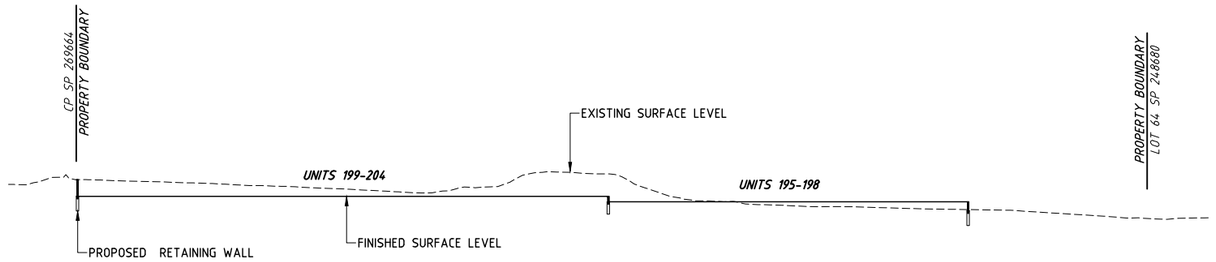
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25376-SK07		A



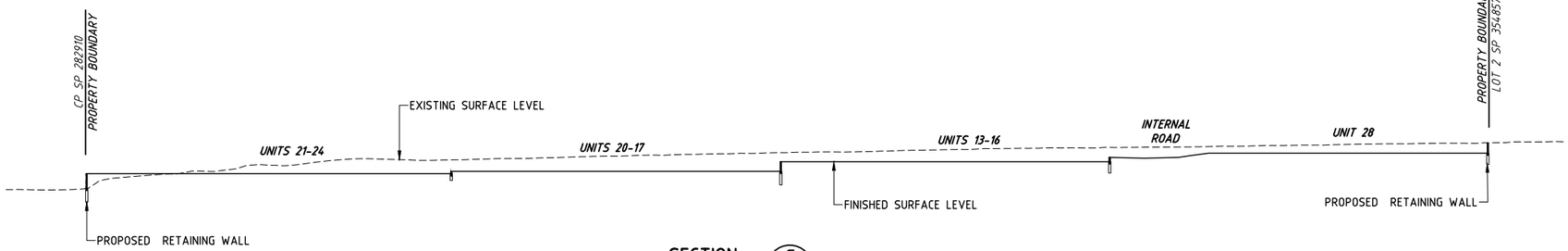
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SK05



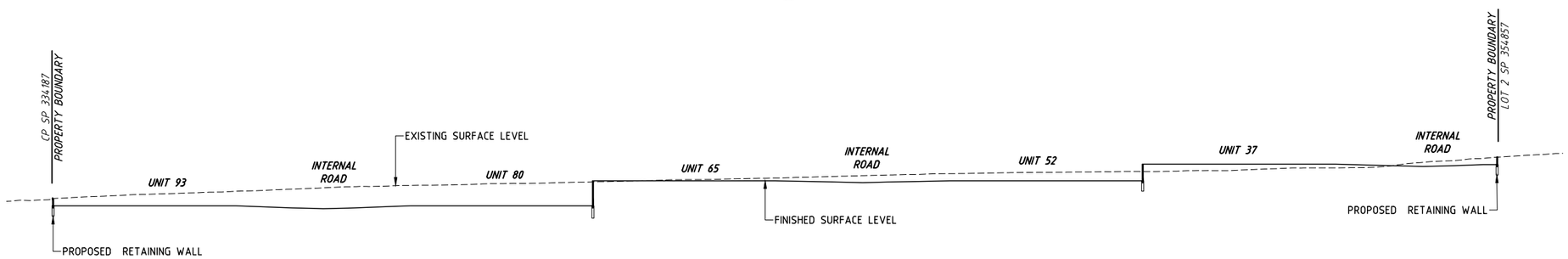
SECTION E
SCALE 1:250
SK05



SECTION F
SCALE 1:250
SK05



SECTION G
SCALE 1:250
SK06



SECTION H
SCALE 1:250
SK06

SCALE 1:250 (A1)
0 5 10 15m
(SCALE BEFORE REDUCTION)

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ABN 42 664 382 610
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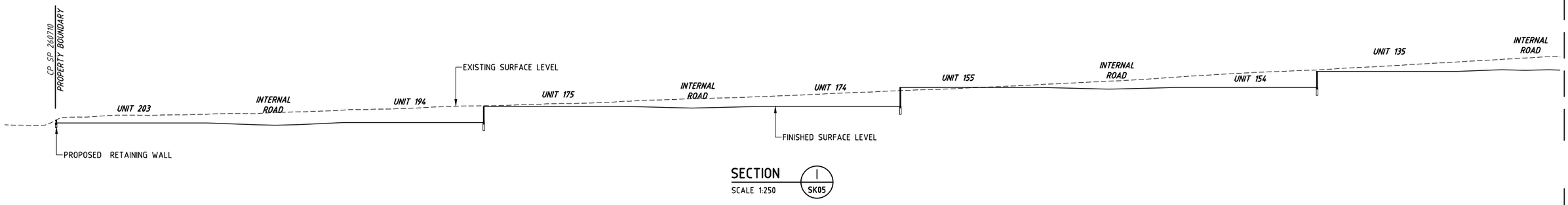
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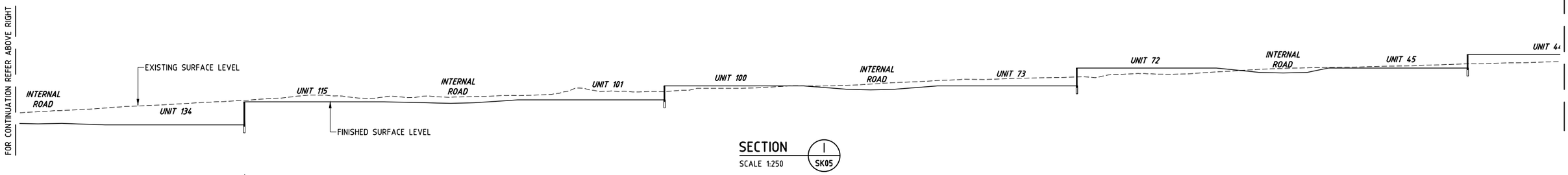
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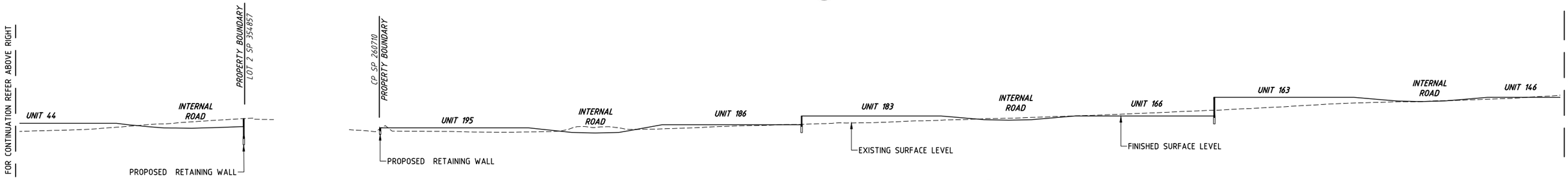
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25376-SK08	A



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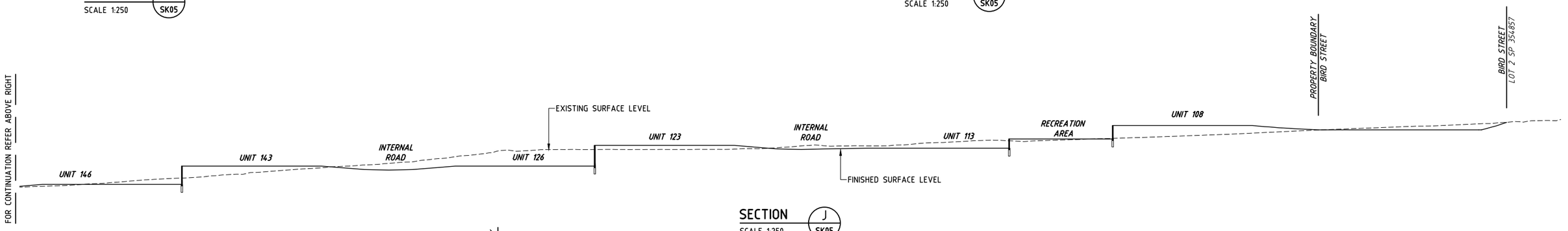


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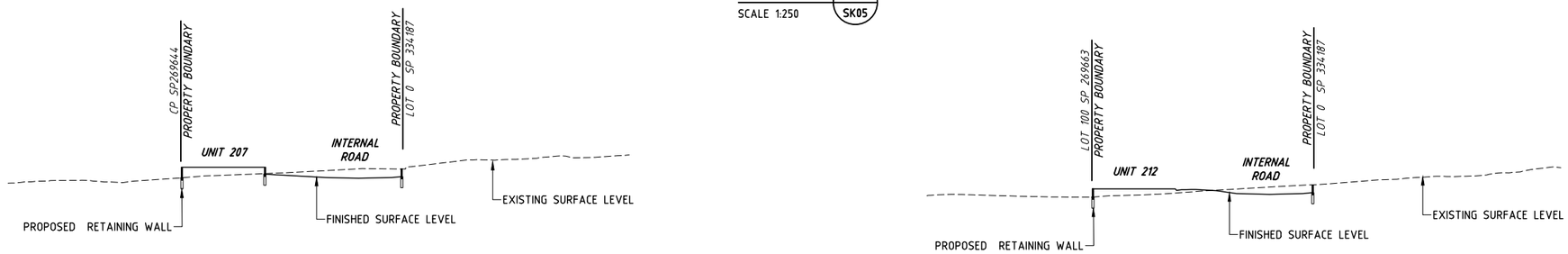


SECTION I
SCALE 1:250 SK05

SECTION J
SCALE 1:250 SK05



SECTION J
SCALE 1:250 SK05



SECTION K
SCALE 1:250 SK05

SECTION L
SCALE 1:250 SK05

SCALE 1:250 (A1) 0 5 10 15m
(SCALE BEFORE REDUCTION)

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HCE Engineers Pty Ltd
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mail@hce-engineers.com.au
07 3829 1399

COMPASS ASSURANCE SERVICES ISO 9001

PROJECT	TITLE	CLIENT
19 RIVER ROAD BUNDAMBA QLD 4304 LOT 1 SP 354857	CONCEPT EARTHWORKS SECTIONS SHEET 3 OF 3	AR DEVELOPMENTS

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REVISION	AMENDMENT	DATE
A	REPORT ISSUE	21/07/26

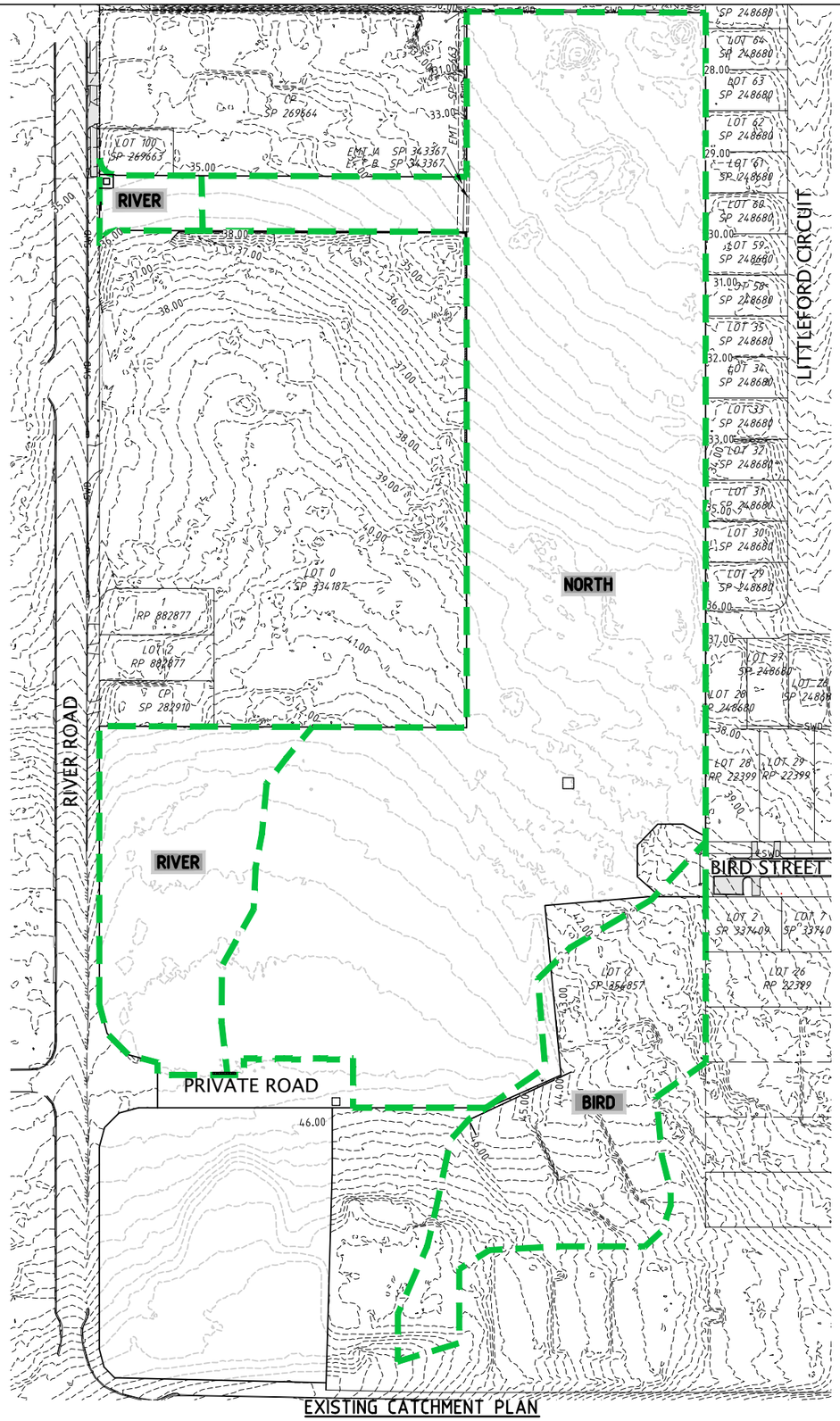
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MB	JA	10/06/2026

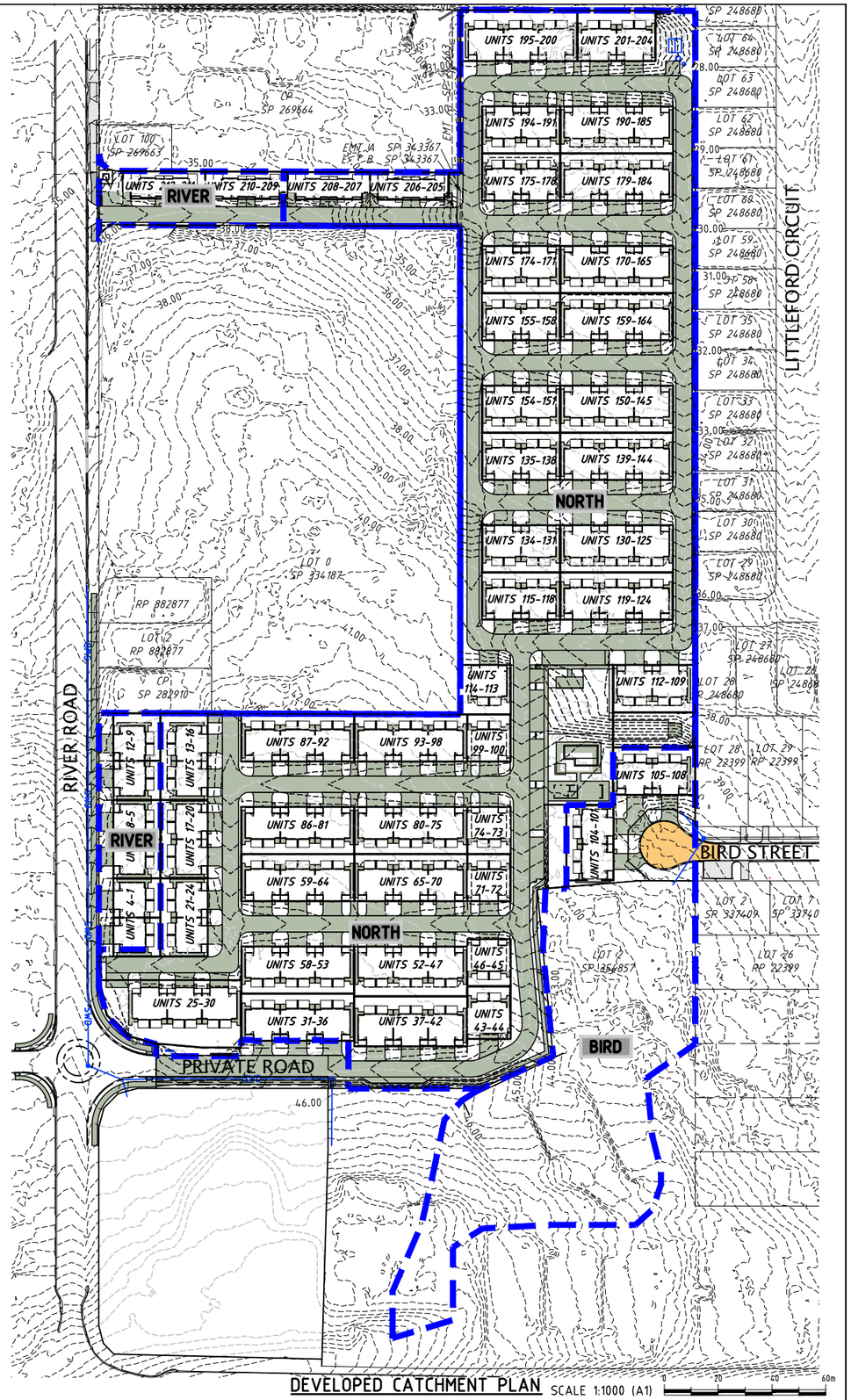
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Drawing No. 25376-SK09
Rev. A

LEGEND

- ---10.0--- EXISTING SURFACE CONTOURS (0.25m INTERVAL)
- ---10.0--- FINISHED SURFACE CONTOURS (0.25m INTERVAL)
- —SWD— EXISTING STORMWATER DRAINAGE
- —SWD— PROPOSED STORMWATER DRAINAGE
- EXISTING KERB AND CHANNEL
- PROPOSED KERB AND CHANNEL
- PROPOSED PAVEMENT
- EXISTING CONCRETE
- PROPOSED CONCRETE
- EXISTING CATCHMENT BOUNDARY
- DEVELOPED CATCHMENT BOUNDARY
- NORTH CATCHMENT LABEL



EXISTING CATCHMENT PLAN
SCALE 1:1000



DEVELOPED CATCHMENT PLAN SCALE 1:1000 (A1)
SCALE 1:1000
0 20 40 60m
(SCALE BEFORE REDUCTION)

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mail@hce-engineers.com.au
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COMPASS ASSURANCE SERVICES ISO 9001

PROJECT	TITLE	CLIENT
19 RIVER ROAD BUNDAMBA QLD 4304 LOT 1 SP 354857	CONCEPT STORMWATER CATCHMENT PLAN	AR DEVELOPMENTS

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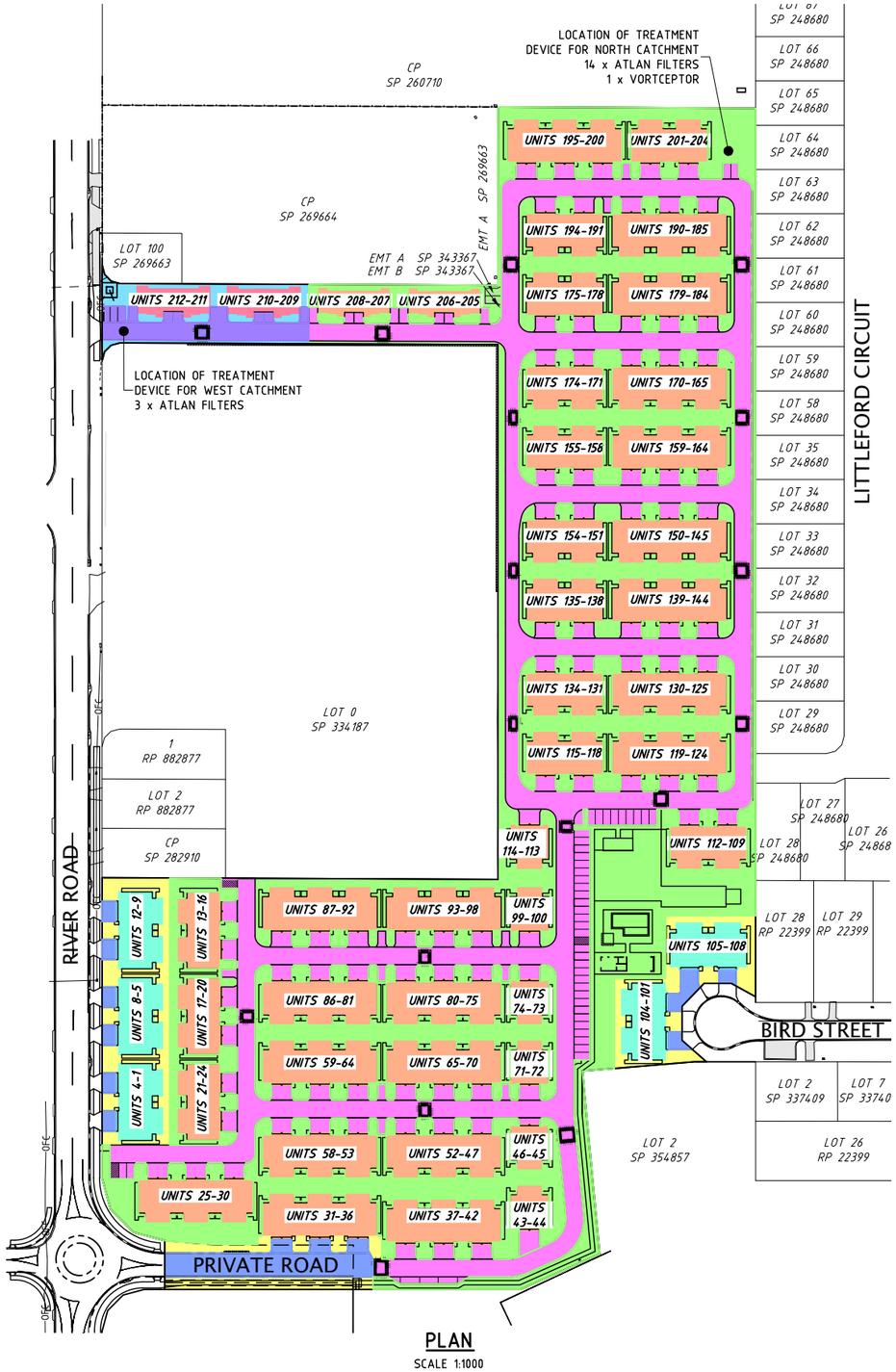
REVISION	AMENDMENT	DATE
A	REPORT ISSUE	21/07/26
B	REPORT ISSUE	07/10/26

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Designed	Drawn	Date
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Approval No.	Scale
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Drawing No.	Rev.
25376-SK10	B



PLAN
SCALE 1:1000

LEGEND

- STORMWATER QUANTITY CATCHMENT BOUNDARY
- EXISTING KERB AND CHANNEL
- PROPOSED KERB AND CHANNEL
- NORTH ROOF AREA
- NORTH GROUND AREA
- NORTH ROAD AREA
- WEST ROOF AREA
- WEST GROUND AREA
- WEST ROAD AREA
- NON-TREATED ROOF AREA
- NON-TREATED GROUND AREA
- NON-TREATED ROAD AREA

STORMWATER QUALITY NORTH CATCHMENT		
NAME	AREA (ha)	IMPERVIOUS %
ROOF AREA	1.765	100
GROUND AREA	1.391	20
ROAD AREA	1.238	100

STORMWATER QUALITY WEST CATCHMENT		
NAME	AREA (ha)	IMPERVIOUS %
ROOF AREA	0.043	100
GROUND AREA	0.043	20
ROAD AREA	0.057	100

STORMWATER QUALITY NON-TREATED CATCHMENT		
NAME	AREA (ha)	IMPERVIOUS %
ROOF AREA	0.187	100
GROUND AREA	0.184	20
ROAD AREA	0.100	100

SCALE 1:1000 (A1) 0 20 40 60m
(SCALE BEFORE REDUCTION)

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mail@hce-engineers.com.au
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COMPASS ASSURANCE SERVICES ISO 9001

PROJECT	TITLE	CLIENT
19 RIVER ROAD BUNDAMBA QLD 4304 LOT 1 SP 354857	CONCEPT STORMWATER QUALITY CATCHMENT PLAN	AR DEVELOPMENTS

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REVISION	AMENDMENT	DATE
A	REPORT ISSUE	21/07/26
B	REPORT ISSUE	07/10/26

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Rev. B

Appendix A – Rational Method Calculations

RATIONAL METHOD CALCULATIONS - EXISTING SITE

Job Reference	25376
Site Address	19 River Road
Council	Ipswich City Council

Number of Sub-Catchments	1	
Minor Storm Event	Q2	*(As per QUDM Table 7.02.1)*
Major Storm Event	Q50	*(As per QUDM Table 7.02.1)*

Subcatchment Summary Table

Number	*Catchment Name*	*Catchment Description*	C_{10}	*tc*
1	To West (River Road)	Open Space (eg parks)	0.70	12

Catchment Calculations (Major and Minor Storm ARI's)

Number	*Area*	*C2*	*I2*	*Q2*	*C50*	*I50*	*Q50*
	ha		*mm/hr*	*m³/s*		*mm/hr*	*m³/s*
1	0.677	0.60	97	0.109	0.81	192	0.291

Total Runoff	Minor	0.109	*m³/s*
	Major	0.291	*m³/s*
Total Area		0.677	*ha*

Overland Flow Calculations

Trunk SW Infrastructure		
Pipe Diameter	N/A	*m*
Number of Pipes	0	
Grade	0	*m/m*
mannings	0	
Pipe Capacity		*m^3/s*
Pipe Velocity		*m/s*
Capacity @ 3m/s		*m^3/s*
Overland Flow		*m^3/s*

All Storm ARI's

ARI	*Peak Discharge*	
3 Month	0.041	*m^3/s*
1	0.081	*m^3/s*
2	0.109	*m^3/s*
5	0.154	*m^3/s*
10	0.188	*m^3/s*
20	0.227	*m^3/s*
50	0.291	*m^3/s*
100	0.336	*m^3/s*

RATIONAL METHOD CALCULATIONS - DEVELOPED SITE

Job Reference	25376
Site Address	19 River Road
Council	Ipswich City Council

Number of Sub-Catchments	1	
Minor Storm Event	Q10	*(As per QUDM Table 7.02.1)*
Major Storm Event	Q50	*(As per QUDM Table 7.02.1)*

Subcatchment Summary Table

Number	*Catchment Name*	*Catchment Description*	C_{10}	*tc*
1	Dev Site West	Low-medium to high density residential areas	0.87	8

Catchment Calculations (Major and Minor Storm ARI's)

Number	*Area*	*C10*	*I10*	*Q10*	*C50*	*I50*	*Q50*
	ha		*mm/hr*	*m³/s*		*mm/hr*	*m³/s*
1	0.201	0.87	164	0.080	1.00	222	0.124

Total Runoff	Minor	0.080	*m³/s*
	Major	0.124	*m³/s*
Total Area		0.201	*ha*

Overland Flow Calculations		
Trunk SW Infrastructure		
Pipe Diameter	N/A	*m*
Number of Pipes	0	
Grade	0	*m/m*
mannings	0	
Pipe Capacity		*m^3/s*
Pipe Velocity		*m/s*
Capacity @ 3m/s		*m^3/s*
Overland Flow		*m^3/s*

All Storm ARI's		
ARI	*Peak Discharge*	
3 Month	0.017	*m^3/s*
1	0.035	*m^3/s*
2	0.047	*m^3/s*
5	0.066	*m^3/s*
10	0.080	*m^3/s*
20	0.097	*m^3/s*
50	0.124	*m^3/s*
100	0.137	*m^3/s*

RATIONAL METHOD CALCULATIONS - EXISTING SITE

Job Reference	25376
Site Address	19 River Road
Council	Ipswich City Council

Number of Sub-Catchments	1	
Minor Storm Event	Q2	*(As per QUDM Table 7.02.1)*
Major Storm Event	Q100	*(As per QUDM Table 7.02.1)*

Subcatchment Summary Table

Number	*Catchment Name*	*Catchment Description*	C_{10}	*tc*
1	To East (Bird Street)	Open Space (eg parks)	0.70	15

Catchment Calculations (Major and Minor Storm ARI's)

Number	*Area*	*C2*	*I2*	*Q2*	*C100*	*I100*	*Q100*
	ha		*mm/hr*	*m³/s*		*mm/hr*	*m³/s*
1	0.906	0.60	88	0.132	0.84	193	0.408

Total Runoff	Minor	0.132	*m³/s*
	Major	0.408	*m³/s*
Total Area		0.906	*ha*

Overland Flow Calculations	
Trunk SW Infrastructure	
Pipe Diameter	0.6 *m*
Number of Pipes	1
Grade	0.03 *m/m*
mannings	0.011
Pipe Capacity	1.257 *m^3/s*
Pipe Velocity	4.445 *m/s*
Capacity @ 3m/s	0.848 *m^3/s*
Overland Flow	-0.440 *m^3/s*

All Storm ARI's		
ARI	*Peak Discharge*	
3 Month	0.049	*m^3/s*
1	0.099	*m^3/s*
2	0.132	*m^3/s*
5	0.187	*m^3/s*
10	0.229	*m^3/s*
20	0.276	*m^3/s*
50	0.353	*m^3/s*
100	0.408	*m^3/s*

RATIONAL METHOD CALCULATIONS - DEVELOPED SITE

Job Reference	25376
Site Address	19 River Road
Council	Ipwish City Council

Number of Sub-Catchments	1	
Minor Storm Event	Q20	*(As per QUDM Table 7.02.1)*
Major Storm Event	Q100	*(As per QUDM Table 7.02.1)*

Subcatchment Summary Table

Number	*Catchment Name*	*Catchment Description*	C_{10}	*tc*
1	Dev Site East	Low-medium to high density residential areas	0.81	15

Catchment Calculations (Major and Minor Storm ARI's)

Number	*Area*	*C20*	*I20*	*Q20*	*C100*	*I100*	*Q100*
	ha		*mm/hr*	*m³/s*		*mm/hr*	*m³/s*
1	1.101	0.85	149	0.388	0.97	193	0.574

Total Runoff	Minor	0.388	*m³/s*
	Major	0.574	*m³/s*
Total Area		1.101	*ha*

Overland Flow Calculations

Trunk SW Infrastructure		
Pipe Diameter	N/A	*m*
Number of Pipes	0	
Grade	0	*m/m*
mannings	0	
Pipe Capacity		*m^3/s*
Pipe Velocity		*m/s*
Capacity @ 3m/s		*m^3/s*
Overland Flow		*m^3/s*

All Storm ARI's

ARI	*Peak Discharge*	
3 Month	0.069	*m^3/s*
1	0.139	*m^3/s*
2	0.186	*m^3/s*
5	0.264	*m^3/s*
10	0.322	*m^3/s*
20	0.388	*m^3/s*
50	0.496	*m^3/s*
100	0.574	*m^3/s*

RATIONAL METHOD CALCULATIONS - EXISTING SITE

Job Reference	25376
Site Address	19 River Road, Bundamba
Council	Ipswich City Council

Number of Sub-Catchments	1	
Minor Storm Event	Q2	*(As per QUDM Table 7.02.1)*
Major Storm Event	Q50	*(As per QUDM Table 7.02.1)*

Subcatchment Summary Table

Number	*Catchment Name*	*Catchment Description*	C_{10}	*tc*
1	To North	Open Space (eg parks)	0.70	18

Catchment Calculations (Major and Minor Storm ARI's)

Number	*Area*	*C2*	*I2*	*Q2*	*C50*	*I50*	*Q50*
	ha		*mm/hr*	*m³/s*		*mm/hr*	*m³/s*
1	4.280	0.60	81	0.574	0.81	159	1.522

Total Runoff	Minor	0.574	*m³/s*
	Major	1.522	*m³/s*
Total Area		4.280	*ha*

Overland Flow Calculations	
Trunk SW Infrastructure	
Pipe Diameter	N/A *m*
Number of Pipes	0
Grade	0 *m/m*
mannings	0
Pipe Capacity	*m^3/s*
Pipe Velocity	*m/s*
Capacity @ 3m/s	*m^3/s*
Overland Flow	*m^3/s*

All Storm ARI's		
ARI	*Peak Discharge*	
3 Month	0.214	*m^3/s*
1	0.427	*m^3/s*
2	0.574	*m^3/s*
5	0.791	*m^3/s*
10	0.990	*m^3/s*
20	1.188	*m^3/s*
50	1.522	*m^3/s*
100	1.768	*m^3/s*

RATIONAL METHOD CALCULATIONS - DEVELOPED SITE

Job Reference	25376
Site Address	19 River Road, Bundamba
Council	Ipswich City Council

Number of Sub-Catchments	3	
Minor Storm Event	Q10	*(As per QUDM Table 7.02.1)*
Major Storm Event	Q100	*(As per QUDM Table 7.02.1)*

Subcatchment Summary Table

Number	*Catchment Name*	*Catchment Description*	C_{10}	*tc*
1	To North	Low-medium to high density residential areas	0.87	8

Catchment Calculations (Major and Minor Storm ARI's)

Number	*Area*	*C10*	*I10*	*Q10*	*C100*	*I100*	*Q100*
	ha		*mm/hr*	*m³/s*		*mm/hr*	*m³/s*
1	4.500	0.87	165	1.794	1.00	246	3.075

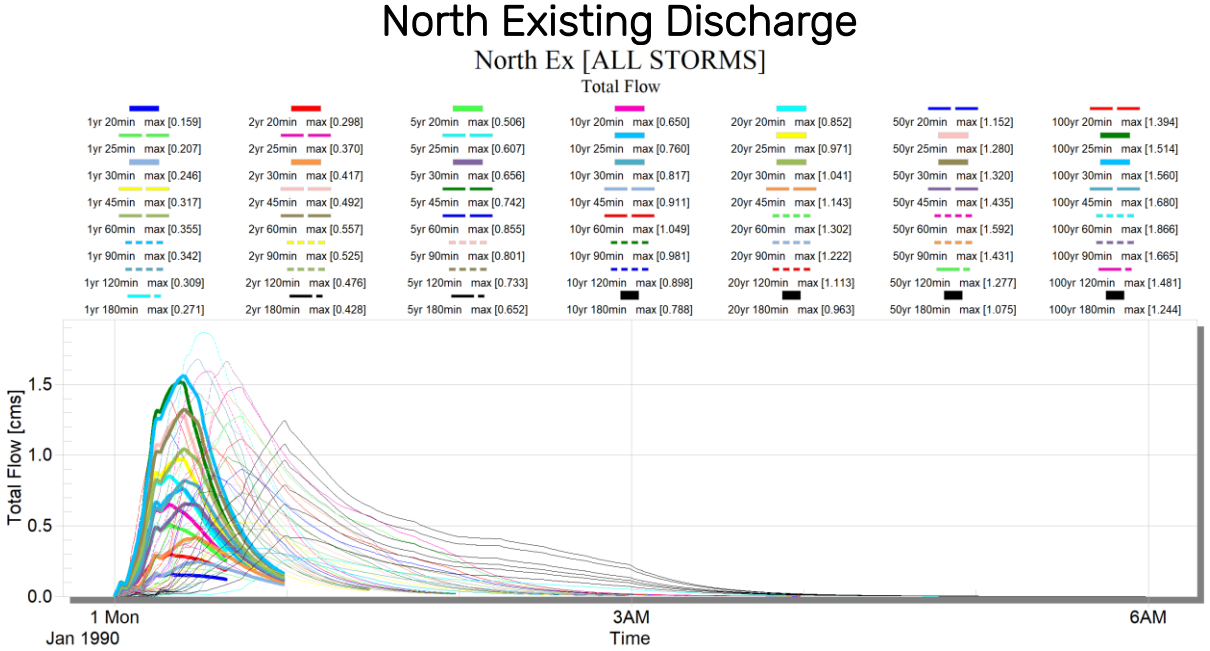
Total Runoff	Minor	1.794	*m³/s*
	Major	3.075	*m³/s*
Total Area		4.500	*ha*

Overland Flow Calculations	
Trunk SW Infrastructure	
Pipe Diameter	N/A *m*
Number of Pipes	0
Grade	0 *m/m*
mannings	0
Pipe Capacity	*m^3/s*
Pipe Velocity	*m/s*
Capacity @ 3m/s	*m^3/s*
Overland Flow	*m^3/s*

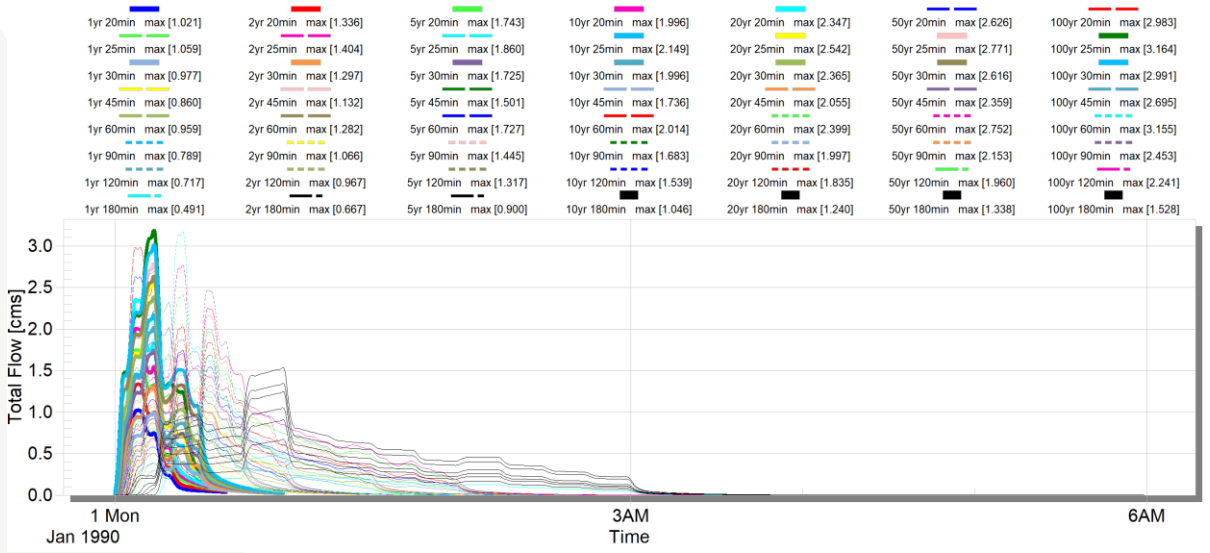
All Storm ARI's		
ARI	*Peak Discharge*	
3 Month	0.389	*m^3/s*
1	0.778	*m^3/s*
2	1.045	*m^3/s*
5	1.446	*m^3/s*
10	1.794	*m^3/s*
20	2.158	*m^3/s*
50	2.763	*m^3/s*
100	3.075	*m^3/s*

Appendix B – XP RAFTS Outputs

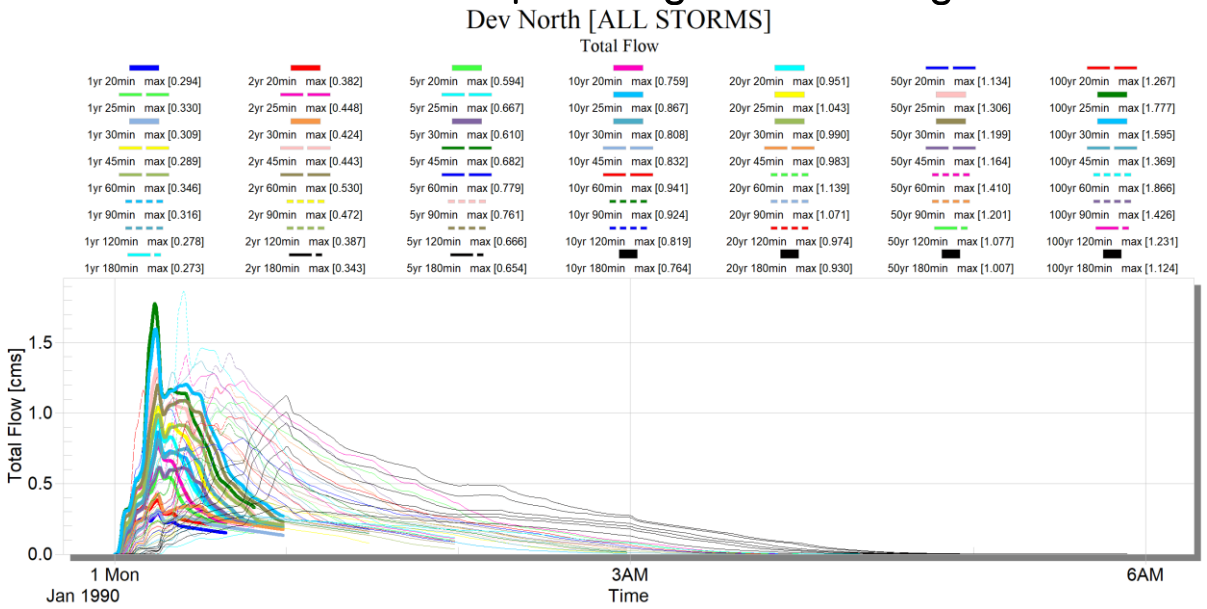
North Existing Discharge



North Developed Not Mitigated Discharge



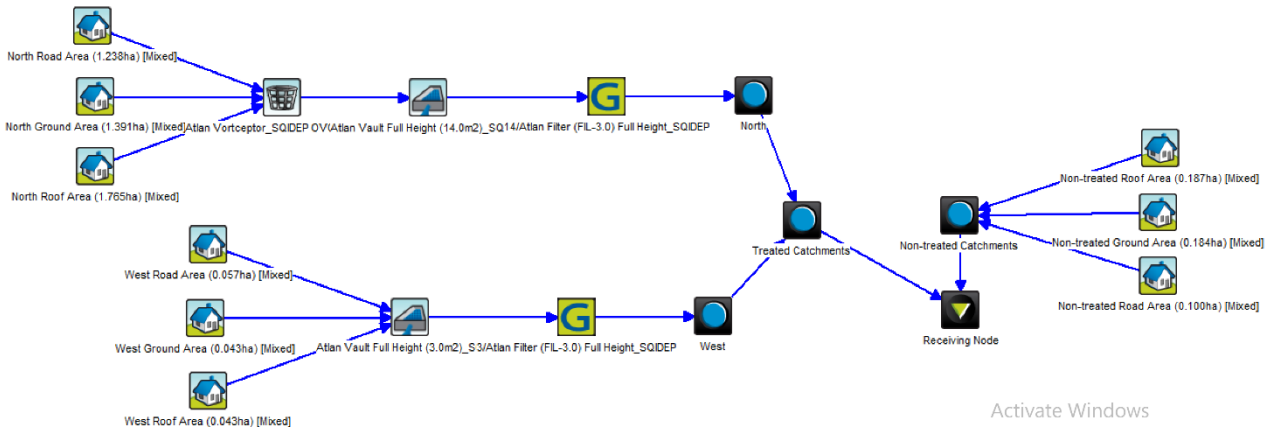
North Developed Mitigated Discharge



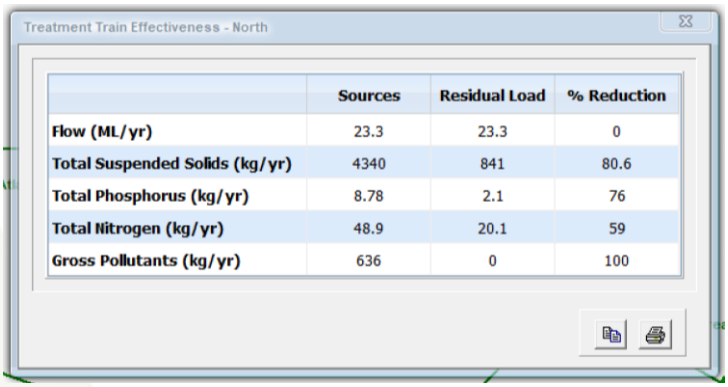
Link:
https://files.hce-engineers.com.au/12dSynergy/Publishing/c189ca8a-ea2f-4248-899a-1677517759df

Appendix C – MUSIC Modelling Results

Model:



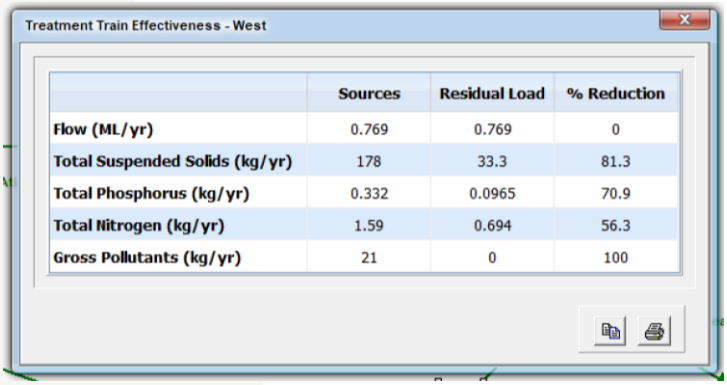
North Catchment Results:



Treatment Train Effectiveness - North

	Sources	Residual Load	% Reduction
Flow (ML/yr)	23.3	23.3	0
Total Suspended Solids (kg/yr)	4340	841	80.6
Total Phosphorus (kg/yr)	8.78	2.1	76
Total Nitrogen (kg/yr)	48.9	20.1	59
Gross Pollutants (kg/yr)	636	0	100

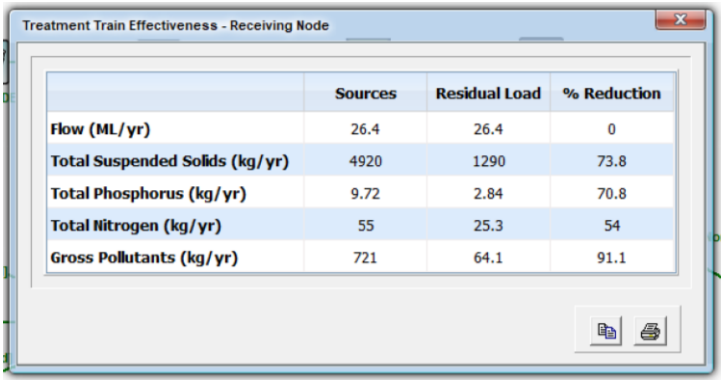
West catchment Results:



Treatment Train Effectiveness - West

	Sources	Residual Load	% Reduction
Flow (ML/yr)	0.769	0.769	0
Total Suspended Solids (kg/yr)	178	33.3	81.3
Total Phosphorus (kg/yr)	0.332	0.0965	70.9
Total Nitrogen (kg/yr)	1.59	0.694	56.3
Gross Pollutants (kg/yr)	21	0	100

Whole Site Results:



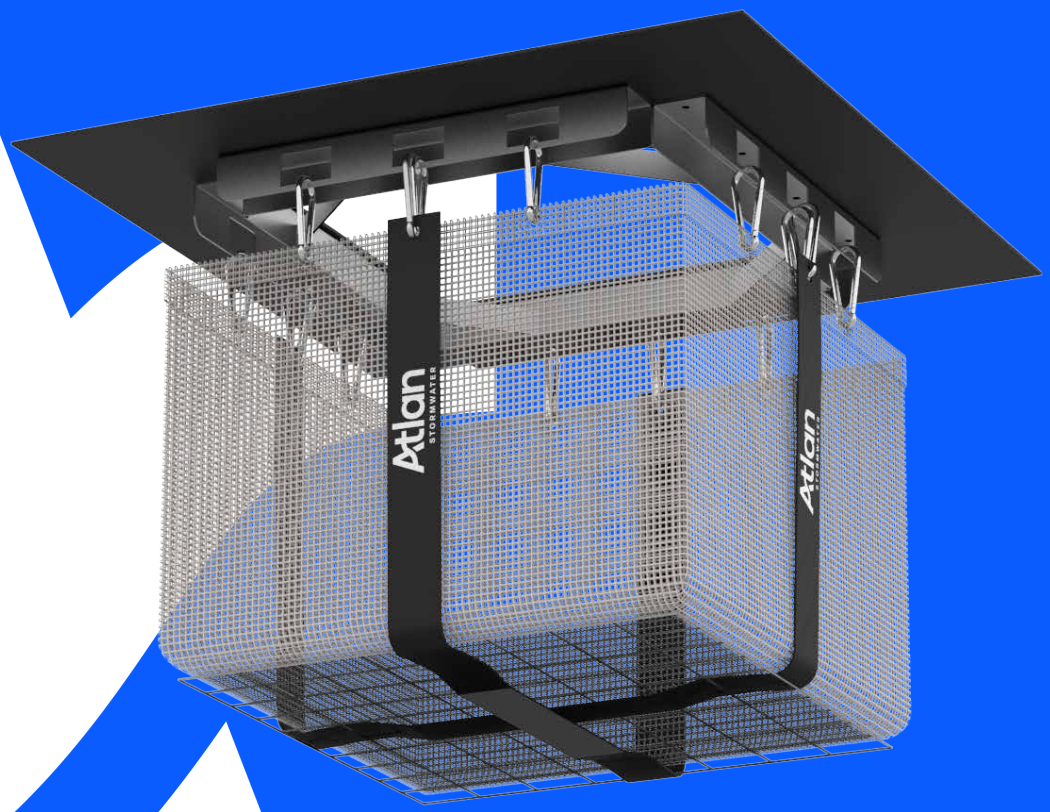
	Sources	Residual Load	% Reduction
Flow (ML/yr)	26.4	26.4	0
Total Suspended Solids (kg/yr)	4920	1290	73.8
Total Phosphorus (kg/yr)	9.72	2.84	70.8
Total Nitrogen (kg/yr)	55	25.3	54
Gross Pollutants (kg/yr)	721	64.1	91.1

Link:
https://files.hce-engineers.com.au/12dSynergy/Publishing/16ed9aa2-d0cd-47a1-99de-c4aec025d349

Appendix D – Maintenance Guidelines

OPERATION & MAINTENANCE MANUAL

StormSack



atlan.com.au

Atlan
STORMWATER

INTRODUCTION

Maintenance of the Atlan StormSack is essential to preservation of its condition to ensure lifetime operational effectiveness.

The Atlan StormSack is a highly engineered water quality device that is deployed directly in the stormwater system as primary treatment to capture contaminants close to the surface for ease of maintenance.

To ensure full operational capacity, it is vital to ensure that the pollutants it captures are periodically removed, and filtration components are thoroughly cleaned.

This manual should be used in conjunction with the relevant site traffic management and safety plans, as well as any other provided documentation from Atlan.

The Atlan StormSack provides effective filtration of solid pollutants and debris typical of urban runoff, while utilising the existing or new storm drain infrastructure. The StormSack is designed to rest on the flanges of conventional catch basin frames and is engineered for most hydraulic and cold climate conditions.



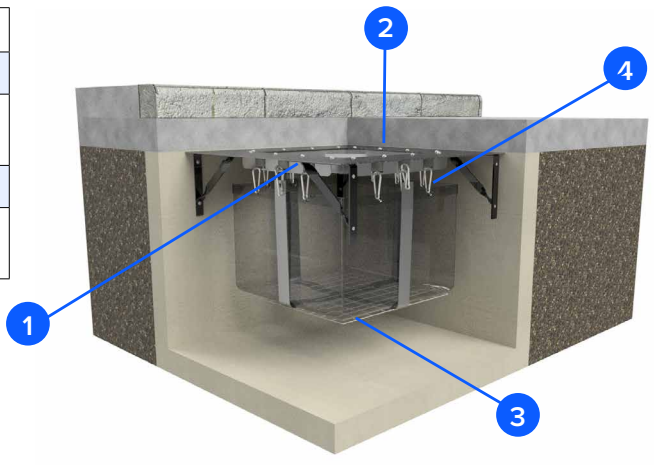
Typically the StormsSack is serviceable from the street level, and therefore maintenance does not usually require confined space entry into the catch basin structure. The unit is designed to be maintained in place with a vacuum hose attached to a sweeper or sucker truck.

COMPONENTS

- Adjustable Flange Deflector: Black HDPE attached to support frame
- Catchment Bag: 200micron woven poly fabric
- Support Hardware: Stainless steel 304
- Bag Support: Stainless steel 304 mesh
- Replaceable Oil Boom: Polypropylene 3 inch (76 mm) diameter (optional add-on)

Application	Regulatory Issue	Target Pollutants
Council Storm Drain Retrofits	At-source litter capture	Sediment, Litter, O&G
Commercial/Retail/Residential	Stormwater Compliance	Sediment, Litter, O&G
Litter Prone Urban Areas	Cost effective litter control	Litter ≥ 5 mm
Scrap Metal/Solid Waste/Oil Storage/Etc	Industrial Multi-Sector General Permit	Gross Pollutants, O&G
Part of Treatment Train	Council Stormwater Quality Improvement Targets	Sediment, Litter, O&G
Construction Sediment/Erosion	Sediment Control Plan	Sediment/Erosion Control

Features	
1.	Aluminium frame
2.	Black poly surround secured to frame • Can be cut to suit on site
3.	Reinforced StormSack bag
4.	Carabiners attach bag to frame for easy service and replacement



Standard StormSack to suit Pit Sizes
450x450mm
600x600mm
900x600mm
900x900mm

Custom sizes (i.e. 1200x900mm) can be manufactured on short lead times.

HEALTH & SAFETY

IMPORTANT: A full site based risk assessment should be completed prior to commencing work on your Atlan StormSack.

PERSONAL HEALTH & SAFETY

When carrying out maintenance operations of the Atlan StormSack all contractors and staff personnel must comply with all current workplace health and safety legislation. The below measures should be adhered as practically as possible:

- Comply with all applicable laws, regulations and standards.
- All those involved are informed and understand their obligations in respect of the workplace health and safety legislation.
- Ensure responsibility is accepted by all employees to practice and promote a safe and healthy work environment.

PERSONAL PROTECTIVE EQUIPMENT

When carrying out maintenance operations of the Atlan StormSack, wearing the appropriate personal protective equipment is vital to reducing potential hazards. Personal protective equipment in this application includes:

- Eye protection
- Safety apron
- Fluorescent safety vest
- Form of skin protection
- Puncture resistant gloves
- Steel capped safety boots

CAPTURED POLLUTANTS

The material captured by the Atlan StormSack can be harmful and needs to be handled correctly. The nature and amount of the captured pollutants depends on the characteristics of the site.

Pollutants can include from organic material such as leaves and sticks through to debris such as plastics, glass and other foreign objects such as syringes.

EQUIPMENT HANDLING

Handling activities such as a removing the drain grate a well as managing pedestrians and other non-worker personnel at the site should be exercised in accordance with specified safety procedures and guidelines.

CONFINED SPACES

Confined space entry procedures are not covered in this manual. It is requested that all personnel carrying out maintenance of the Atlan StormSack must evaluate their own needs for confined space entry and compliance with occupational health and safety regulations. Non trained staff are not permitted to participle in any confined space entries.

When maintenance operations cannot be carried out from the surface and there is a need to enter confined space, only personnel that currently hold a Confined Space Entry Permit are allowed to enter the confined space.

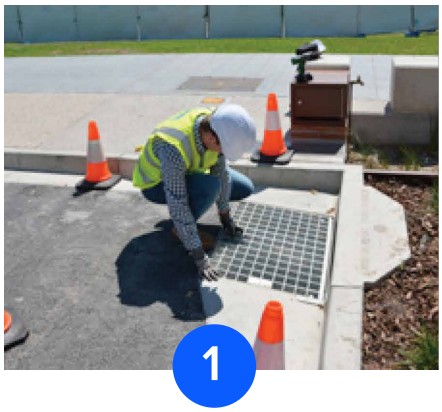
TRAFFIC MANAGEMENT

Typically stormwater gully pits are situated on roads and carparks, or adjacent to roads in a footpath or swale. As traffic requirements vary depending on the circumstance of the site, separate traffic control plans should be prepared for each site.

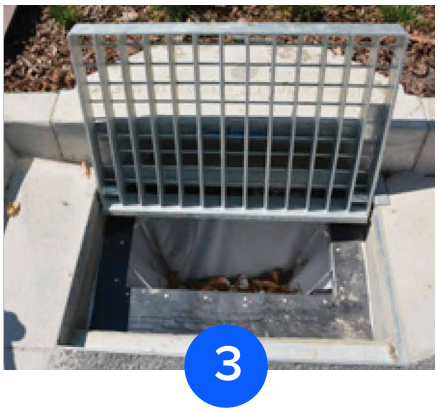
The specific road safety requirements for each site can be obtained from the relevant road authority to ensure all maintenance operations comply with the laws and regulations. State government publications can also be useful to find out the signage requirements, placement of safety cones and barricades that are required when working on public roads.

MAINTENANCE OF THE ATLAN STORMSACKS IS A SPECIALIST ACTIVITY

When carrying out maintenance operations of the Atlan StormSack, factors such as equipment handling methods, pollutants and site circumstances can impose potential risks to the maintainer and nearby civilians.







OPERATIONS

GENERAL MONITORING

The Atlan StormSack must be checked on a regular basis to analyse whether it requires maintenance or cleaning. Atlan requires that the StormSack bags be cleaned out and inspected 2-4 times in a year as per WSUD requirements. As gully pit grates are usually quite heavy, it is vital to exercise the correct lifting techniques and also ensure that the area surrounding the open pit is shielded from access of non-work personnel.

To ensure optimal performance of the Atlan StormSack, the material collected by the filter bag should not exceed the level of approximately a half to two thirds of the total bag depth. When this material collected is showing signs of exceeding this level they should be scheduled to be emptied.

It is also recommended that additional monitoring is conducted following moderate to extreme rainfall events, especially when previous months have had little or no rainfall.



GULLY PIT COVER REMOVAL

Opening a hinged pit cover

1. Insert the lifting hooks beneath the grate.
2. Check hinge points are not damaged and debris is not caught in the hinge area.
3. Fully open pit grate, ensuring that the grate will stay in the open position without any external forces applied. Grates that do not remain open without being held, should be removed or secured during maintenance activities.

Opening a non-hinged pit cover

1. Place lifting hooks beneath grate, where possible in the four corners of the grate. Concrete lids may have Gatic lifting points, a key arrangement or holes in the lid, which may require special equipment such as Gatic lifters. Alternatively if safe to do so grip the grade with your hands.
2. Position each person on either side of the grate.
3. Lift the grate, ensuring that good heavy lifting posture is used at all times.
4. Place the grate on angle on the gutter, to allow for the lifting hooks to be removed.
5. For extremely heavy one-piece grates and concrete Gatic covers, insert the lifters in place and slide the lids back.





REPAIRS

Depending on the extent of the damage to the Atlan StormSack unit, it can usually be repaired.

Filter Bag Tears

Small tears to the filter bag can be repaired by either sewing the tear back together with additional fabric to increase the strength of the stitching, or by sewing a patch of filter material onto the filter bag.

Spill Procedures

In the event of a spill discharging into a gully pit, all effected sediment must be removed from the filter bags and the filter bags are to be removed and replaced with new filter bags.

Replacement Parts

If large tears or irreparable damage to the frame and structure are present, it is advisable to replace the components.

All required spare parts can be sourced directly from Atlan Stormwater.

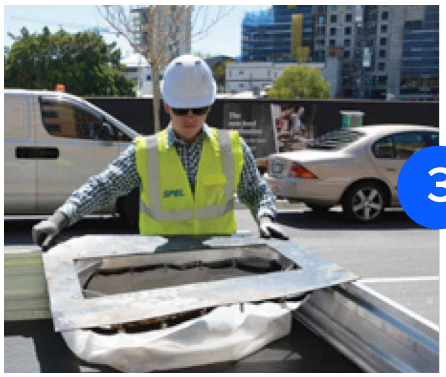
CLEANING METHODS

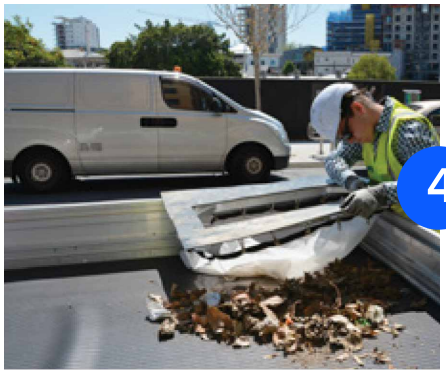
CLEANING USING AN VACUUM TRUCK

1. Open gully pit.
2. Place the vacuum hose, suck out all of the sediment, organic leaf material, litter and other materials that were collected in the filter bag.
3. Allow the filter bag to be sucked up in the vacuum hose for a few seconds to allow for the filter mesh pores to be cleaned.
4. Use the vacuum hose to remove any build-up of material around the overflows and in the bottom of the pit.
5. Remove filter back from pit.
6. Remove any sediment and litter caught in the gully pit grate.
7. Back opening channels are to be cleared of any debris to ensure flow is not hindered.
8. Thoroughly examine the structural integrity of the filter bag and frame.
9. Reinstate filter bag and gully pit covers.











CLEANING BY HAND

CAUTION: Correct PPE must be warn - refer to page three. Remain alert for dangerous objects and wildlife.

1. Open gully pit.
2. Using the correct lifting technique, lift the StormSack out by the diagonal lifting corners fitted to the frame. For extremely heavy and overfilled bags either use a hydraulic lifting arm to lift the StormSack, or remove excess material using a shovel or etc. Take care not to damage the bag when removing litter form the bag.
3. Lift the StormSack clear of the stormwater pit and position over the collection bin or vehicle.
4. Lift and empty the bag by holding the bottom lifting loops only.
5. Brush the StormSack with a stiff brush to remove the sediment from the filter pores.
6. Thoroughly examine the structural integrity of the filter bag and frame.
7. Reinstate StormSack and gully pit covers.

MATERIAL DISPOSAL

Collected materials can be potentially harmful to humans and the environment. Once all captured material from the Atlan StormSack has been removed, it must be taken off site and disposed of at a transfer station or a similar approved disposal site.

BLOCKAGE TROUBLESHOOTING

In the unlikely event of surface flooding around a gully pit which has a Atlan StormSack fitted, the following steps should be carried out:

- Check the overflow bypass.
- If overflow is clear and surface flooding still exists remove the Atlan StormSack and check the outlet pipe for blockages.
- Removal of the Atlan StormSack can be difficult if clogged with sediment and holding water.
- If the filter is clogged brush the side walls to dislodge particles trapped at the interface allowing water to flow through the filter.
- If the outlet pipe is blocked a vacuum truck may be required to unblock it. Litter can be removed from the Atlan StormSack using the vacuum truck before removal. If a vacuum truck is not available please follow the hand maintenance cleaning steps prior to unblocking the outlet pipe.

ATLAN STORMSACK MAINTENANCE CHECKLIST

SITE DETAILS	
Client	
Location of system on site	
Site address	
Site contact name and number	

CHECKLIST ITEMS	YES/NO	COMMENTS
Is the pit free from pollutants and debris?	SELECT	
Is there movement or damage to the cage?	SELECT	
Is there movement or damage to the plastic pit seals?	SELECT	
Is structural integrity in good condition including fixings, joints and connections?	SELECT	
Is the filter bag pores clean and not clogged?	SELECT	
Is the filter bag damaged in any way?	SELECT	
Are the inlet and outlet pipes free from debris and damage?	SELECT	
Is the cover grate free from debris and damage?	SELECT	
Does the StormSack need repairs or replacement parts?	SELECT	
Has captured material been disposed of responsibly at an approved disposal site?	SELECT	

MAINTENANCE & REPAIR NOTES

SIGN OFF	
Name of service technician	
Date	

Joy in water

‘We believe clean waterways are a right not a privilege and we work to ensure a Joy in Water experience for you, with your children and grandchildren.’

Andy Hornbuckle

Atlan
STORMWATER

P 02 8705 0255
sales@atlan.com.au
100 Silverwater Rd,
Silverwater NSW 2128
atlan.com.au

0426

OPERATION & MAINTENANCE MANUAL

Vortceptor



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STORMWATER



INTRODUCTION

This operation and maintenance manual has been written to assist asset owners and maintenance staff understand how the Vortceptor GPT works, and how to maintain their asset to ensure it performs optimally throughout its life cycle.

The Vortceptor is a vortex type Gross Pollutant Trap that provides robust, high performing, and reliable primary stormwater treatment. It is able to remove litter, sediment, oil, and particulate bound nutrient pollutants out of stormwater. The Vortceptor has no moving parts, which reduces the risk of moving part malfunctions.

It is constructed out of a FRP (fibreglass) body, and 316 stainless steel screens that has been specifically engineered to withstand the tough demands of stormwater and wastewater applications. FRP is resistant to the most demanding of conditions and can exceed the durability of conventional precast concrete and cast in-situ concrete construction.



Manufacture

The Vortceptor is manufactured in Penrith NSW Australia.

Why FRP?

Glass fibre reinforced polymer (FRP) or fibreglass is a composite material of high strength glass fibre reinforcement in a polymer resin matrix. The glass fibres provide the main load bearing function of the material, and can be woven and aligned specifically for strength. Glass fibre reinforcing provides ideal engineering properties of linear elastic behaviour until failure, and extremely high strength that can exceed that of steel in tension. The matrix has 4 important functions: 1. It holds the glass fibre reinforcing in place 2. It transfers forces to and between the fibres, 3. Prevents buckling of the fibres 4. it provides the beneficial protection from the environment. The resin is specifically formulated to ensure resistance to harsh stormwater environments, that can exceed the durability that of concrete.

This material stands up to the harshest environments, commonly found in stormwater, wastewater, acid sulfate soils, and saltwater.

Fibreglass is becoming a material that is enjoying increased adoption in civil structural engineering applications worldwide due to its light weight, high strength, and its ability to resist degradation. The ability of fibreglass to achieve high strength with low weight means that the Vortceptor can be fabricated and delivered to site in a substantially assembled state. The treatment chamber is mostly one-piece, with the other sections being any risers, covers, and a precast concrete diversion chamber. One-piece construction means there are no joints to be made on site for the treatment chamber, which eliminates the potential for leaking joints, and risk of backfill and subgrade degradation from water egress through leaking joints. This means that the Vortceptor will provide a more reliable and watertight body, than one made from precast concrete components that are joined and sealed onsite. This is especially important as joints must be able to withstand tremendous hydrostatic pressures. The Vortceptor takes away this risk by eliminating joints, using a single piece FRP body.

MAINTENANCE



Structural strength of FRP

The Vortceptor has been engineered to withstand the forces associated with structures that are buried and carry vehicular loads. The Vortceptor has been engineered to withstand vehicular loadings to Class D rating per AS3996. A cast in situ concrete cover slab that is 600mm larger than the diameter of the FRP Vortceptor separation chamber, and 200mm thick is required to support a dynamic T44 traffic load. The precast concrete diversion chamber is rated to carry Class D traffic loads without the need for the additional concrete cover slab. Refer to Atlan Stormwater Vertical Tank installation guide for further details.

Safety Precautions

The Vortceptor is an underground structure that retains water. Ensure that adequate safety equipment and procedures are in place to avoid personnel falling into the Vortceptor, as there is a severe risk of drowning.

The Vortceptor is deemed a confined space. It is not necessary to enter the Vortceptor during maintenance, however in the rare event that entry is required, it should only be done so by suitably qualified and equipped personnel, working in accordance with strict OH&S laws, regulations and procedures.

Pollution captured by the Vortceptor can be hazardous to health. Do not make contact with the pollutant material. Ensure personnel are fully equipped with PPE to avoid contact and have procedures in place for first aid.



OPERATION

The Vortceptor is comprised of two chambers: The separation treatment chamber stormwater enters this chamber by being directed by a weir into a chute and is then circulated into the screening area. A vortex flow pattern forms as a result of flow velocity and head. Pollutants are removed via screening, and via centrifugal and gravitational forces acting to separate sediment and other particles.

Pollutants are captured and are stored in a sump area separate to the screening area. The shear cone separates the screening area and the sump, and acts to create quiescent conditions in the sump. This is what allows the Vortceptor to avoid resuspension of captured pollutants. The sump resides directly below the screening area and is conveniently accessible from the manhole for vacuum cleaning.

Storage of pollutants away from the screening area ensures that the Vortceptor can provide a consistent treatment flow rate, that does not diminish according to the level of pollutants stored. This is a key advantage over other GPTs that store pollutants in the screening area.

Floating pollutants are kept at the top of the screening area, but do not impede flow rate. An oil baffle acts to contain oil and hydrocarbons within the treatment chamber. The captured floatable pollution remains inside the Vortceptor until the time it is cleaned.

The vortex action of flow acts to create a shear force across the face of the 316 stainless steel vortex separation screen. The flow is tangential to the screen, which acts to create a self-cleaning effect and prevents the screen from blinding.

Treated flows are then discharged into the diversion chamber via the outlet chute and then discharged from the diversion chamber outlet into the drainage network.

The Diversion Chamber Pit

This chamber allows interface of the Vortceptor with the pipe or culvert drainage network. A weir goes across the width of the Diversion Chamber and is angled so that it is aligned with the entry chute to the separation treatment chamber. The Diversion Chamber is sized to allow bypass of flows exceeding the treatment flow rate over the weir.

Inline Vortceptor models have a small diversion chamber integrated over the separation treatment chamber, to provide a unit that is packaged into a compact footprint.

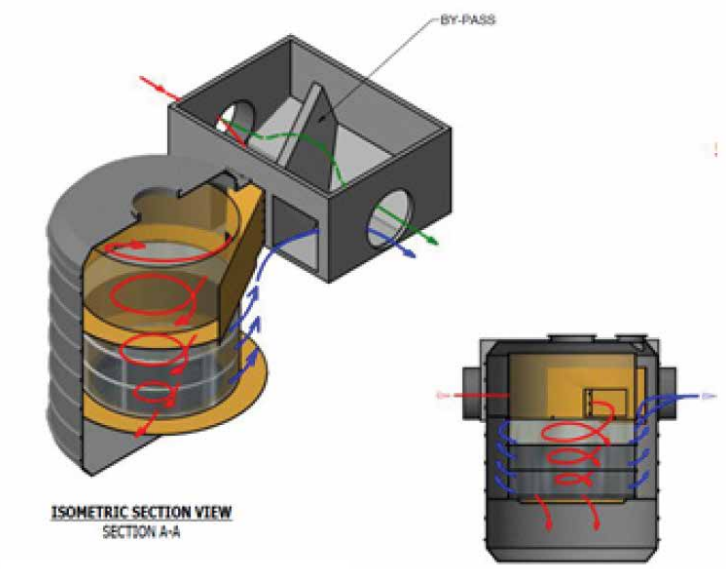


Figure 1 - Offline Vortceptor

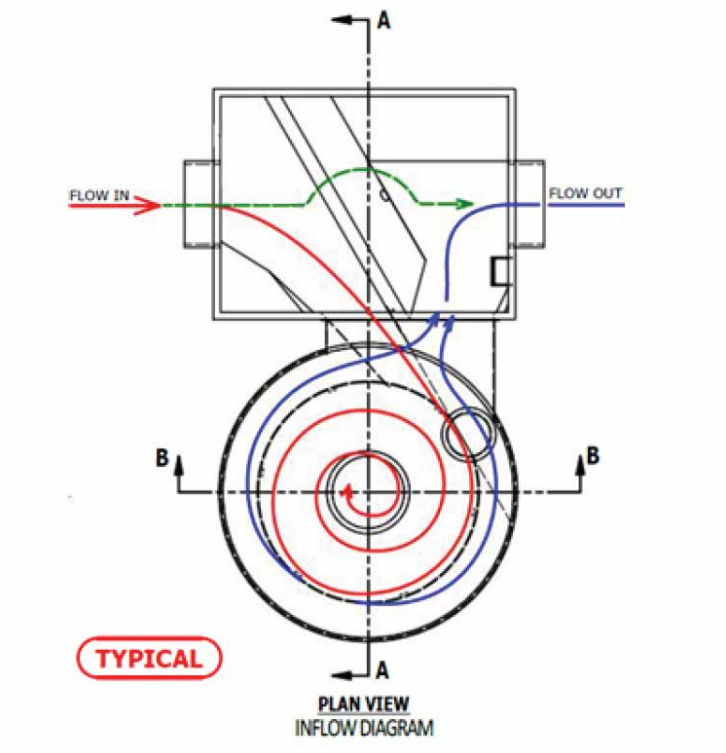


Figure 2 - Offline Vortceptor Plan view showing Separation treatment chamber (Circle) and diversion chamber (rectangle)

Offline and Online

The Vortceptor GPT comes in an offline and online configuration. Offline – the treatment separation chamber is adjacent to the diversion chamber. Online – The diversion chamber and the separation treatment chamber are integrated together.

Cleaning options

The following cleaning options allow asset owners to choose the best option available for ongoing maintenance and the required cleaning frequency with the right cleaning services and resources available.

Depending on the size, access, and depth of the system, the three following methods can be used to clean the Atlan Vortceptor.

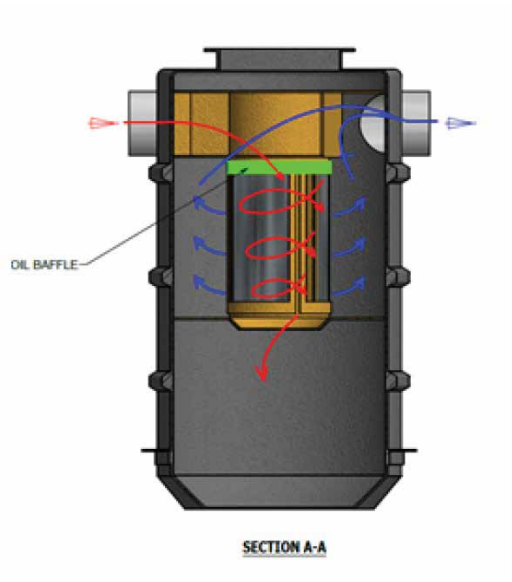


Figure 3 - Online Vortceptor in Elevation view

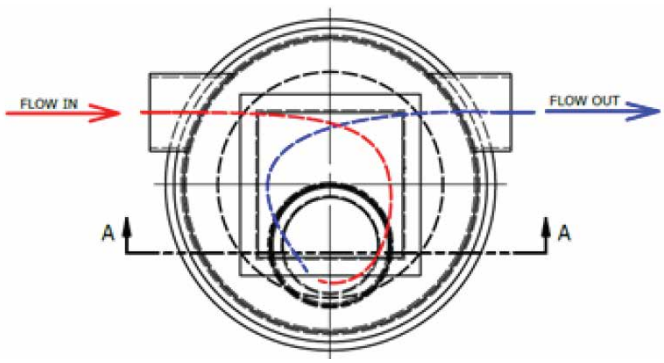


Figure 4 - Online Vortceptor in Plan view showing the diversion chamber and separation chamber in line



Vacuum Suction Cleaning

Equipment needed – eductor truck
Personnel needed – 2

Suction cleaning is used for most proprietary GPT's. This is by far the most convenient and safest method but does require specialist machinery to achieve. There are several specialist companies that offer vacuum suction cleaning of GPTs. Costs are usually based on the total volume of pollutants disposed, as well as water removed. Asset owners should enquire with cleaning contractors if the option to decant captured water back into the Vortceptor is possible, to reduce disposal fees.

Grab Cleaner

Equipment needed – truck with mounted crane and grab attachment
Personnel needed – 1 to 2

The Grab Cleaner can be carried out without dewatering the system. However, this operation is limited to the larger Vortceptor models with larger screen internal diameters. This option is practically only available for the SVO.530 and above as they have screen internal diameters of 2m. Care must be taken by the operator to ensure that the grab does not make contact with the stainless steel screen, and the shear cone underneath the screen area.

The grab truck cleaning option offers the removal of 80 – 90% of the pollution stored in a sump. It can be a cheaper option than vacuum suction cleaning. However, the asset owner must still allow for an annual vacuum clean, to remove accumulated sediment in the sump and behind the screens.

Removable Basket

Truck with mounted crane
Personnel – 1 to 2

If a removal waste basket is fitted, it can be lifted at any time, without the need for dewatering. This is the fastest and the most cost-effective option but comes at the sacrifice of sump capacity. The basket will not impede flow rate.

The smaller sump capacity that results from using a basket may lead to the need for more frequent maintenance activities. But this is offset by the ease and ability to carry out the cleaning activity in house.

An annual vacuum clean to thoroughly dewater and remove accumulated sediment will be recommended for this approach.





Tidal and backwater affected Vortceptors

Gross pollutant traps, including the Vortceptor, may from time to time, be required in tidal and backwater affected locations. The designer should consider specifying a penstock or stop valve on the outlet side of the Vortceptor, so that the Vortceptor can be isolated from tidal and backwater, and effectively dewatered and cleaned. It will be critical for the maintenance crew to re-open the penstock or stop valve after they have finished maintaining the Vortceptor. Failure to re-open the penstock or valve can lead to catastrophic flooding.

Increasing the Vortceptor sump capacity to spread out the cleaning intervals

Vortceptor sump capacities can be increased over and above the standard capacities listed in Table 1 below. It is recommended that the designer carefully estimate the expected pollution load volumes from their catchment and target a sump capacity to match a desired cleaning frequency. Extending the sump is only possible during the desktop design stage, before the Vortceptor is manufactured, so good early planning and design is essential.



Atlan Vortceptor Maintenance Capacities & Dimensions Inline

Models	Dimensions (mm)					Capacities			
	Internal Diameter	Overall Width	Depth Below Invert	Manhole Size (mm)	Max Pipe Size (mm)	Sump Capacity (m^3)	Floatables Volume (m^3)	Treatable Flow Rate (L/s)	Max Flow Rate (L/s)
INLINE SERIES									
SVI.025 (L/R)	1200	1370	1400	600x 600	450	1.2	0.06	26	280
SVI.055 (L/R)	1800	1970	1650	900x 900	525	2.7	0.22	55	380
SVI.055.M (L/R)	2200	2370	1585		525	3.2	0.22	55	750
SVI.100/15 (L/R)	1500	1670	1900	1000 DIA Internal 600x 600	600	3.1	0.20	100	700
SVI.160/22 (L/R)	2200	2370	2400		750	3.4	0.39	160	940
SVI.200/22 (L/R)	2200	2370	2900		750	3.1	0.39	200	990
SVI.300/22 (L/R)	2200	2370	3100		750	4.5	0.83	300	1050
SVI.400/22 (L/R)	2200	2370	3000		750	3.4	0.83	400	1180
SVI.400/25 (L/R)	2500	2670	2900		900	5.5	0.83	400	1650
SVI.400/30 (L/R)	3000	3170	3500		900	10	1.5	400	2500
SVI.500/30 (L/R)	3000	3170	3500		1050	10	1.5	500	1650
SVI.500/35 (L/R)	3500	3670	4000		1050	10	1.5	500	1900



Atlan Vortceptor Maintenance Capacities & Dimensions Offline

Models	Dimensions (mm)				Capacities			
	Internal Diameter	Overall Width	Depth below invert	Manhole Size (mm)	Sump Capacity (m^3)	Floatables Volume (m^3)	Treatable Flow Rate (L/s)	Bypass Flow Rate (L/s)
OFFLINE SERIES								
SVO.096 (L/R)	1500	1670	1725	1000 DIA Internal 600x600	2.0	0.35	96	PROJECT SPECIFIC DESIGN
SVO.140 (L/R)	1500	1670	2025		2.3	0.35	140	
SVO.180 (L/R)	1500	1670	2325		3.0	0.35	180	
SVO.220 (L/R)	2200	2350	2800		4.5	1.1	220	
SVO.360 (L/R)	2200	2350	3080		6.0	1.1	360	
SVO.530 (L/R)	3000	3150	3200		8.5	2.8	530	
SVO.800 (L/R)	3000	3150	4200		8.5	2.8	800	
SVO.810 (L/R)	4000	4150	3400		19.3	5.65	800	
SVO.1200 (L/R)	4000	4150	4000		19.3	5.65	1200	
SVO.1600 (L/R)	4000	4150	4600		19.3	5.65	1600	

Maintenance

The Atlan Vortceptor requires regular inspections and cleaning. There are no consumable parts on the Atlan Vortceptor throughout its operating life. The regularity of inspections and cleaning of the Vortceptor is contingent on the features and properties of the catchment area. Good monitoring and record keeping systems by the asset owner will allow them to optimally schedule cleaning activities for each individual Vortceptor. The section below provides asset owners some guidance to the frequencies for maintaining the Vortceptor.

Inspection

Routine inspection is the key to effective maintenance. Pollutant transportation and deposition may vary from catchment to catchment. Regular routine inspections will help the asset owner assess the rate of pollutant capture for that specific location.

At a minimum, routine inspections should be performed twice per year. The suggested inspection frequency in the first year of operation is 3 months.

This interval can be extended to 6 months at the discretion of the asset owner. The routine visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet, outlet, and separation screen. The routine inspection should also quantify the accumulation of floating trash, and sediment in the sump. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. All inspections should be recorded. A sample inspection report is attached to this manual. Furthermore, it is recommended that the Vortceptor be inspected after every major rain event, with a focus on ensuring there are no blockages to the inlet and outlets of the Vortceptor and the diversion chamber.

Access for maintenance

Separation Treatment chamber

The separation treatment chamber has adequate access for maintenance. Vortceptor models up to SVO.360 have single manhole access, whereas the larger Vortceptor models SVO.530 and above have 2 manholes, consisting of Class D cast iron lids. The lid in the centre of the separation chamber provides access into the screen and sump area.

The single round lid as pictured below provides access behind the screen, so that sediment can be extracted using a vacuum.

The lids are locked with bolts. The lids can be lifted using standard manhole cover lifters.

As described above, an additional Class D manhole cover allows access to the clean water side of the screen, or otherwise called the area ‘behind the screen’. This area can have some level of sediment deposition over time. This manhole allows convenient access, by allowing the vacuum hose to be dropped down vertically to the area behind the screen. It is recommended that the area behind the vortex separation screen be cleaned annually, to avoid build-up of sediment. Alternatively, access behind the screen can be gained by inserting the vacuum hose from the outlet side of the diversion chamber, and into the outlet of the separation treatment chamber.



Diversion chamber

There are access manholes above the diversion chamber, with a lid situated either above the inlet side and/or the outlet side of the chamber.

These manholes allow for visual inspection to the treatment chamber inlet and outlet chutes, and if required, access for cleaning.

Access for Maintenance

Pollution removal performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to reaching maximum sump capacity for easier removal of sediment. The level of sediment is easily determined by measuring from the finished surface level down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile.

Method to calculate the % sump capacity filled with pollutants

1. Determine the water depth that is above the sediment layer. This is done by taking two measurements with a measuring staff: one measurement from the finished surface level (ie manhole opening level) to the top of the sediment pile and the other from the manhole opening to the water surface.

2. If the difference between these measurements is less than the Depth from water level to top of sump in table 2, the system should be cleaned out. If the water depth to the sediment is less than the water depth to the top of sump, this means the sediment level is above the sump.

3. If the water depth to sediment is greater than the depth from water level to top of sump, calculate the % of sump that contains sediment by the following method:

Height of sediment = Depth of Water level to top of sump + Sump depth - water depth to sediment
Sump % full = height of sediment / height of sump x 100

A work sheet is attached to the end of this manual to assist with calculating and recording the sump levels.

Models	Sump depth (mm)	Depth from Water level to top of sump	Sump Capacity (m^3)	Light Liquid Volume (L)	Floatables Volume (m^3)
INLINE SERIES					
SVI.025	25	1400	500	600	770
SVI.055	55	1650	700	800	770
SVI.055.M	55	1585	700	800	770
OFFLINE SERIES					
SVO.096 (L/R)	1150	1010	2.0	239	0.39
SVO.140 (L/R)	1320	1260	2.3	239	0.39
SVO.180 (L/R)	1380	1560	2.5	239	0.39
SVO.220 (L/R)	1430	1560	4.3	515	1.1
SVO.360 (L/R)	1570	1860	6.0	515	1.1
SVO.530 (L/R)	1270	1860	8.5	1263	2.8
SVO.800 (L/R)	1270	2860	8.5	1263	2.8
SVO.810 (L/R)	1540	1860	19.3	2155	5.65
SVO.1200 (L/R)	1540	2490	19.3	2155	5.65
SVO.1600 (L/R)	1560	3150	19.3	2155	5.65

Table 2 - Sump depth dimensions

Cleaning

Cleaning of the Vortceptor system should be done during dry weather conditions when little or no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump.

The system should be completely drained down and the sump fully evacuated of sediment, and a final hose down of the screen and sump.

Disposal of material

The material captured by the Vortceptor could include hazardous material, such as syringes, chemicals, and sharp objects. Care must be taken by cleaning crews and they must work in accordance with a specific job safety plan. PPE such as gloves, protective wear, boots should be mandatory. Disposal of material must be done in accordance with all environmental regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins.

Inspection and cleaning frequencies

The frequency of cleaning will depend on the pollutant loads of the catchment, so inspections are recommended to confirm the maintenance intervals, which could be either three, six or twelve months.

Visual inspection and cleaning frequencies

	After every major storm	3 months	6 months	12 months
Visual inspection of treatment chamber	-	visually inspect every 3 months. Measure the amount of pollutants in the sump	-	-
Visual inspection of diversion chamber	Check inlet and outlet pipe or culvert for blockages	-	Visually inspect the diversion chamber for any signs of blockage and sediment build up	Visually inspect the diversion chamber for any signs of blockage and sediment build up
Regular Clean – Removal of captured pollutant material from the Vortceptor separation chamber	-	-	-	-
-	-	-	Primarily to remove floatables and sump contents contents. Note Cleaning interval is every 6 months on average but may need to be adjusted according to site specific conditions. Interval frequency can be reduced if extended sump has been installed	-
Full dewater and clean	-	-	-	Full sump pump out, jet screen and sump
Clean behind screen	-	-	-	In conjunction with full dewater and clean
Visual inspection of Vortex separation screen	-	-	-	Note the condition of the screen – note down signs of damage if any
Clean diversion chamber	-	-	Visual inspection	Remove sediment buildup if required.

Repairs and replacement

The Vortceptor does not have any consumable parts that require replacement throughout its design life of the unit. However, in the unlikely event that the Vortceptor requires repair due to damage, the following provides guidance on repairing the Vortceptor.

All repairs should be conducted by suitably qualified personnel, following OH&S requirements for working in confined spaces. All repairs should be conducted in dry weather and should be conducted after the Vortceptor has been dewatered and emptied.

Vortex Separation Screen

The vortex separation screen is comprised of 316 stainless steel. The Screen is not a consumable item. In the unlikely event that the screen is damaged, specific sections of the screen can be removed by cutting them out. Replacement screens can be riveted into the fibreglass body, and tack welded to the neighbouring screens. The installer must ensure that the screen is installed such that the screen aperture is facing the correct direction.

The way to check this is to run a hand over the surface of the screen. Ensure you are wearing gloves. The screen is smooth when stroking in one direction, and rough when stroking in the opposite direction. The smooth direction indicates the direction that the vortex will flow. Ensure that the replaced screen is in the same direction as of the screens next to them. Replacement screens are available from Atlan Stormwater, as well as specialist on site support from Atlan Stormwater's maintenance team.

Shear cone

The shear cone is not a consumable item. The only practical way it will be damaged is if a grab makes contact. Vortceptors up to SVO.360 have FRP shear cones, and the units from SVO.530 and above have 316 stainless steel shear cones. Replacement of the shear cone has been designed for easy replacement.

First completely dewater the unit, then gain access, noting that it is a confined space. Undo bolts and replace the damaged shear cone section. The shear cone is divided into 4 separate sections, so that only the damaged section needs to be replaced. Replacement shear cone sections are available from Atlan Stormwater as well as specialist on site support from Atlan Stormwater's maintenance team.

Cast iron Manhole covers

Cast iron manhole covers are not consumable items. However in the event they are damaged, they are readily available on the market as standard covers are used for the Vortceptor.

Precast concrete Diversion chamber

The diversion chamber is made of min 40Mpa concrete. Damage or cracks can be repaired with a concrete mortar such as Rapidset, Xypex, Parchem. 2-part epoxy and flexible fillers such as Sikaflex are also widely available. Refer to the manufacturers for specialist details on repairing precast concrete for water retaining structures.

Fibreglass components

One of the many benefits of using FRP/fibreglass over conventional materials such as concrete is its ease and durability of repairs. The material to repair fibreglass is readily and widely available.

Safety

Ensure the work area is well ventilated as the resin fumes can be harmful, especially in a confined space area. Resins, acetone, and FRP dust are flammable. Peroxides (catalyst) are strong oxidizing agents and can ignite fuels. Follow MSDS instructions, including PPE prior to commencement of repair work.

Repairs to Fibreglass

A key principle of repairs to fibreglass is that the repair will differ from the original fibreglass primary structure. The original resin and glass reinforcing fabric in the primary structure has cured and bonded chemically and physically with each other, forming the primary bond. Repairs to a damaged fibreglass part is referred to as secondary bonds, that are attached to the primary structure. The repair relies on the physical bond to the primary structure, and the resin must have strong adhesive properties. Increasing the surface area of the bond to the primary structure will increase the strength and durability of the repair.

Parts for repair

1. Resin – Polyester resin or Vinyl ester resin
2. Catalyst / Hardener – MEKP (Butanox M50 or equivalent)
3. Fibreglass matt – 450g/m2 chopped strand mat
4. Acetone – for cleaning the bond surface
5. Hot Coat – finishing layer (resin mixed with 1% solution of 8% wax in styrene can be used for this purpose)
6. Paint brush and or roller – for applying resin to fibreglass mat

Commercial fibreglass repair kits are widely available and can be used to repair the Vortceptor.

Identify the Damaged Area

Identify the damage and draw the boundary of the damage. An easy inspection method is to tap a solid material, like a coin, and listen for any differences in the sound of the tap. Mark out suspect areas. Damage could be cracks, holes, puncture, and delamination.

Trimming and cutting

Cut out the damaged area if you cannot patch over the area. Otherwise grind the surface as described below. Most concrete or masonry cutting tools are compatible to cut FRP. Note that high speed cutting tools for metals are not suitable for FRP.

Surface cleaning and grinding

Grind approximately 20mm or more of surface area from the damaged area to promote adhesion of the repair. Grind surface using abrasive methods.

Recommended equipment are 4 inch grinder with 34 grit sanding disc, or an orbital sander with a low grit number such as 60 grit. Do not use chemical primers. Grind the surface until the glossy finish of the resin is no longer visible, surface is even and uniform with no high or low spots. A slight taper in the surface will assist with locking in the repair.

Clean the surface of dust, water, oil. Brush or vacuum to remove dust, then wipe the surface with clean acetone. The surface should not be wet and must be dried.

The surface must be prepared again if the repair has not been performed within 24 hours of the surface preparation, or if the surface is contaminated with oil or water.

Resin preparation

Mix resin and catalyst in small batches. Catalyst should be between 1.25% to 2.5% of the resin weight. The reaction of the resin and catalyst will cause high amount of heat when curing. Refer to the resin and catalyst manufacturer's instructions.

Applying Fibreglass layers

Wet the bonding surface with catalysed resin. Apply fibreglass mat in layers, and completely cover with resin. Minimise the layer thickness to no more than 7mm, to avoid generating excess heat. Build up the layers until it matches or exceeds the thickness of the primary structure. Press the layers together to avoid the formation of air pockets between the layers, by using a roller.

Finishing the Fibreglass repair

After all layers are applied, a final coat of 'Hot Coat' is to be applied. The Hot coat can be applied while the top layer is still wet.

Further Assistance

Thank you for choosing the Atlan Vortceptor GPT. We are confident that it will faithfully carry out the essential task of keeping our waterways clean of pollution and do so in a robust and hassle-free manner for years to come. Our confidence in the product is backed by our 25 year warranty. Engineering and maintenance support are at hand for all asset owners. Contact Atlan Stormwater on 1300 773 500 or email maintenance@atlan.com.au.













Inspection & Maintenance Log

Model _____ Location _____

Date	Depth from manhole to top of sediment (1)	Depth from manhole to top of water level (2)	Water depth to sediment (1) – (2) (3)	Water Depth top of sump (from table 2) (4)	Is the water Depth (3) less than water depth to sump (4) Yes/No If yes, organize clean	% sump capacity full	Describe Maintenance Performed	Comments

a. The water depth to sediment is determined by taking two measurements with a measuring staff: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface.

b. Obtain the Water depth to top of sump for the specific Vortceptor model from table 2 of this manual

c. Compare the Water Depth to Sediment (3) to the Water Depth to top of sump (4). If the water depth to the sediment is less than the water depth to the top of sump, this means the sediment level is above the sump.

d. If the water depth to sediment is greater than the depth from water level to top of sump, calculate the % of sump that contains sediment by the following method:

Height of sediment = Depth of Water level to top of sump + Sump depth - water depth to sediment
Sump % full = height of sediment / height of sump x 100

e. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

Joy in water

‘We believe clean waterways are a right not a privilege and we work to ensure a joy in water experience for you and future generations.’

Andy Hornbuckle

Atlan
STORMWATER

P 02 8705 0255
sales@atlan.com.au
100 Silverwater Rd,
Silverwater NSW 2128
atlan.com.au

0723

OPERATION & MAINTENANCE MANUAL

AtlanFilter



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STORMWATER

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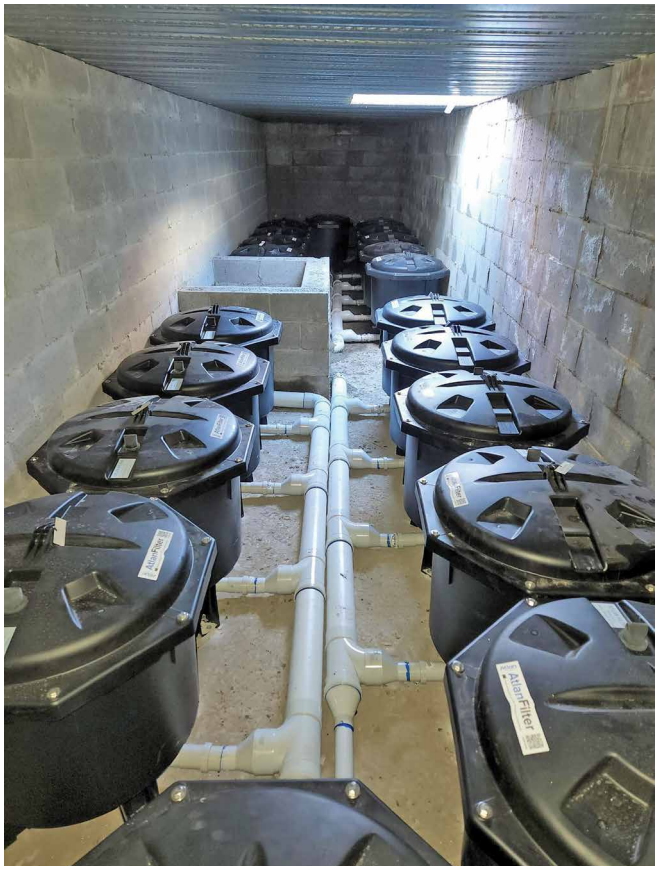
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INTRODUCTION

Understanding how to correctly and safely maintain the AtlanFilter is essential for the preservation of the filter's condition and its operational effectiveness. The AtlanFilter is a highly engineered stormwater filtration device designed to remove sediments, heavy metals, nitrogen and phosphorus from stormwater runoff.

The filters can be housed in either a concrete or fibreglass structure that evenly distributes the flow between cartridges.

Flow through the filter cartridges is gravity driven and self-regulating, which makes the AtlanFilter system a low maintenance, high performance stormwater treatment device.

This guide will provide the necessary steps that are to be taken to correctly and efficiently ensure the life of the AtlanFilter product.



Figure 1 - AtlanFilters in a concrete chamber / vault

FEATURES

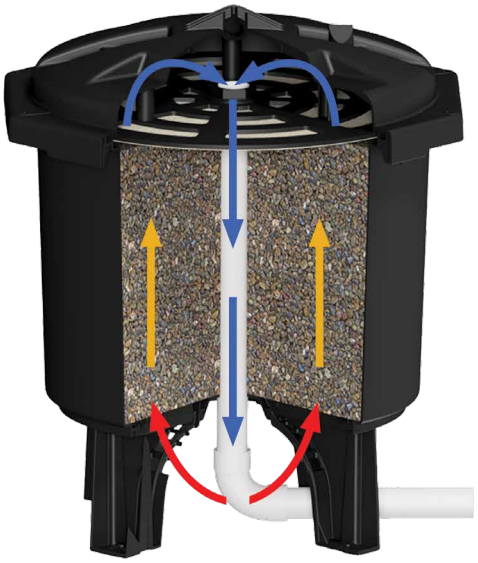


Figure 2 - Diagram of water flow through the AtlanFilter

The AtlanFilter has a patented design that facilitates influent flow over the entire surface area of the media, providing consistent pollutant removal within a small footprint.

The AtlanFilter provides highly effective media filtration using gravity flow conditions, without the need for moving parts or floating valves. This eliminates the risk of mechanical failure, such as stuck valves and seizing components during its service life. This provides highly robust treatment performance.

Hydraulic head provided by a suitably sized weir in the filter vault forces stormwater through the filter media via the inlet ports underneath the filter cartridge.

Refer to the table below for minimum head required for the AtlanFilter cartridges to assist in sizing the weir.

The water to be treated enters the AtlanFilter cartridge via an upwards direction as the water level builds up around the AtlanFilter. This ‘up flow’ reduces the amount of sediment that could enter the media cartridge, as the sediment is allowed to drop to the vault floor under gravity. Any remaining sediment in the water is introduced through the filter media under hydraulic pressure and is filtered.

Water is filtered through the media, where dissolved and particulate Total Nitrogen and Total Phosphorus are removed via reaction with the media, in addition to the removal of Total Suspended Solids / sediment.

AtlanFilter Media Self-Backwash feature

A one-way air release valve located at the top of the filter cartridge allows air to escape as the cartridge fills up with water. This creates a siphonic flow condition as the air is completely evacuated from inside the AtlanFilter cartridge. Siphonic flow conditions are maintained until such time the water level outside of the cartridge falls beneath the inlet ports underneath the filter. At this moment, the water level inside the AtlanFilter cartridge is higher than the surrounding water level.

The water inside the AtlanFilter cartridge is then expelled upon the break of the siphon, and the water flows down and out of the inlet ports under gravity, onto the vault floor.

This is a highly effective backwash of the media and allows the expulsion of a high proportion of sediment out from the AtlanFilter media. The expelled sediment can be removed either manually or with a vacuum from the vault floor.

This backwash effect allows the media to remain highly conductive and is the key to the industry leading longevity of the AtlanFilter cartridge system, which does not need replacement for at least 5 years, and typically will achieve up to 5-8 years of service (depending on catchment loading), subject to the AtlanFilter being regularly maintained in accordance with this guideline and in accordance with the specific needs of the catchment.



Figure 3 - Typical Outlet Weir Wall

FEATURES

Self Supporting Feet

Each AtlanFilter cartridge stands on 4 feet, which negates the need for the construction of a false floor in the vault. The feet are bolted to the vault floor with the supplied stainless steel angles and M10 bolts. The feet allow a clear height from the vault floor up to the inlet ports of 240mm. The absence of a false floor allows plenty of room for backwashed sediment to evacuate from underneath the cartridges and thereby avoid blocking the inlet ports to the AtlanFilter from sediment buildup. It is for this reason that Atlan recommended the sediment buildup not exceed 150mm above the vault floor, so as to avoid blocking the inlet ports of the AtlanFilter. Blockage of the inlet ports due to sediment accumulation in the vault floor will cause the AtlanFilter to go into bypass and be ineffective. Hence it is important to keep up to date with monitoring and maintaining the AtlanFilter vault.



Figure 5 - Underside of the AtlanFilter showing the screened inlet ports and the connection for the outlet pipe in the middle.



Figure 4 - AtlanFilter feet.

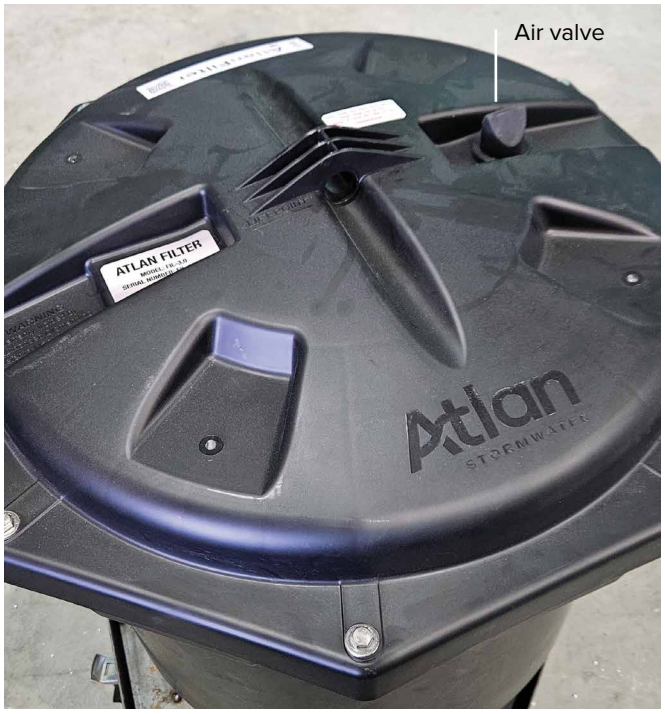


Figure 6 - the top of the AtlanFilter showing the location of the one way air valve.



SIZES

Atlan Stormwater manufactures two height cartridges for varying site constraints as shown below. Each cartridge is designed to treat stormwater at a flow rate of 1.5 litres per second and 3.0 litres per second for the half height cartridge (model no. FIL-1.5) and full-height cartridge (model no. FIL-3.0) respectively.



ATLANFILTER	STANDARD HEIGHT FIL-3.0	STANDARD HEIGHT - SHORT LEGS FIL-3.0.SF	HALF HEIGHT FIL-1.5	HALF HEIGHT - SHORT LEGS FIL-1.5.SF
Overall height	850mm	750mm	615mm	515mm
Diameter	726mm	726mm	726mm	726mm
Minimum head required	850mm	750mm	550mm	450mm
Treatment flow rate	3.0L/s	3.0L/s	1.5 L/s	1.5 L/s
Filter outlet diameter	50mm	50mm	50mm	50mm

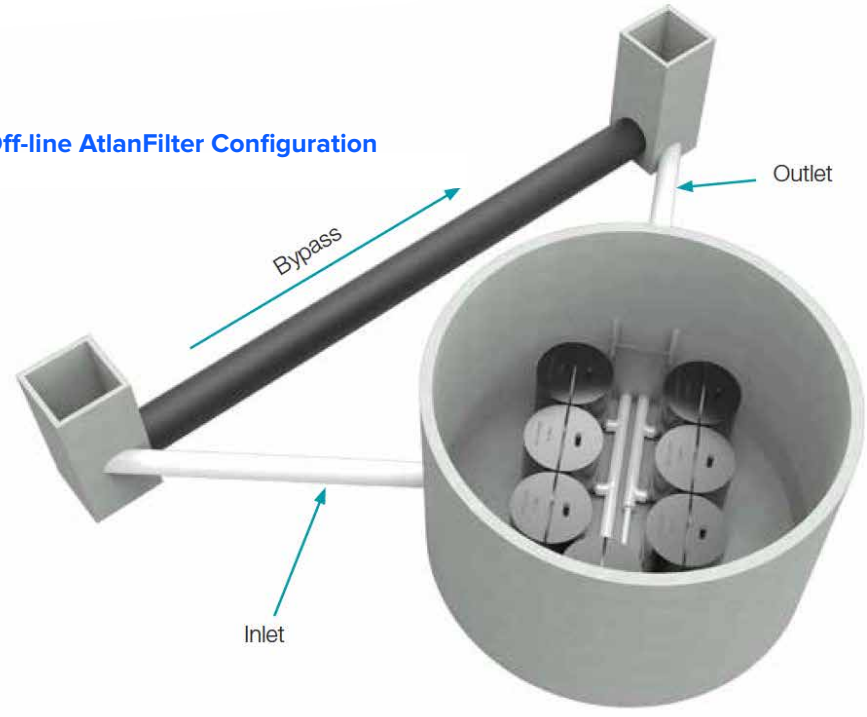
SYSTEM CONFIGURATION

AtlanFilter cartridges are installed in concrete or fibreglass tanks commonly referred to as ‘vaults’. The vault selection and configuration are based on site characteristics and/or constraints; computational stormwater quality modelling; and selected AtlanFilter models. Typical AtlanFilter system configurations are shown below.

In-line AtlanFilter Configuration



Off-line AtlanFilter Configuration



HEALTH AND SAFETY

A. Personal health & safety

When carrying out the necessary installation operations of the AtlanFilter all contractors and staff personnel must comply with all current workplace health and safety legislation.

The below measures should be adhered to as practically as possible.

- Comply with all applicable laws, regulations and standards.
- All those involved are informed and understand their obligations in respect of the workplace health and safety legislation.
- Ensure responsibility is accepted by all employees to practice and promote a safe and healthy work environment.

B. Personal protective equipment/safety equipment

When carrying out the necessary installation operations of the AtlanFilter, wearing the appropriate personal protective equipment and utilising the adequate safety equipment is vital to reducing potential hazards.

Personal protective equipment / safety equipment in this application includes:

- Eye protection
- Safety apron
- Fluorescent safety vest
- Form of skin protection
- Puncture resistant gloves
- Steel capped safety boots
- Ear muffs
- Hard hat/s
- Sunscreen

C. Confined space

In the event access is required into the vault, confined space permits will be required which is not covered in this Guide. Typical equipment required for confined space entry include:

- Harness
- Gas detector
- Tripod
- Spotter

D. Traffic Control

It is not uncommon for Atlan Filter cartridges to be installed underneath trafficable areas. Minimum traffic control measures will need to be put in place in accordance with traffic control plans set out by respective local and state road authorities.

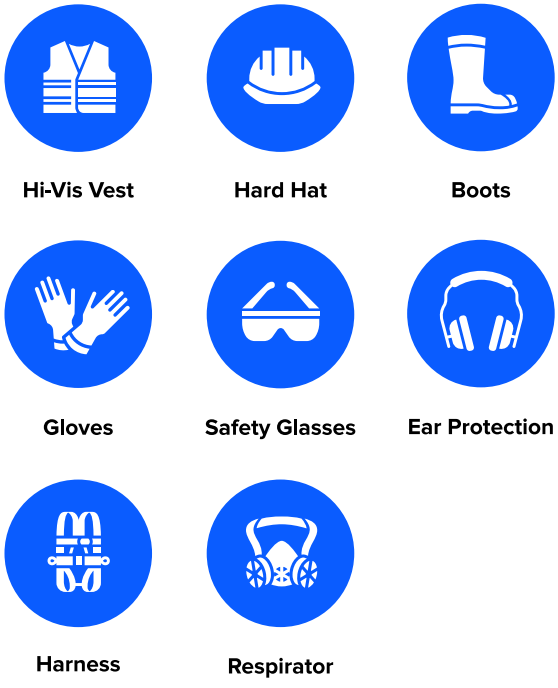


Vaults are to be treated as confined space.

Entry by permit only.



Monitor weather conditions prior to operation maintenance. Do not enter a vault during an episode of heavy rain as this can create a risk of drowning.



MAINTENANCE FREQUENCY

The AtlanFilter's design allows for a greater life span when frequently maintenance. Maintenance is broken up into three categories which include:

- Standard inspection
- General cleaning
- Cartridge replacement.

Standard Inspection

Standard inspections are conducted at regular four month intervals. At this time, an approved trained maintenance officer or Atlan representative shall undertake all measures outlined in Maintenance Procedure, Standard Inspection.

General Cleaning

At the end of each standard inspection, trigger measures will identify if general cleaning is required.

General cleaning will need to be executed immediate during standard inspections if the follow triggers are satisfied:

- Build-up of debris/pollutants within the vault greater than 150mm;
- Accumulation of debris/pollutants on the outlet chamber of the AtlanFilter vault;
- After large storm events, tidal or flooding impacts at the request of the owner;

Cartridge Replacement

Stormwater treatment is dependent on the effectiveness of the AtlanFilter cartridge system. As the AtlanFilter ages, pollutants will inundate the cartridge and ultimately reduce the treatment flow rate. At this point, a AtlanFilter flow test apparatus will be utilities to determine if replacement cartridges are required.

Based on the [site] concept modelling (MUSIC) and previous industry experience, we estimate the life of the AtlanFilter to be between 5 - 8 years (depending on catchment loading). As a minimum requirement, each AtlanFilter cartridge should be replaced within 10 years.

The life cycle of the AtlanFilter can be impacted if standard inspections and general maintenance is not undertaken in accordance with this operation and maintenance Guide.

Other factors that will affect the above life cycle of the AtlanFilter include:

- Installation of cartridge system during construction phase and impacted by construction sediment loads;
- Neglecting to install pre-treatment using an industry approved GPT or a surface inlet pit trash bag such as the Atlan StormSack.
- Unforeseen environmental hazards affecting the AtlanFilter functionality.

MAINTENANCE PROCEDURES

Stormwater pollutants captured and retained by the AtlanFilter system need to be periodically removed to ensure environmental values are upheld. All associated maintenance works is heavily dependent on the site's operational activities and generated stormwater pollutants. To ensure the longevity of the installed AtlanFilter treatment system, it is imperative that the procedures detailed in this Guide are followed and all appropriate measures are actioned immediately.

Standard inspection

The standard inspection requires personal experience of Atlan products to visual inspection the vault and filter conditions.

Confined space requirements may not be required if a full inspection and assessment of each AtlanFilter can be achieved at surface level without being deemed a confined space entry.

The standard inspection requires personal experience of Atlan products to visual inspection the vault and filter conditions.

Confined space requirements may not be required if a full inspection and assessment of each AtlanFilter can be achieved at surface level without being deemed a confined space entry.

Site Inspection Procedures

1. Implement pre-start safety measures

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected.

Area in which work is to be carried out must be clean, safe and hazard free. (Refer to figure 4.)

2. Set-up gantry tripod above manhole

Assemble and position the gantry above the manhole safely and as practically as possible. Attach the winch or chain block to the gantry for lifting the Atlan Filters.

Perform safety procedures ie. Attach harnesses etc. (if confined space).

3. Open manhole lid

Once you have set up the Gantry and ensured that the area is safe to operate in, you can proceed to open the manhole lid, using lid lifters.

4. Conduct gas tests

(If tank is classed confined space)

Once the lids have been removed to a safe distance to prevent tripping, you must then proceed to conduct gas tests. Perform necessary gas tests according to the confined space regulations.

5. Once confined space has been deemed safe to operate in, enter tank safely

Once you have carried out the required gas test and the work area is deemed safe, you may then enter the pit via a ladder or winch system to assess the work area you will be operating in. Ensure all confined space

6. AtlanFilter system assessment

Perform a review of the AtlanFilter system using the AtlanFilter assessment report/checklist. Sign off and forward a copy of the report to property manager and Atlan representative.

7. Reinstate AtlanFilter system and disposal

At the completion of the site inspection, ensure the site is reinstated back to its initial state and all pollutants are removed from the site in line with pollutant disposal procedures.

8. Sign off and forward a copy of the report to property manager and Atlan representative

GENERAL CLEANING



Vacuum out of Filter tank, removal, and disposal of pollutants at the completion of a standard inspection, general cleaning may be deemed necessary immediately or scheduled for a future date. Steps undertaken for general cleaning should be in general accordance with the procedure outlined below but not limited.

1. Implement pre-start safety measures

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected.

Area in which work is to be carried out must be clean, safe and hazard free. (Refer to figure 4.)

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6. AtlanFilter system assessment

Perform a review of the AtlanFilter system using the AtlanFilter assessment report/checklist.

7. Pollutant removal from tank

Perform clean-up using a licenced vacuum truck contractor or wet/dry vacuum, depending on level of sediment built up and/or tank size.

8. Reinstate AtlanFilter system and disposal

At the completion of the site inspection, ensure the site is reinstated back to its initial state and all pollutants are removed from the site in line with pollutant disposal procedures.

9. Sign off and forward a copy of the report to property manager and Atlan representative

CARTRIDGE RECYCLING AND REPLACEMENT

AtlanFilter cartridges can be swapped out for new cartridges. The spent AtlanFilter cartridges can be collected from site and sent to Atlan Stormwater's facilities, where the spent media will be removed from the cartridge in factory conditions and disposed of in accordance with environmental regulations.

The AtlanFilter cartridge will be recharged with new media, thereby recycling and repurposing the cartridge.

AtlanFilter replacement procedures may vary depending on the configuration of the AtlanFilters, the type of vault and engineers' specs. Replacement instructions for manhole AtlanFilter systems and precast vault AtlanFilter systems are contained in this section.

At the completion of a standard inspection, AtlanFilter replacement may be deemed necessary immediately or scheduled for a future date. Steps undertaken for cartridge replacement should be in general accordance with the procedure outlined below but not limited.

1. Implement pre-start safety measures

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected.

Area in which work is to be carried out must be clean, safe and hazard free.

2. Set-up gantry tripod above manhole

Assemble and position the gantry above the manhole safely and as practically as possible. Attach the winch or chain block to the gantry for lifting the AtlanFilters.

Perform safety procedures ie. attach harnesses etc. (if confined space).

3. Open manhole lid

Once you have sent up the gantry and ensured that the area is safe to operate in, you can proceed to open the manhole lid, using lid lifters.

4. Conduct gas tests

(If tank is classed confined space)

Once the lids have been removed to a safe distance to prevent tripping, you must then proceed to conduct gas tests. Perform necessary gas tests according to the confined space regulations.

5. Once confined space has been deemed safe to operate in, enter tank safely

Once you have carried out the required gas test and the work area is deemed safe, you may then enter the pit via a ladder or winch system to assess the work area you will be operating in. Ensure all confined space procedures are followed.

6. Remove exhausted cartridges

Disconnect all internal pipe work from inside the vault. Unbolt anti-floatation measures and remove cartridges from the vault using Gantry Tripod method.

7. Pollutant removal

Using a wet/dry vacuum or sucker truck, suck out all the residual pollutant from the vault.

8. Install pipework and AtlanFilters

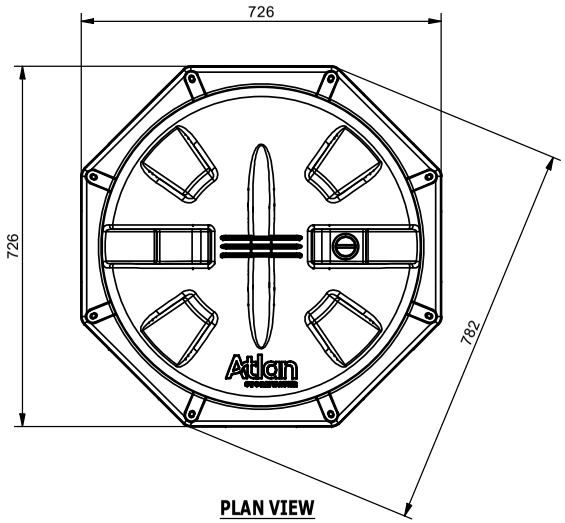
Please refer to the below standard install diagrams for the AtlanFilters. Then refer to your site specific drawings, as site requirements may require something different to the standard layout. Lower filters into tank, position into place, connect filter outlet pipework with the supplied fittings.

9. Install anti–floatation system

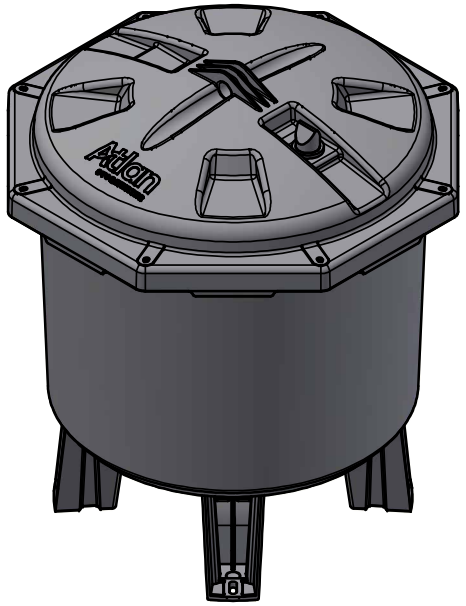
Please refer to the detailed drawings showing how the anti-floatation (anchor) bars are to be installed.

10. Sign off and forward a copy of the report to property manager and Atlan representative

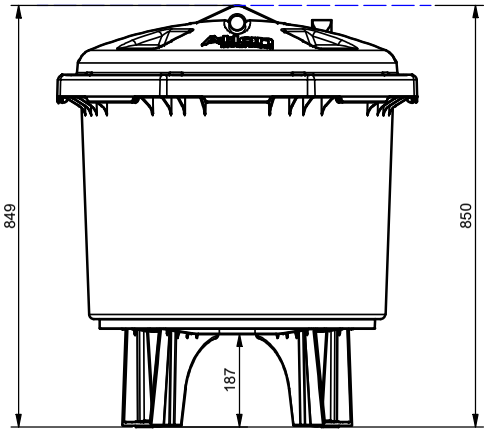
ATLAN FILTER - FIL-3.0
STANDARD HEIGHT



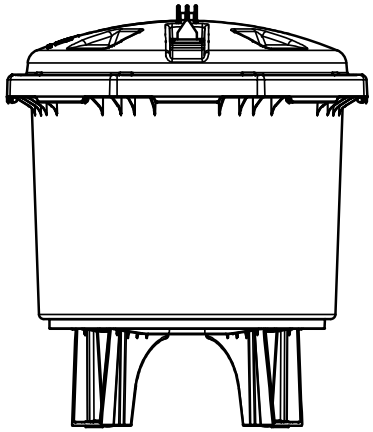
PLAN VIEW



ISOMETRIC VIEW



ELEVATION VIEW



SIDE VIEW

ISSUED FOR CONSTRUCTION

C:\Users\smart\OneDrive\Documents\Vault\Designs\ATLAN\01 - STANDARDS\ATLAN FILTER\FIL-3.0\FIL-3.0.dw

TOLERANCE: All Dimensions to Closest 10 mm & +/- 30 mm

ALL INTERCONNECTING PIPEWORK, PITS AND ASSOCIATED DRAINAGE BY OTHERS

CLIENT:

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Approved	Date
Request No.	

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	27/01/2025	P.Z.	INITIAL RELEASE	

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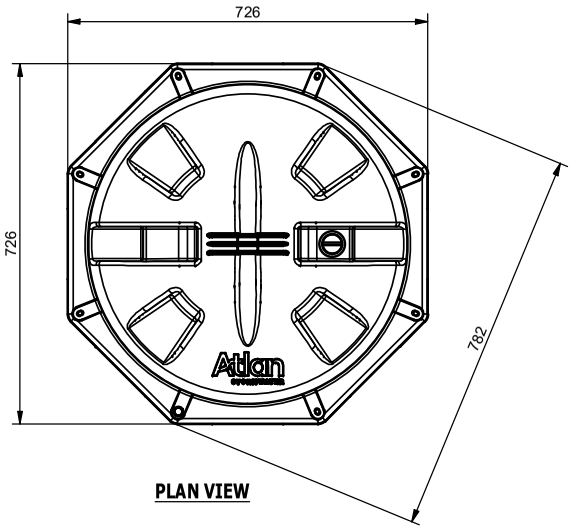
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ATLAN FILTER
FIL-3.0

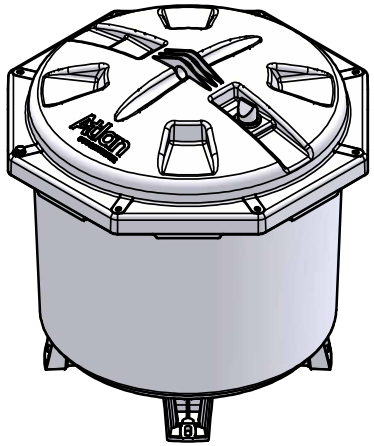
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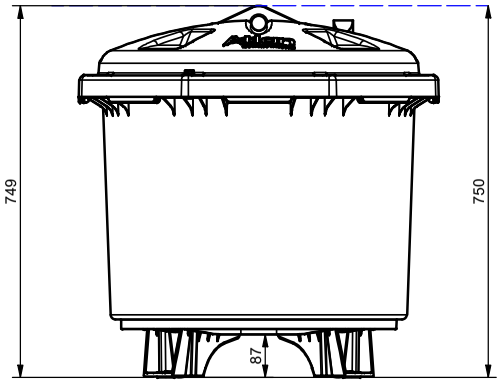
ATLAN FILTER - FIL-3.0
STANDARD HEIGHT - SHORT LEGS



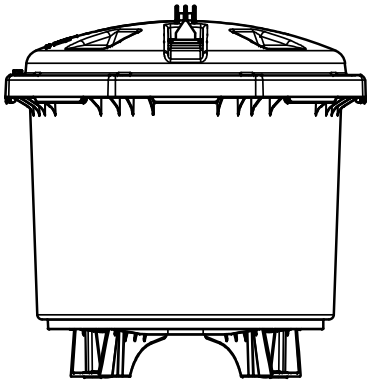
PLAN VIEW



ISOMETRIC VIEW



ELEVATION VIEW



SIDE VIEW

ISSUED FOR CONSTRUCTION

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TOLERANCE: All Dimensions to Closest 10 mm & +/- 30 mm

ALL INTERCONNECTING PIPEWORK, PITS AND ASSOCIATED DRAINAGE BY OTHERS

REV	DATE	BY	DESCRIPTION	CHK
	29/02/2024	P.Z.	INITIAL RELEASE	

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Approved		Date
Request No.		

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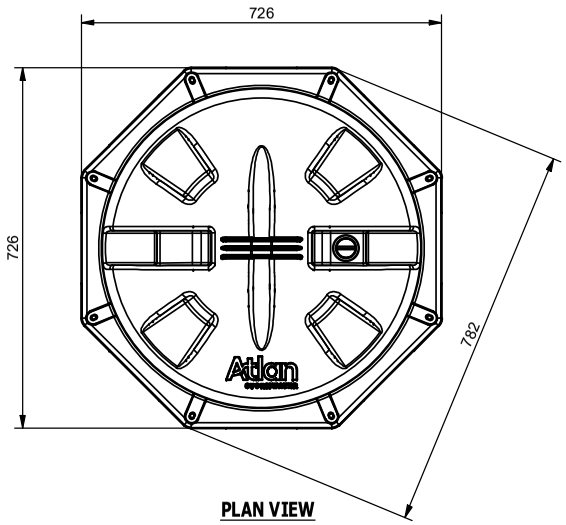
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TITLE
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FIL-3.0

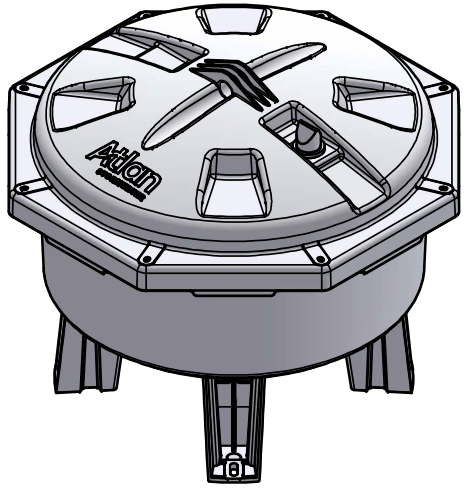
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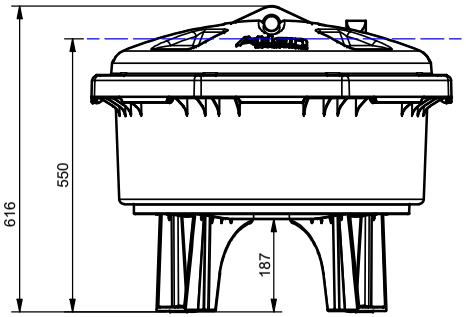
ATLAN FILTER - FIL-1.5
HALF HEIGHT



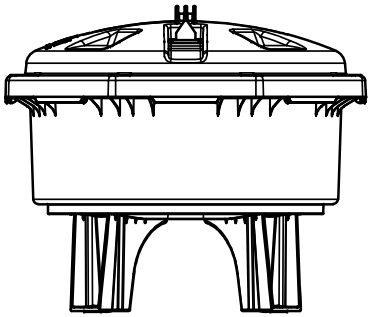
PLAN VIEW



ISOMETRIC VIEW



ELEVATION VIEW



SIDE VIEW

TOLERANCE: All Dimensions to Closest 10 mm & +/- 30 mm

ALL INTERCONNECTING PIPEWORK, PITS AND ASSOCIATED DRAINAGE BY OTHERS

REV	DATE	BY	DESCRIPTION	CHK
	27/01/2025	P.Z.	INITIAL RELEASE	

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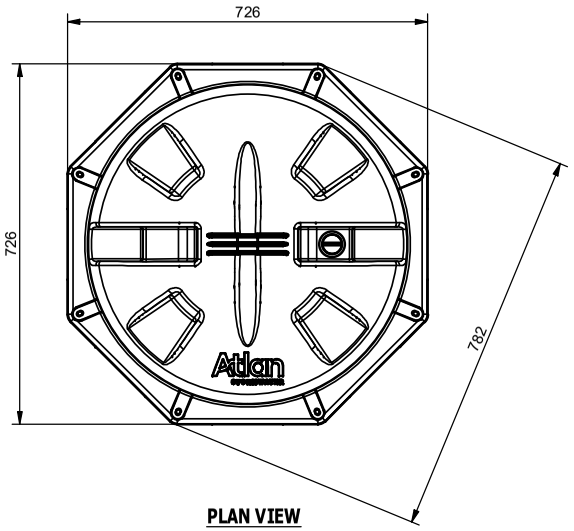
TITLE
ATLAN FILTER
FIL-1.5

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	

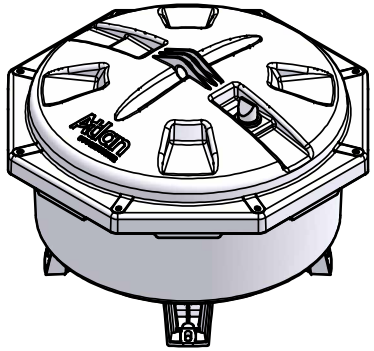
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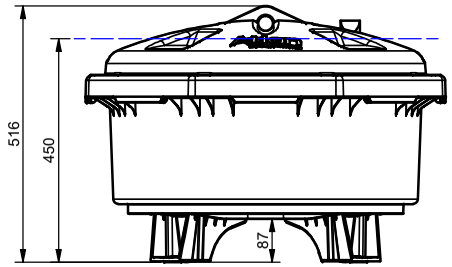
ATLAN FILTER - FIL-1.5
HALF HEIGHT - SHORT LEGS



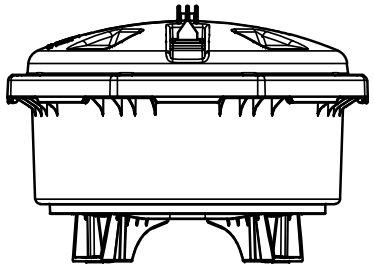
PLAN VIEW



ISOMETRIC VIEW



ELEVATION VIEW



SIDE VIEW

TOLERANCE: All Dimensions to Closest 10 mm & +/- 30 mm

ALL INTERCONNECTING PIPEWORK, PITS AND ASSOCIATED DRAINAGE BY OTHERS

REV	DATE	BY	DESCRIPTION	CHK
	29/02/2024	P.Z.	INITIAL RELEASE	

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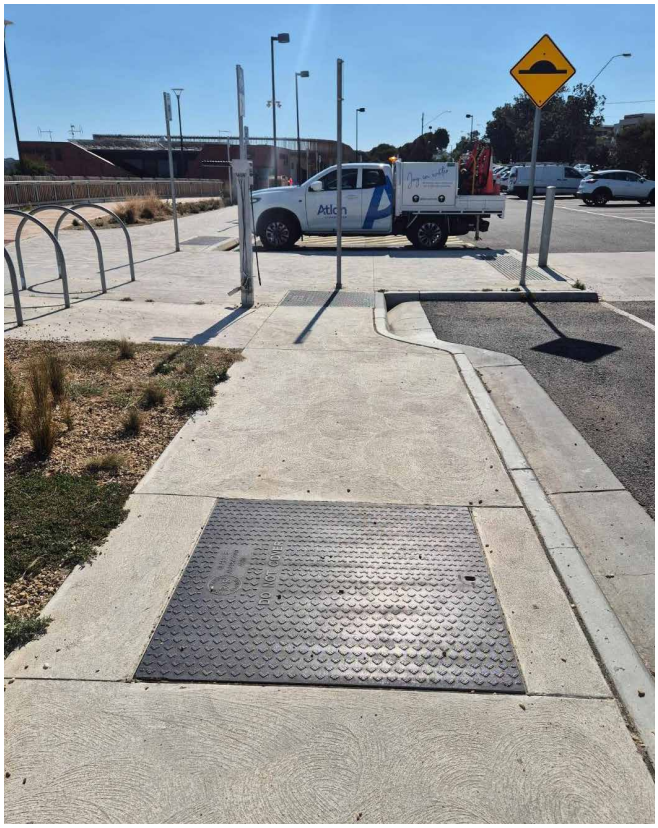
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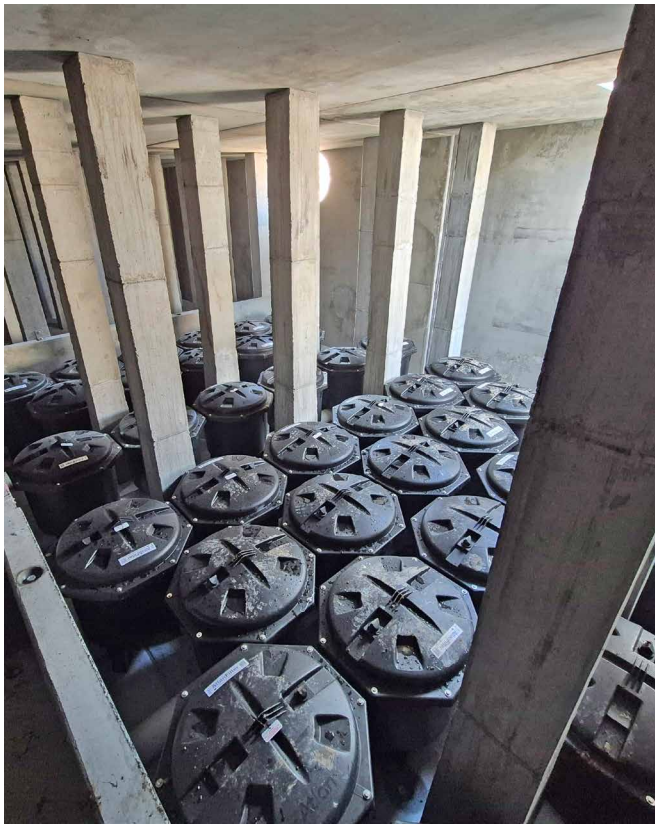
TITLE
ATLAN FILTER - SHORT
FIL-1.5

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	

CUSTOMER CODE : | DWG No. FIL-1.5.SF

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SITE EXIT & CLEAN UP



At the end of the scheduled maintenance, approved contractors or Atlan maintenance crew are required to reinstate the site to pre-existing conditions. Steps included but limited to are:

- Ensure all access covers are securely inserted back into their frames;
- Remove and dispose collected pollutants from the site in accordance with local regulator authorities;
- Retrieve all traffic control measures and maintenance tools; and
- Return all exhausted and/or damaged Atlan products to Atlan Stormwater to begin recycling program.

Joy in water

‘We believe clean waterways are a right not a privilege and we work to ensure a Joy in Water experience for you, with your children and grandchildren.’

Andy Hornbuckle

Atlan
STORMWATER

P 02 8705 0255
sales@atlan.com.au
100 Silverwater Rd,
Silverwater NSW 2128
atlan.com.au