



**SITE BASED STORMWATER
MANAGEMENT PLAN**

FOR

**PROPOSED MULTIPLE DWELLING
35 UNIVERSITY DRIVE, MEADOWBROOK**

JOB NO 26.1461

AUGUST 2026

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CERTIFICATION

Site Based Stormwater Management Plan

Job Number: 26.1461
Issue No: 2
Report Date: 21/08/2026
Author: Mark Nelson

Site Address: 35 University Drive, Meadowbrook
RP Description: Approved Lot 3 on Lot 100 SP312822
Proposed Development: Multiple Dwelling
Logan City Council Ref:

Signature:


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For and on behalf of DEQ Consulting Pty Ltd
t/a DEQ Consulting Engineers
R.P.E.Q. No: 27857

DATE: 21/08/2026

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TABLE OF CONTENTS

CERTIFICATION	II
COPYRIGHT CONSENT	II
TABLE OF CONTENTS	III
LIST OF TABLES AND FIGURES	V
1 INTRODUCTION	1
2 SITE CHARACTERISTICS	2
2.1 LOCATION	2
2.2 TOPOGRAPHY AND SITE DRAINAGE	3
3 FLOODING	3
4 DEVELOPMENT PROPOSAL	4
4.1 PROPOSED DEVELOPMENT	4
4.2 PROPOSED LAWFUL POINT OF DISCHARGE	4
4.3 PROPOSED STORMWATER DRAINAGE	5
6 CONSTRUCTION PHASE WATER QUALITY MANAGEMENT	6
6.1 POLLUTANTS	6
6.2 POTENTIAL IMPACTS	6
6.3 EROSION AND SEDIMENT CONTROL MEASURES	6
6.4 PERFORMANCE OBJECTIVES AND INDICATORS	8
6.5 MONITORING AND MAINTENANCE	8
6.6 RESPONSIBILITY AND REPORTING	9
7 OPERATIONAL PHASE WATER QUALITY MANAGEMENT	9
7.1 INTRODUCTION	9
7.2 POLLUTANTS	9
7.3 OBJECTIVES	10
7.4 MUSIC RAINFALL PARAMETERS	10
7.5 MUSIC SOURCE NODE PARAMETERS	11
7.6 STORMWATER QUALITY IMPROVEMENT DEVICES	12
7.7 PROPOSED STORMWATER QUALITY	12
7.8 MAINTENANCE	15
8 CONCLUSION	16
8.1 STORMWATER QUALITY MANAGEMENT	16

9 REFERENCES 17

APPENDIX A - SITE SURVEY PLAN & EXISTING SERVICES..... 18

APPENDIX B - PROPERTY FLOOD REPORT..... 19

APPENDIX C - DEVELOPMENT PROPOSAL..... 20

APPENDIX D - CIVIL SITEWORKS CONCEPT PLAN 21

APPENDIX E - CODE ASSESSMENT..... **ERROR! BOOKMARK NOT DEFINED.**

APPENDIX F - EROSION AND SEDIMENT CONTROL INSPECTION CHECKLISTS 22

APPENDIX G - STORMWATER QUALITY MANAGEMENT..... 27

LIST OF TABLES AND FIGURES

TABLES

TABLE 1 - POLLUTANTS TYPICALLY GENERATED DURING THE CONSTRUCTION PHASE..... 6

TABLE 2 - CONSTRUCTION PHASE POLLUTANTS..... 8

TABLE 3 - POLLUTANTS TYPICALLY GENERATED DURING THE OPERATIONAL PHASE 9

TABLE 4 - WATER QUALITY OBJECTIVES (LOAD BASED) 10

TABLE 5 - WATER QUALITY OBJECTIVES (CONCENTRATION BASED) 10

TABLE 6 - MUSIC BASE AND STORM FLOW CONCENTRATION PARAMETERS 11

TABLE 7 - MUSIC RUNOFF GENERATION PARAMETERS 12

TABLE 8 - MUSIC CATCHMENT PARAMETERS 13

TABLE 9 - MUSIC MODEL RESULTS - LOAD BASED 14

TABLE 10 - MUSIC MODEL RESULTS – CONCENTRATION BASED 15

FIGURES

FIGURE 1 - SITE LOCATION PLAN..... 2

FIGURE 2 – FLOOD RISK MAP 3

FIGURE 3 – STUDY: LOGAN AND ALBERT RIVERS FLOOD STUDY 2023..... 3

FIGURE 4 – STUDY: SLACKS AND SCRUBBY CREEK FLOOD STUDY 2023..... 4

FIGURE 5 - MUSIC MODEL LAYOUT 14

1 INTRODUCTION

DEQ Consulting Pty Ltd has been commissioned to prepare a Site Based Stormwater Management Plan for inclusion with the PDA Development Application submission to Economic Development Queensland (EDQ) for a Material Change of Use for a Multiple Dwelling development at 35 University Drive, Meadowbrook.

This Site Based Stormwater Management Plan has been prepared to address the increase in stormwater runoff caused by the proposed development. The Management Plan has also been prepared to address the requirements of State Planning Policy July 2017 - Water Quality and Logan City Council's Water Quality Objectives.

Details regarding all analysis and calculations are described in this report.

2 SITE CHARACTERISTICS

2.1 LOCATION

The subject development site (Approved Lot 3 on Lot 100 SP312822) is proposed developed land under COM/55/2025 with a total area of 30,210m². The site is bounded by University Drive to the north, Lake Ellerslie located within Griffith University Logan Campus to the east, Logan Motorway to the south and approved Lot 1 adjacent Meadowbrook Drive to the west.



Figure 1 - Site Location Plan

Refer Appendix A - Site Survey Plan & Existing Services

2.2 TOPOGRAPHY AND SITE DRAINAGE

The existing site is vacant with the existing ground levels predominantly falling from west to the east prior to discharging to the existing Lake Ellerslie located adjacent the eastern boundary. A stormwater easement located along the southern boundary caters for discharge from the Logan Motorway and is discharged over the eastern boundary to Lake Ellerslie. The site is currently impacted by flooding. Current development approval COM/55/2025 involves filling the site above the PMF of 10.90m AHD. A new stormwater outlet for the lot is proposed to discharge to the existing stormwater easement located within the site at the south-eastern corner of the lot.



Figure 2 – Flood Risk Map

3 FLOODING

City of Logan Property Flood Property Report indicates the site is affected by flooding.

Study: Logan and Albert Rivers Flood Study 2023

Likelihood (each year)	River flooding
20% chance	Not applicable
10% chance	Not applicable
5% chance	8.4 metres AHD
2% chance	9.8 metres AHD
1% chance	10.9 metres AHD
0.5% chance	11.5 metres AHD
0.2% chance	12.4 metres AHD
0.05% chance	13.0 metres AHD
PMF	17.4 metres AHD

Figure 3 – Study: Logan and Albert Rivers Flood Study 2023

Study: Slacks and Scrubby Creek Flood Study 2023

Likelihood (each year)	Creek flooding
20% chance	8.9 metres AHD
10% chance	9.0 metres AHD
5% chance	9.1 metres AHD
2% chance	9.3 metres AHD
1% chance	9.4 metres AHD
0.5% chance	9.6 metres AHD
0.2% chance	9.7 metres AHD
0.05% chance	9.3 metres AHD
PMF	10.9 metres AHD

Figure 4 – Study: Slacks and Scrubby Creek Flood Study 2023

Proposed earthworks under construction (COM/55/2025) are proposed to fill the site above the PMF (10.9m AHD) for the Slacks and Scrubby Creek event and the Logan and Albert River 1% AEP (10.9m AHD).

Refer Appendix B – Property Flood Report

4 DEVELOPMENT PROPOSAL

4.1 PROPOSED DEVELOPMENT

It is proposed to provide for Multiple Dwellings consisting of 145 townhouses, associated internal private road network, carparking, landscaping, open space and communal areas. Access to the townhouses is achieved via a proposed 10m wide crossover to University Drive currently under construction in conjunction with works associated with COM/55/2025.

Refer Appendix C – Development Proposal

4.2 PROPOSED LAWFUL POINT OF DISCHARGE

The existing stormwater easement located along the southern boundary within the lot discharging to Lake Ellerslie to the east has been adopted as the lawful point of discharge for the developed site. A piped outlet into the easement is currently under construction in conjunction with works associated with COM/55/2025.

4.3 PROPOSED STORMWATER DRAINAGE

The on-site stormwater drainage networks are proposed to service the developed sites and convey the developed runoff to the lawful point of discharge. The minor storm event runoff within the respective developed sites will be conveyed by a piped stormwater drainage network within the internal access roads and conveyed through privately owned underground stormwater management devices prior to discharge to the lawful points of discharge.

A roofwater drainage network is proposed to service the roof areas and courtyards of the townhouse dwellings on lot 3 and is to discharge to the on-site stormwater drainage network for conveyance to the stormwater management system.

Surcharge of the on-site drainage system (Q50 major less Q10 piped) within the sites will be conveyed within the internal road networks to the south-eastern corner of the site where it will be conveyed to the existing stormwater drainage easement prior to discharge to Lake Ellerslie to the east.

The memorandum prepared by DCF Engineering addresses the proposed development in relation to the existing site and overall catchment. The report provides hydrologic justification for a no-detention stormwater management strategy for the proposed development.

Refer Appendix D – Civil Siteworks Concept Plan

6 CONSTRUCTION PHASE WATER QUALITY MANAGEMENT

6.1 POLLUTANTS

Pollutants typically generated during the construction phase of the development are shown below (BCC, 2014).

Table 1 - Pollutants Typically Generated During the Construction Phase

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, off-cuts
Sediment	Unprotected exposed soils and stockpiles during earthworks and building
Hydrocarbons	Fuel and oil spills, leaks from construction vehicles, leaks from cars and delivery vehicles
Toxic materials	Cement slurry, asphalt prime, solvents, cleaning agents, washwater (eg from tile works)
pH altering substances	Acid sulphate soils, cement slurry and washwaters

Source: Brisbane City Council Subdivision and Development Guidelines (2008).

6.2 POTENTIAL IMPACTS

The construction phase of a development has the potential to release significant amounts of coarse / fine sediments and other pollutants into the city's waterways. Potential impacts on the surrounding environment will be minimised during the construction phase with measures as outlined in this SBSMP and detailed Erosion and Sediment Control Plan to be provided at the Operational Works phase.

6.3 EROSION AND SEDIMENT CONTROL MEASURES

6.3.1 Prestart

ESC measure- silt fences, diversion drains & dust control (clearing).

Where possible, disturbance to the existing surface is to be limited to the immediate work area. The existing ground cover is not to be stripped until contractor is ready for earthworks. Silt fence to be erected along boundary and around the construction area and is to be cleaned by the contractor when the capacity is reduced by 25%.

6.3.2 Bulk Earthworks

ESC measure- sediment dam, silt fences, diversion drains & dust control.

All exposed areas are to be protected against wind & water erosion at all times. A sediment pond shall be constructed at the lowest point on the site to capture all contaminated runoff. Silt fences are to be erected around the base of earthworks areas, downstream property boundaries and materials stockpiles. Stockpiles and construction materials are not permitted to be stored within the road reserve. Diversion drains are to be provided at upstream boundaries to divert 'clean' runoff around the disturbed areas on site subject to earthworks.

6.3.3 Construction

ESC measure- sediment basin, silt fences, diversion drains, dust & litter control.

ESC measures are to be provided prior to earthworks commencing. The ESC measures may be modified on site to suit the staging of construction, the contractor is responsible for requesting this action prior to implementation. A temporary construction exit is to be located at the road entry to the site. The contractor is to ensure no dust is tracked onto surrounding roads. Dust producing areas shall be swept to remove silt / dust.

At least one bin or litter trap is to be provided for waste material. Concrete runoff from wash-down of exposed aggregate areas is to be prevented from discharging off the site.

Excavated material from the laying of services is to be placed on the high side of trench. The contractor is to stockpile topsoil & subsoil separately. Where under pavement, the trenches are to be backfilled with CBR 15 material, otherwise the trenches are to be backfilled, capped with topsoil and compacted to 100mm min above adjacent ground level.

6.3.4 Maintenance Period

ESC measure - silt fences, ground cover, dust control.

Silt fences are to remain in place during the maintenance period until landscaping is established / accepted "On Maintenance" by Logan City Council .

6.4 PERFORMANCE OBJECTIVES AND INDICATORS

BCC's *Guideline on Identifying and Applying Water Quality Objectives in Brisbane City* (2000) states that stormwater runoff during the construction phase must be in accordance with the following concentration ranges (or upper limits) shown in the next table.

Table 2 - Construction Phase Pollutants

Pollutant	Criteria
Total Suspended Solids (TSS)	<50mg/L
pH	6.5 – 8.5
Total Nitrogen (mg/L)	0.65
Turbidity (NTU)	Less than 10% above background
Total Phosphorus (mg/L)	0.070
Dissolved Oxygen	80 to 105 percent saturation
Oils and Grease	No visible films or odours
Litter	No anthropogenic material greater than 5m

Source: *Brisbane City Council Guideline on Identifying and Applying Water Quality Objectives in Brisbane City* (2000).

6.5 MONITORING AND MAINTENANCE

The requirement of monitoring during the construction phase will be:

- Work activities are restricted to designated construction areas
- Earthworks and site clearing are undertaken in accordance with the Erosion and Sediment Control Plans
- Erosion and sediment control devices are to be constructed / installed in accordance with the Erosion and Sediment Control Plans
- Water quality monitoring at the nominated monitoring stations must be carried out monthly and following significant rainfall (>25mm in 72 hrs)
- Stormwater discharges from the site are not having any adverse effect on the downstream environment
- Monitoring and recording of the performance of the drainage control devices including water quality testing where required
- Any failure in the stormwater system shall be immediately rectified to prevent uncontrolled discharge from the site

- Any failure to the stormwater system causing damage to surroundings should implement immediate remedial work to the damaged area

6.6 RESPONSIBILITY AND REPORTING

The Construction Contractor will be responsible for the implementation of the Stormwater Management Plan during the course of all construction activities. Regular inspections of the devices (and records of any failures) shall be undertaken.

Refer Appendix E – Erosion and Sediment Control Inspection Checklists

7 OPERATIONAL PHASE WATER QUALITY MANAGEMENT

7.1 INTRODUCTION

The operational phase of the Management Plan focuses on appropriate consideration of Stormwater Quality Improvement Devices (SQIDs) and Water Sensitive Urban Design (WSUD) principles to be incorporated into the total water cycle management of the development site.

7.2 POLLUTANTS

Pollutants typically generated during the operational phase of the development are shown below (BCC, 2008).

Table 3 - Pollutants Typically Generated During the Operational Phase

Pollutant	Sources
Litter	Construction packaging, construction waste materials, paper, food packaging
Sediment	Exposed soils and stockpiles
Oxygen demanding substances	Organic or chemical matter
Nutrients (N & P)	Nitrogen, phosphorus
Pathogens / Faecal coliforms (bacteria & viruses)	Sewage
Hydrocarbons (including oil & grease)	Fuel and oil spills
Heavy metals (often associated with fine sediment)	Sediment runoff

Surfactants	Detergents from car washing, cleansing agents
Organochlorines & organophosphates	Pesticides, herbicides
Thermal pollution	Heat (ie runoff from impervious areas)
pH altering substances	Washwaters

Source: Brisbane City Council Subdivision and Development Guidelines (2008).

7.3 OBJECTIVES

State Planning Policy July 2017 indicates the proposed MCU development is required to comply with this policy due to having an area in excess of 2,500m² and must demonstrate compliance with the following stormwater quality load and concentration based reduction objectives.

Table 4 - Water Quality Objectives (Load Based)

Pollutant Type	Objective
Fine Sediment (TSS)	≥ 80%
Total Phosphorus	≥ 60%
Total Nitrogen	≥ 45%
Gross Pollutants (> 5mm)	≥ 90%

Table 5 - Water Quality Objectives (Concentration Based)

Pollutant Type	Objective
Fine Sediment (TSS)	< 15mg/L
Total Phosphorus	< 0.07mg/L
Total Nitrogen	< 0.65mg/L

7.4 MUSIC RAINFALL PARAMETERS

Stormwater quality modelling has been undertaken for the proposed development utilising MUSIC 6.3.0 to quantitatively determine the effectiveness of the system.

Rainfall Station 40715 Shailer Park meteorological data was utilised for the MUSIC analysis. Modelling of the site was analysed for a period of 10 years (01/01/1980 – 31/12/1989) using a 6 minute time-step period. Water by Design's *MUSIC Modelling Guidelines* Version 1.0 – 2010

utilizing modified % impervious area, rainfall threshold, soil properties and pollutant concentration. No drainage routing was utilised between nodes.

7.5 MUSIC SOURCE NODE PARAMETERS

The MUSIC source node parameters taken from the Water by Design (2010), *MUSIC Modelling Guidelines* and are shown in the next table.

Table 6 - MUSIC Base and Storm Flow Concentration Parameters

Land Use	Flow Type	Total Suspended Solids		Total Phosphorus		Total Nitrogen	
		Log ₁₀ mg/L		Log ₁₀ mg/L		Log ₁₀ mg/L	
		Mean	St. dev.	Mean	Std dev	Mean	Std dev
Urban Residential Roof	Baseflow	1.10	1.30	-0.82	0.00	0.32	0.12
	Stormflow	1.30	0.32	-0.89	0.25	0.30	0.19
Urban Residential Roads	Baseflow	1.20	0.17	-0.85	0.31	0.11	0.12
	Stormflow	2.43	0.32	-0.30	0.25	0.34	0.19
Urban Residential Ground Level	Baseflow	1.20	0.17	-0.85	0.31	0.11	0.12
	Stormflow	2.15	0.32	-0.60	0.25	0.30	0.19

Table 7 - MUSIC Runoff Generation Parameters

Parameter	Urban Residential
Rainfall Threshold (mm/day)	1
Soil Storage Capacity (mm)	120
Initial Storage (% of Capacity)	25
Field Capacity (mm)	80
Infiltration Capacity Coefficient – a	200
Infiltration Capacity Exponent – b	1.0
Initial Depth (mm)	10
Daily Recharge Rate (%)	25
Daily Baseflow Rate (%)	5
Daily Deep Seepage Rate (%)	0

7.6 STORMWATER QUALITY IMPROVEMENT DEVICES

An independent WSUD treatment train on each of the developed sites will be provided prior to discharging runoff to the lawful points of discharge.

7.7 PROPOSED STORMWATER QUALITY

7.7.1 STORMWATER QUALITY IMPROVEMENT DEVICE DETAILS

Ocean Protect OceanGuard filter baskets within the internal road network and Ocean Protect StormFilter cartridges have been proposed to treat the stormwater flows generated within the proposed development for the operational phase of the development. The treatment train through the townhouse developed site is as follows:

- 15 (min) x OceanGuard 200 micron filter baskets are to be installed within all gully pits located within the internal road network
- 56 x Ocean Protect 690 PSorb StormFilters are proposed to treat the developed site flows prior to discharge to the existing stormwater drainage network

7.7.2 Music Catchment Parameters

Details on each catchment (source node) are detailed in the next table.

Table 8 - MUSIC Catchment Parameters

Catchment	Area	Percentage Impervious
	ha	%
Roof	0.980	100
Road	0.478	100
Ground	1.178	46

7.7.3 Music Treatment Node Parameters

7.7.3.1 Ocean Protect OceanGuard 200 series filter baskets

MUSIC parameters for the OceanGuards have been sourced from the manufacturer Ocean Protect who has provided data for the MUSIC nodes.

7.7.3.2 Ocean Protect Stormfilter Cartridges

MUSIC parameters for the Stormfilter cartridges have been sourced from the product manufacturer Ocean Protect who has provided data for the MUSIC nodes. 2nd and 3rd party field testing data can be provided by Ocean Protect upon request.

7.7.4 Music Model

The MUSIC model analysed is shown in the figure below.

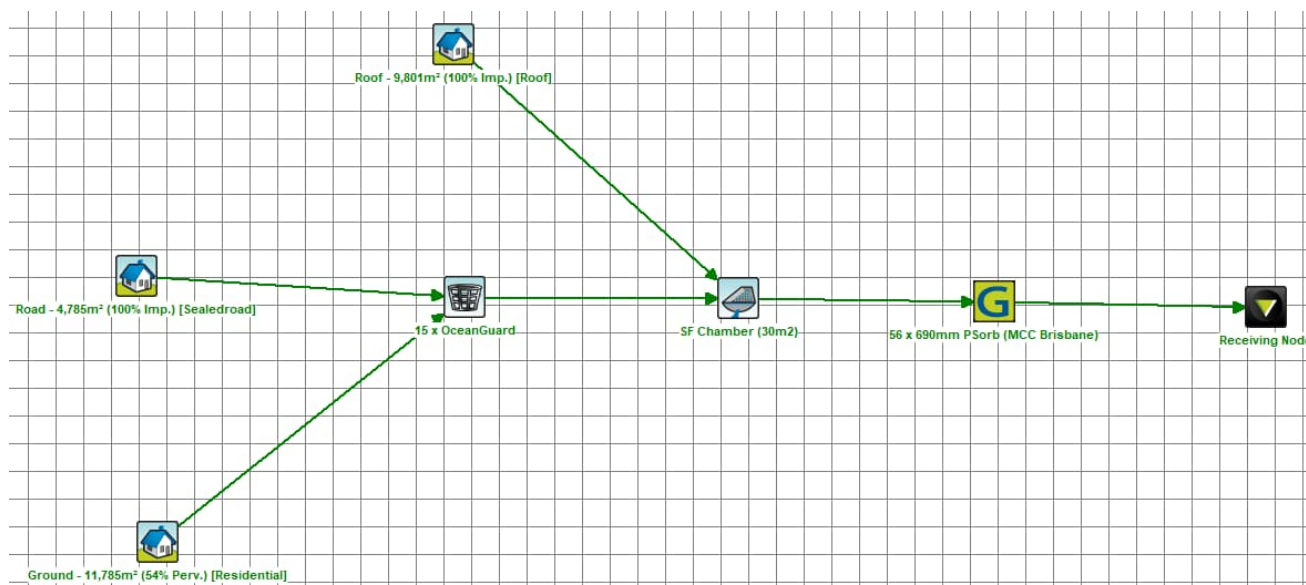


Figure 5 - MUSIC Model Layout

7.7.5 Music Results

The results of the MUSIC modelling demonstrate the following pollutant removal rates of target pollutants as shown in the following tables.

Table 9 - MUSIC Model Results - Load Based

Pollutant Type	Objective	MUSIC Result Achieved	Water Quality Objective Achieved
Total Suspended Solids (TSS)	≥ 80.0%	90.0%	☑
Total Phosphorus (TP)	≥ 60.0%	70.3%	☑
Total Nitrogen (TN)	≥ 45.0%	46.9%	☑
Gross Pollutants (> 5mm)	≥ 90.0%	100.0%	☑

Table 10 - MUSIC Model Results – Concentration Based

Pollutant Type	Objective	MUSIC Result Achieved	Water Quality Objective Achieved
Total Suspended Solids (TSS)	< 15mg/L	1.06mg/L	☑
Total Phosphorus (TP)	< 0.07mg/L	0.015mg/L	☑
Total Nitrogen (TN)	< 0.65mg/L	0.437mg/L	☑

The previous tables demonstrate that the proposed stormwater management system provides a sufficient treatment train to achieve all the required target pollutant load reduction objectives and the TSS, TP and TN mean concentration based reduction objectives to meet Council's requirements.

7.8 MAINTENANCE

Periodical maintenance will be required of the proposed OceanGuard filter baskets and StormFilter cartridges. It is recommended that the maintenance be undertaken in accordance with Ocean Protects Operations and maintenance recommendations for the StormFilter Treatment Train to maintain system performance.

Refer Appendix F – Stormwater Quality Management

8 CONCLUSION

8.1 STORMWATER QUALITY MANAGEMENT

8.1.1 Construction Phase

All construction work will be undertaken in accordance with the Erosion and Sediment Management Plan prepared in association with the detail design documentation.

8.1.2 Operational Phase

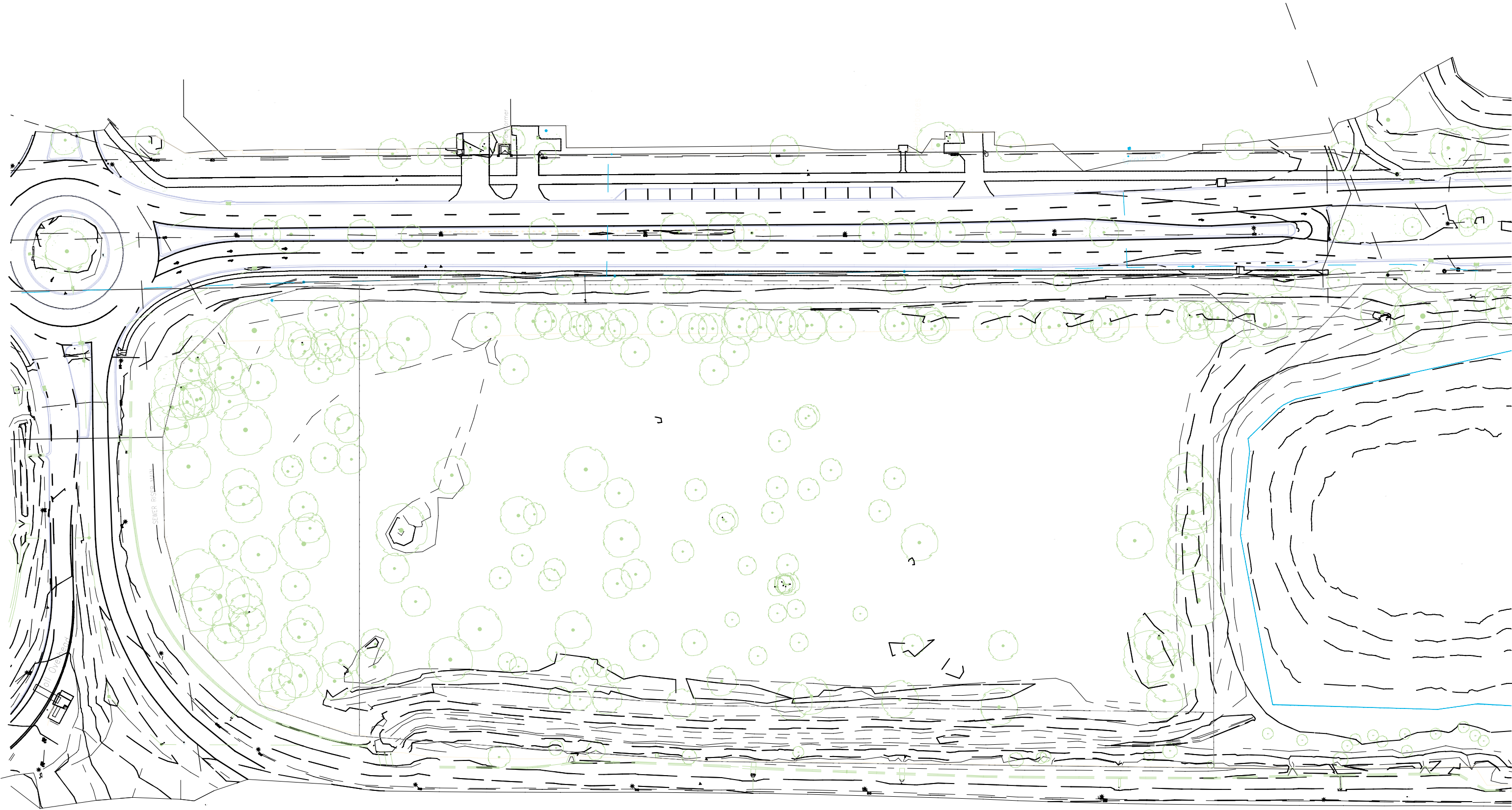
It has been demonstrated that the proposed treatment train to be included in the stormwater drainage system as part of the development proposal meets with Logan City Council 's Stormwater Quality Best Management Practices and satisfies the requirements of State Planning Policy July 2017 - Water Quality.

9 REFERENCES

- Logan City Council, 2014. *Logan Planning Scheme 2015*. Logan City Council, Logan Central.
- Department of Environment and Resource Management 2010. *Planning Guidelines for Water Supply and Sewerage*. Department of Environment and Resource Management, Brisbane.
- Department of Natural Resources and Water, 2007. *Queensland Urban Drainage Manual Volume 1 Second Edition*. Department of Natural Resources and Water, Brisbane.
- *MUSIC – Model for Urban Stormwater Improvement Conceptualisation (Version 6.3, Build 0.1908)*. 2014 eWater Limited.
- Water by Design, 2010. *MUSIC Modelling Guidelines Version 1.0*. SEQ Healthy Waterways Partnership, Brisbane.
- The State of Queensland, Department of Infrastructure, Local Government and Planning, July 2017. *State Planning Policy July 2017*

APPENDIX A

SITE SURVEY PLAN & EXISTING SERVICES

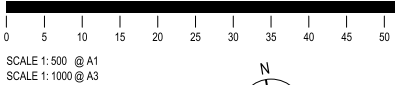


1 EXISTING CONDITIONS
SCALE 1:500 @ A1
SCALE 1:1000 @ A3

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ÀZURE



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35 UNIVERSITY DRIVE

35 UNIVERSITY DRIVE, MEADOWBROOK
CLIENT - AZURE PROPERTY

EXISTING PLAN - GROUND FLOOR

JOB No 7913
DRAWING No SD1201
ISSUE A

ISSUE PURPOSE
DATE D C A
DEVELOPMENT APPLICATION

APPENDIX B

PROPERTY FLOOD REPORT

PROPERTY FLOOD REPORT



Property Details

Address: 35 University Drive MEADOWBROOK QLD 4131

Lot/Plan: Lot 100 SP 312822

Size/Area: 35,512 m²

Property Key: 387712

Catchment(s): Logan River, Slacks Creek

View Logan's [catchments and waterways map](#) (PDF)



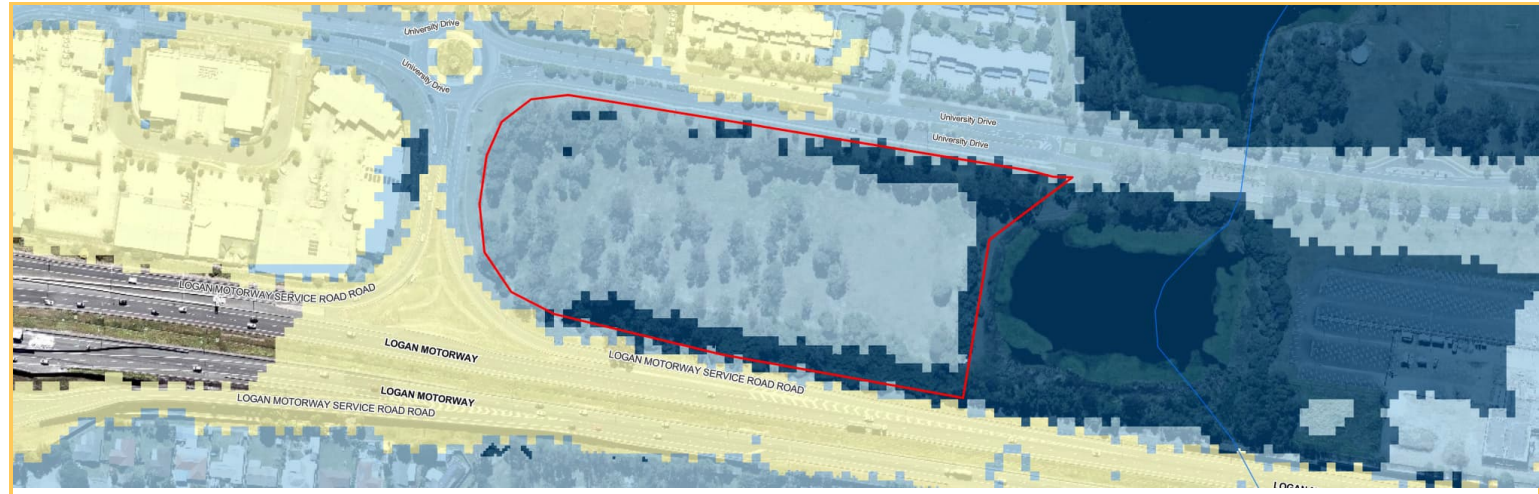
Summary Flood Assessment

The table below presents the flood risks applicable to the selected property. There may be multiple studies and flood scenarios affecting the property, particularly for larger sites.

Assessment	Details
Risk area(s)	High, Moderate
Investigation area	Not applicable
Isolation risk	Not applicable
River flooding	5% chance of a flood this size or larger happening in any given year
Creek flooding	20% chance of a flood this size or larger happening in any given year
Overland flow	Applies. It is possible that flooding from a local waterway which has not yet been studied may also impact the property. Please contact Council for further advice. Overland flow is water (stormwater run-off) that travels over land during heavy rainfall events. It generally occurs quickly and for short durations.

Latest Flood Risk

The extract below comes from the flood risk map based on the latest (most recent) flood studies accepted by Council applicable for this property.



LEGEND

-  **High**
Floodwaters may be deep or fast flowing, or have a relatively high chance of occurrence (e.g. 80% chance in 30 years). Conditions may pose a risk to life and cause damage to buildings, possibly severe. Limited development may be considered if not increasing the flood risk exposure for people or property. These areas are generally better suited to environmental, recreational and some agricultural uses.
-  **Moderate**
Less frequently affected by flooding or if more frequent, with shallow or slower moving floodwater. Conditions may pose an unacceptable risk to people or property if not mitigated. Development may be tolerable if measures are taken to address flood impacts, protect people and limit damage.
-  **Low**
Extremely unlikely chance of flooding (1% chance or less over a 30 year period) and/or relatively shallow or benign flooding conditions. Development is generally acceptable except for essential community infrastructure (e.g. emergency services). Vulnerable uses (e.g. childcare, aged care) may be ok subject to building, site access and safe shelter mitigation measures. Shows the full floodplain under the largest flood that could conceivably occur.
-  **Investigation area**
Locations where a current flood study has not been delivered and information to determine flood risk is not available. The approximation of the floodplain in these areas is based on a citywide overland flow study. Development should avoid these areas until further investigation (updated flood study or localised risk assessment) is completed.



The flood studies this map is based on consider the impacts of climate change, as required by Queensland's planning legislation and policies. The map considers the whole floodplain for Logan and reflects a risk-based approach that takes into account:

- How likely a flood of a given size is in any given year, and
- What the impact or level of danger of that flood is.

Flood Levels

The table below displays flood levels from the most recently accepted flood studies affecting this property. To view the flood study documents please see the [Flood page](#) on Council's website.

The levels are measured in Australian Height Datum (AHD), where sea level is approximately zero (0) metres. The level displayed in the table below is the maximum flood level on the property for that event (likelihood). For some properties, particularly large properties or those on a significant slope, flood levels can vary significantly.

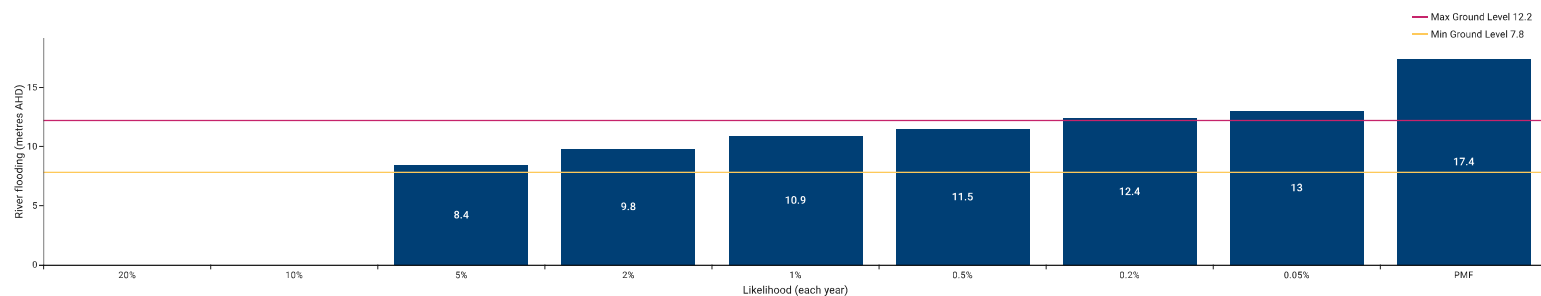
The most likely flood scenarios is shown at the top of the table, with the Probable Maximum Flood (PMF) at the bottom, being the least likely but most serious flood scenario.

Some properties may be impacted by only river flooding or only creek flooding, and some may be impacted by both. There may also be other sources of inundation that may impact the property and affect flood levels, based on overland flow or local creeks where studies have not yet been completed.

Study: Logan and Albert Rivers Flood Study 2023

Likelihood (each year)	River flooding
20% chance	Not applicable
10% chance	Not applicable
5% chance	8.4 metres AHD
2% chance	9.8 metres AHD
1% chance	10.9 metres AHD
0.5% chance	11.5 metres AHD
0.2% chance	12.4 metres AHD
0.05% chance	13.0 metres AHD
PMF	17.4 metres AHD

Flood and Ground Levels in metres AHD

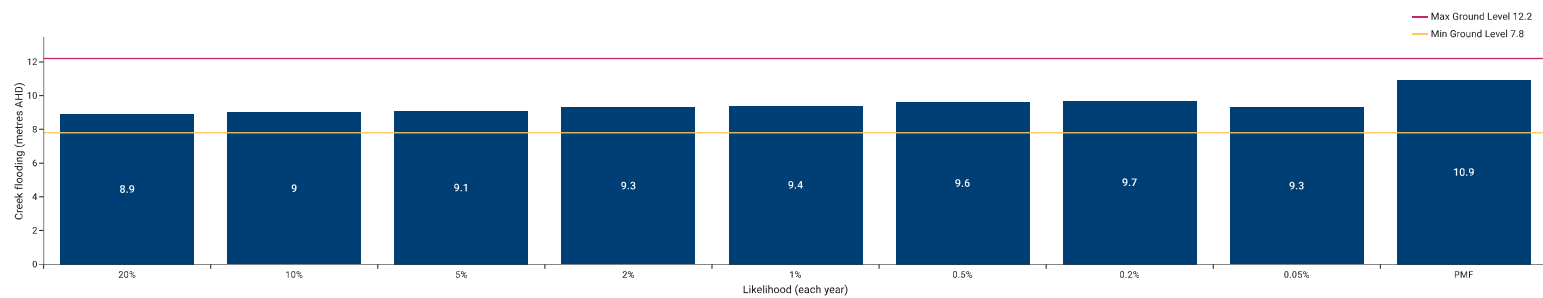


Study: Slacks and Scrubby Creek Flood Study 2023

Likelihood (each year)	Creek flooding
20% chance	8.9 metres AHD
10% chance	9.0 metres AHD
5% chance	9.1 metres AHD
2% chance	9.3 metres AHD
1% chance	9.4 metres AHD
0.5% chance	9.6 metres AHD
0.2% chance	9.7 metres AHD

Likelihood (each year)	Creek flooding
0.05% chance	9.3 metres AHD
PMF	10.9 metres AHD

Flood and Ground Levels in metres AHD



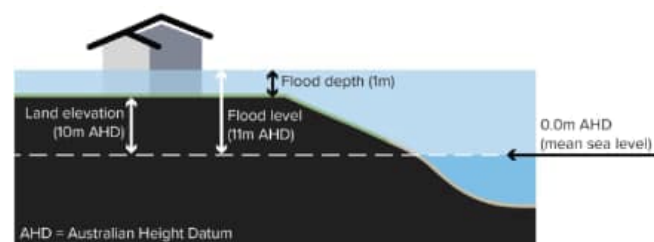
Ground Levels

Ground levels are based on an aerial LiDAR (Light Detection and Ranging) survey, which uses millions of laser point measurements to build a model of the ground surface. The source of the data is displayed in the table below so that you know when the survey was conducted.

Ground level	Details
Minimum ground level	7.8 metres AHD
Maximum ground level	12.2 metres AHD

Source: 2021 Digital elevation model (1 metre grid)

The projected flood depth (how deep the water may be above ground, in metres) is the difference between the flood levels in the section above and the ground levels in this table. The diagram below provides an example (land elevation is ground level).



Overland Flow

Overland flow is water (stormwater/rainfall run-off) that exceeds the capacity of drains, pipes and channels during heavy rainfall events and travels over land towards waterways. It generally occurs quickly and for shorter periods of time. The impact of overland flow is dependent on local conditions, so the mapping is a guide only. It is possible that flooding from a local waterway which has not yet been studied may also impact the property. Please contact Council for further advice.



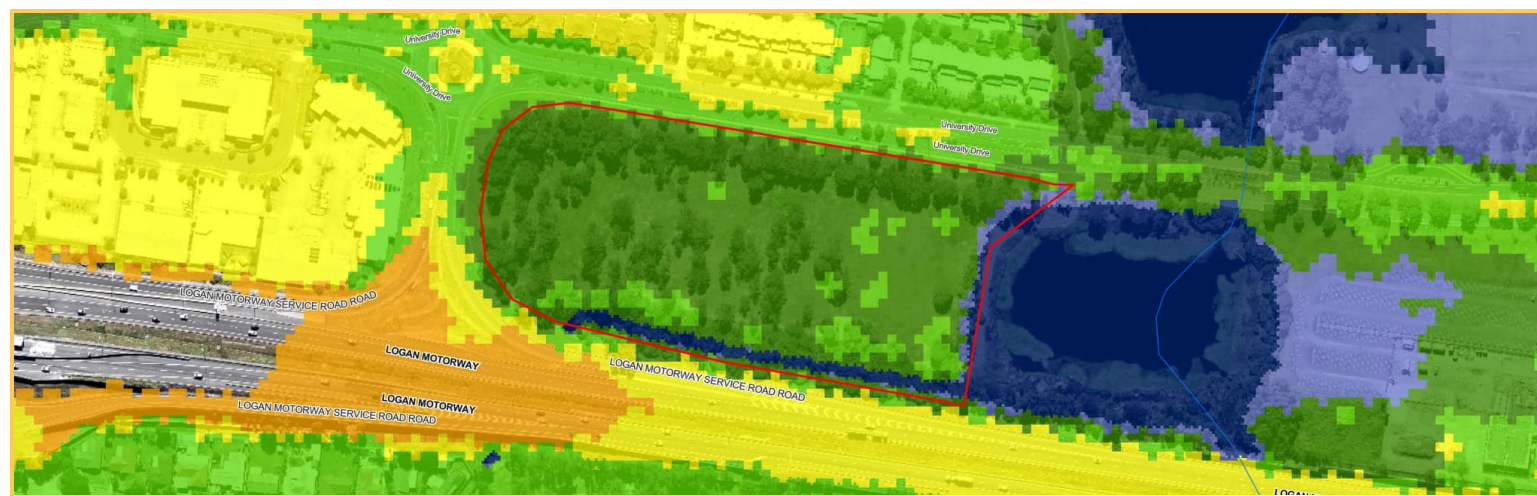
LEGEND



Overland flow extent (areas possibly impacted)

Future Climate Scenarios

This extract comes from the map showing the projected extent of flooding (affected areas) for multiple flood scenarios for all relevant flood studies, **including the projected impacts of climate change**. This map corresponds with the flood levels provided in the table above for the 5%, 2%, 1%, 0.5%, 0.05% and Probable Maximum Flood (PMF) scenarios.



LEGEND

5% chance

The areas modelled to be impacted by a flood that has a 5% (or 1 in 20) chance of happening in any given year, or 80% chance over a 30 year period, which is the common term of a mortgage. This modelling **includes the impacts of climate change** and represents our understanding of future risk.

2% chance

The areas modelled to be impacted by a flood that has a 2% (or 1 in 50) chance of happening in any given year, or 45% chance over a 30 year period, which is the common term of a mortgage. This modelling **includes the impacts of climate change** and represents our understanding of future risk.

1% chance

The areas modelled to be impacted by a flood that has a 1% (or 1 in 100) chance of happening in any given year, or 25% chance over a 30 year period, which is the common term of a mortgage. This modelling **includes the impacts of climate change** and represents our understanding of future risk.

0.5% chance

The areas modelled to be impacted by a flood that has a 0.5% (or 1 in 200) chance of happening in any given year, or 15% chance over a 30 year period, which is the common term of a mortgage. This modelling **includes the impacts of climate change** and represents our understanding of future risk.

0.05% chance

The areas modelled to be impacted by a flood that has a 0.05% (or 1 in 2000) chance of happening in any given year. This is an extremely unlikely flood event with a 1% chance of happening over a 30 year period, not including the impacts of climate change.

PMF

The PMF or probable maximum flood scenario represents the full extent of the floodplain, or the most serious flood that could be expected to occur. This is usually estimated based on the probable maximum rainfall, not including the impacts of climate change.

Investigation area

Locations where a current flood study has not been delivered and information to determine flood risk is not available. The approximation of the floodplain in these areas is based on a citywide overland flow study. Further investigation is needed.

Current Climate Scenarios

This extract comes from the map showing flood affected areas **without** considering the impacts of climate change. This map represents modelled flooding under current conditions, and can be used for insurance purposes.



LEGEND

5% chance

The areas modelled to be impacted by a flood that has a 5% (or 1 in 20) chance of happening in any given year, or 80% chance over a 30 year period, which is the common term of a mortgage. This modelling is based on **current (present day) conditions** and does not take into account the impacts of climate change.

2% chance

The areas modelled to be impacted by a flood that has a 2% (or 1 in 50) chance of happening in any given year, or 45% chance over a 30 year period, which is the common term of a mortgage. This modelling is based on **current (present day) conditions** and does not take into account the impacts of climate change.

1% chance

The areas modelled to be impacted by a flood that has a 1% (or 1 in 100) chance of happening in any given year, or 25% chance over a 30 year period, which is the common term of a mortgage. This modelling is based on **current (present day) conditions** and does not take into account the impacts of climate change.

0.5% chance

The areas modelled to be impacted by a flood that has a 0.5% (or 1 in 200) chance of happening in any given year, or 15% chance over a 30 year period, which is the common term of a mortgage. This modelling is based on **current (present day) conditions** and does not take into account the impacts of climate change.

0.05% chance

The areas modelled to be impacted by a flood that has a 0.05% (or 1 in 2000) chance of happening in any given year. This is an extremely unlikely flood event with a 1% chance of happening over a 30 year period, not including the impacts of climate change.

PMF

The PMF or probable maximum flood scenario represents the full extent of the floodplain, or the most serious flood that could be expected to occur. This is usually estimated based on the probable maximum rainfall, not including the impacts of climate change

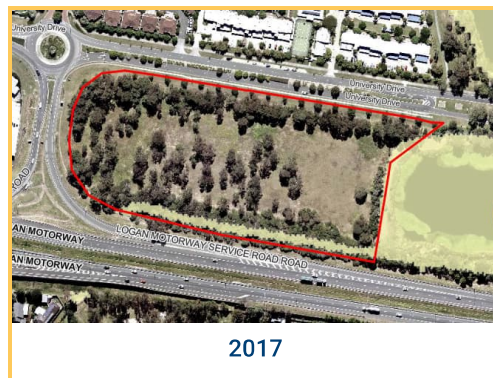
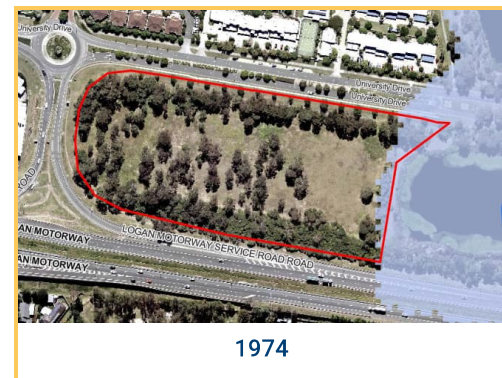
Investigation area

Locations where a current flood study has not been delivered and information to determine flood risk is not available. The approximation of the floodplain in these areas is based on a citywide overland flow study. Further investigation is needed.

Historic Flood Events

Based on the best information available to Council, the table below indicates whether or not the selected property may have been impacted by significant historic flood events. It is possible that other creek flooding or overland flow, which is not included in Council's mapping of these events, may have impacted the property.

Flood event	Property impacted
1974	Yes
2017 (after ex Tropical Cyclone Debbie)	Yes
2022 (late February / early March)	Yes



Planning Scheme Maps

The selected property is shown below on an extract of the Flood Overlay Maps from the Logan Planning Scheme 2015 V9.2 with TLPI No. 1/2024. Various provisions of the planning scheme which refer to properties affected by the Flood Overlay Maps will apply to the flood affected areas for the purposes of planning and development. This may include, for example, raised building floor levels and achieving safe vehicle access to the road network.

OM-05.01 Isolated islands



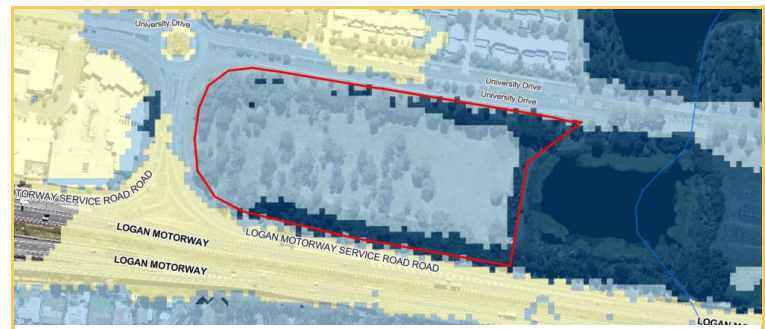
OM-05.02 High flow area



OM-05.03 Meadowbrook flood assessment area



OM-05.04 Flood risk areas



MAP LEGEND

-  **High**
 Floodwaters may be deep or fast flowing, or have a relatively high chance of occurrence (e.g. 80% chance in 30 years). Conditions may pose a risk to life and cause damage to buildings, possibly severe. Limited development may be considered if not increasing the flood risk exposure for people or property. These areas are generally better suited to environmental, recreational and some agricultural uses.
-  **Moderate**
 Less frequently affected by flooding or if more frequent, with shallow or slower moving floodwater. Conditions may pose an unacceptable risk to people or property if not mitigated. Development may be tolerable if measures are taken to address flood impacts, protect people and limit damage.
-  **Low**
 Extremely unlikely chance of flooding (1% chance or less over a 30 year period) and/or relatively shallow or benign flooding conditions. Development is generally acceptable except for essential community infrastructure (e.g. emergency services). Vulnerable uses (e.g. childcare, aged care) may be ok subject to building, site access and safe shelter mitigation measures. Shows the full floodplain under the largest flood that could conceivably occur.
-  **Investigation area**
 Locations where a current flood study has not been delivered and information to determine flood risk is not available. The approximation of the floodplain in these areas is based on a citywide overland flow study. Development should avoid these areas until further investigation (updated flood study or localised risk assessment) is completed.

MAP LEGEND



High flow area

High hazard areas of flooding where significant (deeper, faster) flow of water occurs and in which a building is vulnerable to structural damage or failure from floodwater. Classified as H5 or H6 in the Australian Institute of Disaster Resilience (AIDR) Guideline 7-3 'Flood Hazard'.



High flood island

Areas which are isolated from flood-free land (surrounded by floodwater) but retain a portion of the area as flood free in a probable maximum flood (PMF).



Low flood island

Areas which are surrounded by floodwater and at first isolated from flood-free land, then completely inundated by floodwater (submerged) as the flood continues to rise.



Meadowbrook flood assessment area

Area where the function of important community infrastructure needs to be maintained. Flood mitigation measures and comprehensive emergency management planning is required to adequately manage the risk for flood events.



If more recent flood studies have been completed and accepted by Council, the Latest Flood Risk Map shown at the top of this report may be different from the planning scheme map. The latest flood information should be used to inform development decisions and will be incorporated into the planning scheme in a future amendment.

Further Information

1. Floods are highly unpredictable and variable, and properties may be affected by other sources of potential flooding. Each flood and its impact is different. Areas that were not flooded previously may be affected by future events. Areas that have been previously flooded may be impacted in different ways. This online report cannot take all of this into account.
2. The flood mapping and levels in this report are based on data from flood studies undertaken at a particular time and are subject to change. For example, if the method for calculating flood levels is updated, industry guidelines are updated or more recent information becomes available, this may result in changes to the information in this report. In areas where development is ongoing, the flood mapping and levels may not reflect developed conditions.
3. Flood studies do not create risk. They help us to understand the risk, based on relevant legislation and Queensland Government policies and guidelines. Flood studies also consider a range of other factors such as rainfall and river level information from recent events, climate change and trends, the impacts of development, changes to catchment conditions, new technologies and industry best practice (which help to improve accuracy).
4. Flood studies and models are developed from the best information available at the time. They do not tell you how the flood waters might behave, how quickly they may rise, or how dangerous the flooding will be. The models also cannot represent changes that have occurred since they were developed which may impact flood behaviour, such as earthworks, new developments or road infrastructure.
5. This report is not a substitute for independent professional advice. You should engage the services of a Registered Professional Engineer of Queensland (RPEQ) to get site specific information regarding the flood risk to your property, and how that might affect any proposed building or development work.
6. While Logan City Council takes reasonable care in producing this report, it does not guarantee that the information is accurate, complete or current. Logan City Council does not accept any responsibility for any loss or damage (however it was caused) in connection with the use of or reliance on the information in this report.

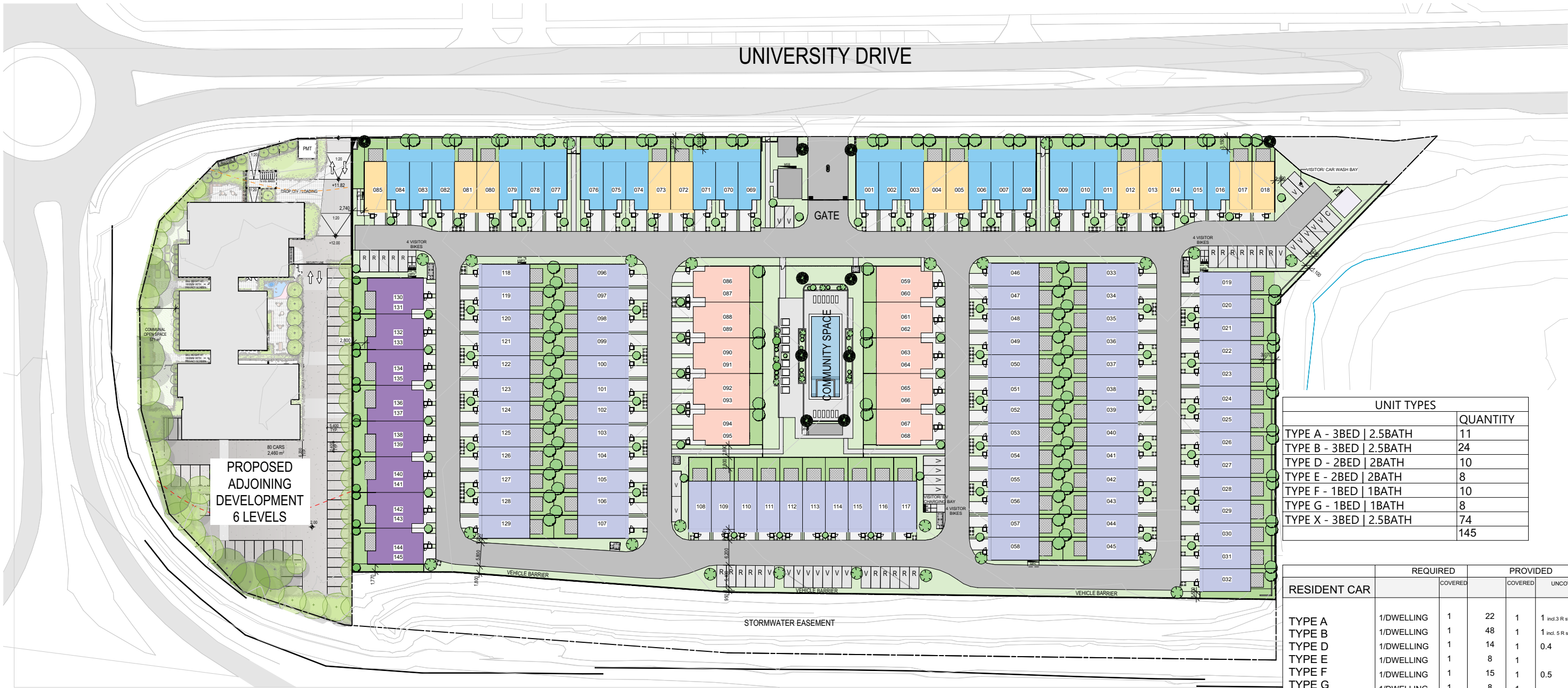
Contact Information

Where to go for further information depends on the type of information you need. Please refer to the [Flood Risk Fact Sheet](#) or contact Council using the details below.

Topic	Contact Details
Flood studies and modelling information, and the flood risk on your property	Contact Council on 07 3412 3412 or email council@logan.qld.gov.au . Further information about flooding and flood studies is available on the Flood page on Council's website.
Planning and development enquiries or proposals	Contact Council on 07 3412 3412 or email development@logan.qld.gov.au . Before lodging a development application, pre-lodgement advice is recommended.
Building information	Contact Council on 07 3412 3412 or email council@logan.qld.gov.au . You can also contact a private building certifier .
Properties in Priority Development Areas	Contact Economic Development Queensland . Council is not the planning authority for these properties.
Independent advice about flooding on your property	Contact a registered engineer through the Board of Professional Engineers of Queensland: Phone: 07 3210 3100 Email: admin@bpeq.qld.gov.au Web: Home - Board of Professional Engineers Queensland (bpeq.qld.gov.au)

APPENDIX C

DEVELOPMENT PROPOSAL



UNIT TYPES		QUANTITY
TYPE A - 3BED | 2.5BATH		11
TYPE B - 3BED | 2.5BATH		24
TYPE D - 2BED | 2BATH		10
TYPE E - 2BED | 2BATH		8
TYPE F - 1BED | 1BATH		10
TYPE G - 1BED | 1BATH		8
TYPE X - 3BED | 2.5BATH		74
		145

RESIDENT CAR		REQUIRED		PROVIDED	
			COVERED	COVERED	UNCOVERED
TYPE A	1/DWELLING	1	22	1	1 incl.3 R street car bay
TYPE B	1/DWELLING	1	48	1	1 incl. 5 R street car bay
TYPE D	1/DWELLING	1	14	1	0.4
TYPE E	1/DWELLING	1	8	1	
TYPE F	1/DWELLING	1	15	1	0.5
TYPE G	1/DWELLING	1	8	1	
TYPE X	1/DWELLING	1	148	1	1 incl.14 R street car bay
TOTAL		145	145	263	145
VISITOR CAR CARETAKER WASHING BAY EV				1/6 DWELLING (INCL. 2 AT MANAGERS)	
				1	
				1	
				1	
TOTAL				26	
VISITOR BIKE	1/12 DWELLING				
TOTAL		12		12	

1 SITE PLAN - MASTER PLAN
SCALE 1:500 @ A1
SCALE 1:1000 @ A3

SITE COVER(m2)
10,831.43 29.7%

SOFT LANDSCAPING(m2)
11,503.83 31.4%

COTTEEPARKER

BRISBANE
T 61 7 3846 7422
COTTEE PARKER ARCHITECTS PTY LTD
ABN 77 010 924 106
COTTEEPARKER.COM.AU

ÄZURE

0 5 10 15 20 25 30 35 40 45 50
SCALE 1:500 @ A1
SCALE 1:1000 @ A3



GENERAL NOTES
1. Clouing, and the description of 'changes' in the title block, is for guidance only and may not cover all edits to the drawing since last issue.
2. Cottee Parker Architects Pty Ltd asserts copyright of this drawing. It may not be used, retained or copied without permission.

BIMcloud: CPACLBIMM01 - BIMcloud2500/7913 35 University Dr Meadowbrook Master: 26/08/20: 5:32 PM

LOGAN MOTORWAY

35 UNIVERSITY DRIVE

35 UNIVERSITY DRIVE, MEADOWBROOK

CLIENT - AZURE PROPERTY

DRAWING TITLE

MASTERPLAN AND DEVELOPMENT SUMMARY

JOB No

7913

DRAWING No

SD1002

ISSUE

C

SD

APPENDIX D

CIVIL SITEWORKS CONCEPT PLAN

LEGEND - CONCEPT PLAN

PROPOSED

PROPOSED STORMWATER DRAINAGE

PROPOSED VEHICULAR PAVEMENT

PROPOSED SLAB LEVEL

PROPOSED LEVEL

PROPOSED WATER SERVICE

PROPOSED SANITARY DRAINAGE

PROPOSED WATER

RL XXX

XXX.XXX

W

HD

CW

EXISTING

EXISTING ELECTRICITY

EXISTING TELSTRA

EXISTING GAS

EXISTING STORMWATER DRAINAGE

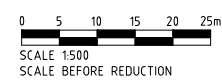
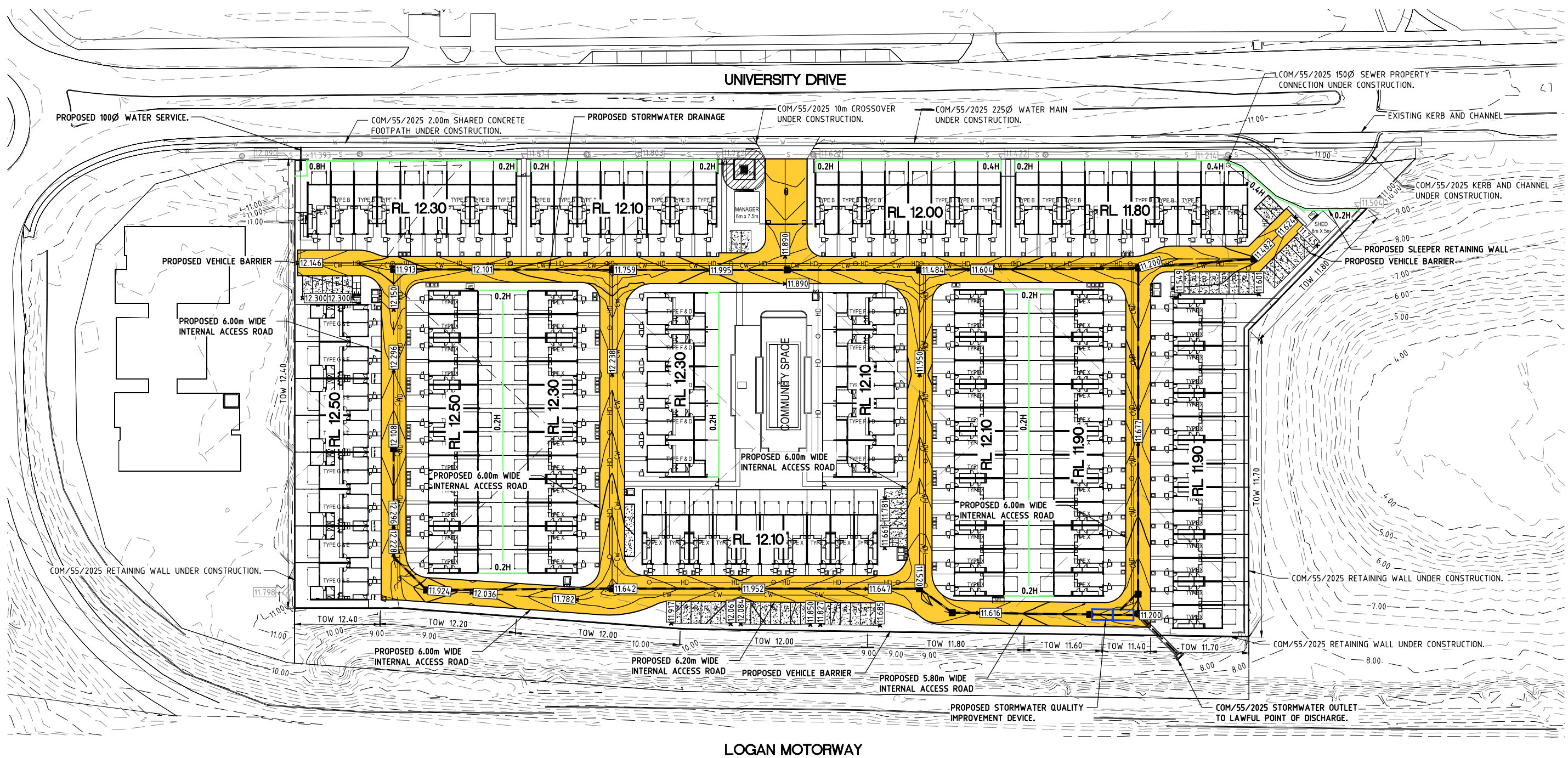
EXISTING SPOT LEVEL

EXISTING SEWER

EXISTING WATER

EXISTING KERB/KERB & CHANNEL

EXISTING CONTOUR



GENERAL NOTES
DIMENSIONS TO BE VERIFIED ON SITE PRIOR TO COMMENCEMENT. PREPARATION OF SHOP DRAWINGS OR MANUFACTURING FIGURED DIMENSIONS TAKE PRECEDENCE OVER SCALING. VERIFY LOCATION OF EXISTING SERVICES BEFORE COMMENCEMENT.
ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE BUILDING CODE OF AUSTRALIA, BUILDING ACT 1975 AS AMENDED, STANDARD BUILDINGS BY LAWS AND RELEVANT AUSTRALIAN STANDARDS.
ALL WORKS ARE TO BE CONSTRUCTED TO THE SATISFACTION OF RELEVANT AUTHORITIES.
THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING NECESSARY PERMITS, AUTHORISATION AND SUBSEQUENT INSPECTIONS AS REQUIRED BY RELEVANT AUTHORITIES.

2	20.08.26	DEVELOPMENT APPLICATION
1	19.08.28	DEVELOPMENT APPLICATION
REV	ISSUE DATE	REVISION

CONSULTANT: **DEQ** DESIGN ENGINEERS QUEENSLAND
Consulting Engineers
Civil, Structural and Soil Testing
DEQ Consulting Pty Ltd t/a ABN 53 065 711 248 E: soiltesting@deq.com.au

JOB NO. 22.3273
5 Parkview Street
Milton Qld, 4064
P: (07) 3367 0211
F: (07) 3367 0205
W: www.deq.com.au
E: civil@deq.com.au

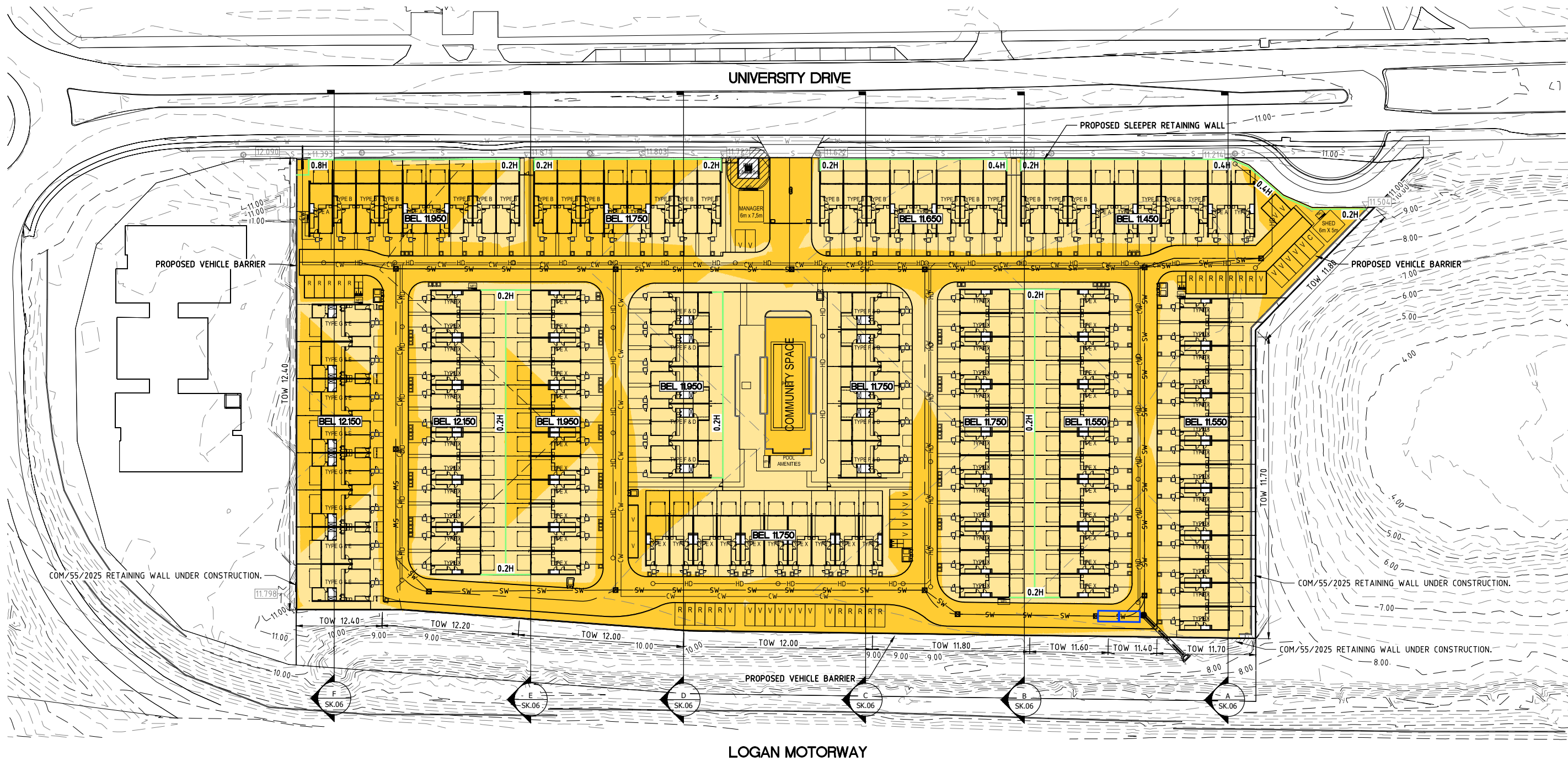
DEVELOPED BY: **ÀZURE**
AZD.COM.AU

PROJECT: **35 UNIVERSITY DRIVE MEADOWBROOK**

DRAWN BY: MN
AZD JOB No.: P25025
SCALE: AS SHOWN
DRAWING TITLE: **CIVIL SITEWORKS CONCEPT PLAN**
DRAWING No.: DA-C-001
REVISION: 2

LEGEND - EARTHWORKS

- 9.0
30.98
- EXISTING CONTOURS
EXISTING SPOT LEVEL
- PROPOSED CUT AREA
- PROPOSED FILL AREA
- BEL 0.000
- 0.00H
- PROPOSED BULK EARTHWORKS PAD
PROPOSED SLEEPER RETAINING WALL
PROPOSED RETAINING HEIGHT



0 5 10 15 20 25m

SCALE 1:500

SCALE BEFORE REDUCTION

GENERAL NOTES

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1 19.08.26 DEVELOPMENT APPLICATION

REV ISSUE DATE REVISION

CONSULTANT:

DEQ DESIGN ENGINEERS QUEENSLAND

Consulting Engineers

Civil, Structural and Soil Testing

DEQ Consulting Pty Ltd t/a ABN 53 065 711 248 E: soiltesting@deg.com.au

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E: civil@deg.com.au

DEVELOPED BY:

ÀZURE

AZD.COM.AU

PROJECT:

ADDRESS:
**35 UNIVERSITY DRIVE
MEADOWBROOK**

DRAWN BY: MN

AZD JOB No.: P25025

SCALE: AS SHOWN

DRAWING TITLE:
**BULK EARTHWORKS
CONCEPT PLAN**

DRAWING No.: DA-C-005

REVISION: 2

LEGEND - EARTHWORKS SECTIONS

- RL 9.129

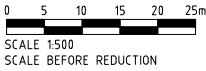
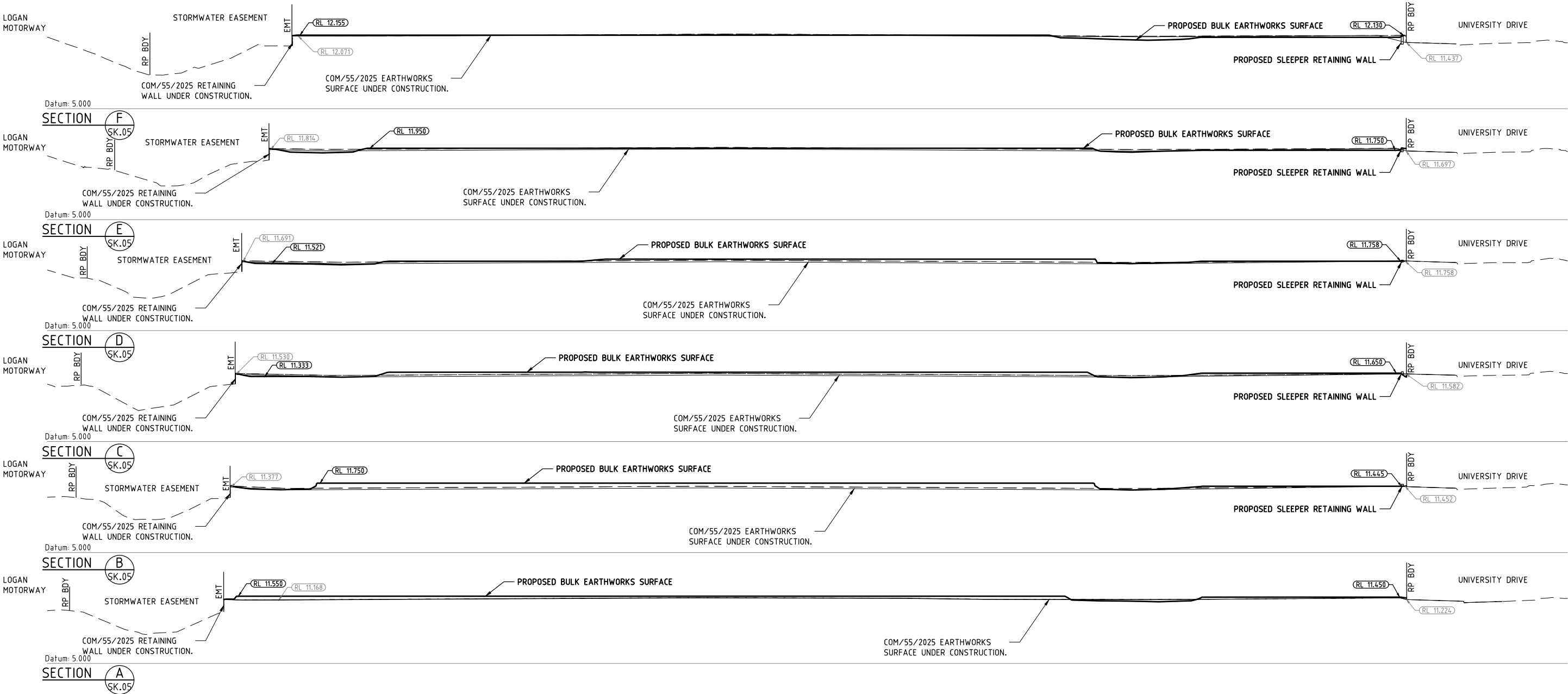
RL 6.948

- EXISTING LEVELS

PROPOSED BULK EARTHWORKS LEVELS

EXISTING SURFACE PROFILE

PROPOSED BULK EARTHWORKS PROFILE



GENERAL NOTES

DIMENSIONS TO BE VERIFIED ON SITE PRIOR TO COMMENCEMENT. PREPARATION OF SHOP DRAWINGS OR MANUFACTURING FIGURED DIMENSIONS TAKE PRECEDENCE OVER SCALING.

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REV	ISSUE DATE	REVISION

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E: structural@deq.com.au
E: civil@deq.com.au

DEVELOPED BY: **ÀZURE**

AZD.COM.AU

PROJECT:

ADDRESS:
**35 UNIVERSITY DRIVE
MEADOWBROOK**

DRAWN BY: **MN** AZD JOB No.: **P25025** SCALE: **AS SHOWN**

DRAWING TITLE:
**BULK EARTHWORKS
CONCEPT SECTIONS**

DRAWING No.: **DA-C-006** REVISION: **2**

APPENDIX E

EROSION AND SEDIMENT CONTROL INSPECTION CHECKLISTS

DAILY SITE INSPECTION

LOCATION

SITE SUPERVISOR **DATE**

SIGNATURE

Legend: ☐ OK ☐ Not OK N/A Not applicable

Item	Consideration	Assessment
1	All tradespeople working on the site have been informed of the erosion and sediment control requirements of the site.	.....
2	All required builder identification, safety notices, and pollution (e.g. litter and sediment control) management signs are visible.	.....
3	The work site and all erosion and sediment control measures do not represent a safety risk to tradespeople or the public.	.....
4	Public roadways are clear of sediment.	.....
5	Turfing on the footpath area is clear of sediment, sand and mud.	.....
6	Entry/exit pads are clear of excessive sediment deposition.	.....
7	Entry/exit pads have adequate available void spacing to trap sediment.	.....
8	The construction site is clear of litter and unconfined rubbish.	.....
9	Long-term (> 24 hours) soil/sand stockpiles are protected from wind, rain, and stormwater flow.	.....
10	At end of day, all short-term soil/sand stockpiles located	

- outside the sediment control zone have been removed and cleaned.
- 11 No dust problems exist on the site.
- 12 Up-slope “clean” water is being appropriately diverted through the site in a non-erosive manner.
- 13 Drainage lines are free of soil scour and sediment deposition.
- 14 Stormwater flow down exposed earth batters does not cause erosion.
- 15 Appropriate erosion controls of all finished soil disturbances have been discussed with the client.
- 16 Sediment fences have been correctly installed (e.g. fabric buried and standing up-slope of stakes) and are free of damage.
- 17 Sediment fences have been installed in a manner that will allow sediment-laden stormwater to temporarily pond and settle behind the fence rather than flow around the fence.
- 18 Appropriate sediment controls have been placed adjacent to, or around, stormwater inlets—as appropriate for the type of inlet.
- 19 All sediment traps are free of excessive sediment deposition.
- 20 Finished service trenches have been appropriately backfilled, compacted and stabilised.
- 21 All reasonable and practicable measures are being taken to control sediment runoff from the site.
- 22 The site is adequately prepared for potential storms.
- 23 Adequate stockpiles exist of ESC materials, such as extra sediment fence fabric.
- 24 Temporary downpipes have been correctly connected to any installed roof gutters.

WEEKLY SITE INSPECTION

LOCATION

INSPECTION OFFICER DATE

SIGNATURE

Legend: ☐ OK ☐ Not OK N/A Not applicable

Item	Consideration	Assessment
1	Public roadways clear of sediment.	.....
2	Entry/exit pads clear of excessive sediment deposition.	.....
3	Entry/exit pads have adequate void spacing to trap sediment.	.....
4	The construction site is clear of litter and unconfined rubbish.	.....
5	Adequate stockpiles of emergency ESC materials exist on site.	.....
6	Site dust is being adequately controlled.	.....
7	Appropriate drainage and sediment controls have been installed prior to new areas being cleared or disturbed.	.....
8	Up-slope "clean" water is being appropriately diverted around/through the site.	.....
9	Drainage lines are free of soil scour and sediment deposition.	.....
10	No areas of exposed soil are in need of erosion control.	.....
11	Earth batters are free of "rill" erosion.	.....
12	Erosion control mulch is not being displaced by wind or water.	.....
13	Long-term soil stockpiles are protected from wind, rain and stormwater flow with appropriate drainage and	.....

erosion controls.

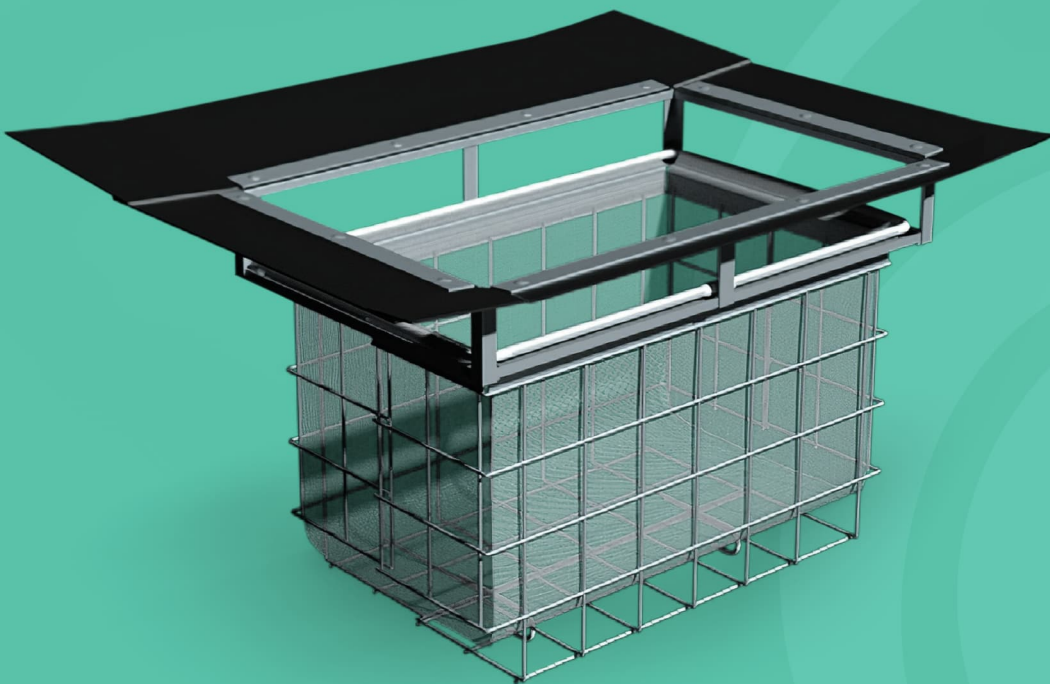
- | | | |
|----|--|-------|
| 14 | Sediment fences are free from damage. | ..... |
| 15 | Sediment-laden stormwater is not simply flowing “around” the sediment fences or other sediment traps. | ..... |
| 16 | Sediment controls placed up-slope/around stormwater inlets are appropriate for the type of inlet structure. | ..... |
| 17 | All sediment traps are free of excessive sediment deposition. | ..... |
| 18 | The settled sediment layer within a sediment basin is clearly visible through the supernatant prior to discharge such water. | ..... |
| 19 | All reasonable and practicable measures are being taken to control sediment runoff from the site. | ..... |
| 20 | All soil surfaces are being appropriately prepared (i.e. pH, nutrients, roughness and density) prior to revegetation. | ..... |
| 21 | Stabilised surfaces have a minimum 70% soil coverage. | ..... |
| 22 | The site is adequately prepared for imminent storms. | ..... |
| 23 | All ESC measures are in proper working order. | ..... |

APPENDIX F

STORMWATER QUALITY MANAGEMENT

OceanGuard®

Operations & Maintenance Manual



Stopping Pollution Entering Waterways



www.oceanprotect.com.au

Introduction	3
Health and Safety	4
How does it work?	5
Maintenance Procedures	6
Maintenance Services	7



Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes for the OceanGuard® as recommended by the manufacturer (Ocean Protect).

The OceanGuard® technology is a gully pit basket designed to fit within new and existing gully pits to remove pollution from stormwater runoff. The system has a choice of filtration liners, designed to remove gross pollutants, solids, and other attached pollutants as either a standalone technology or as part of a 'treatment train' (e.g. with StormFilter®, Jellyfish® or biofiltration). OceanGuards are highly effective, easy to install and simple to maintain.

Why do I need to perform maintenance?

Adhering to the inspection and maintenance schedule of any stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most importantly ensures the long term effective operation of the OceanGuard®.

Health and Safety

Access to pits containing an OceanGuard® typically requires removing (heavy) access covers/grates, but typically it is not necessary to enter into a confined space. Pollutants collected by the OceanGuard® will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or sharp objects such as broken glass and syringes. For these reasons, there should be no primary contact with the waste collect and all aspects of maintaining and cleaning your OceanGuard® require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel, as a result it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the OceanGuard®, precautions should be taken in order to minimise (or when possible prevent) contact with sediment and other captured pollutants by maintenance personnel. In order to achieve this the following personal protective equipment (PPE) is recommended:

- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

The OceanGuard® is designed to be maintained from surface level, without the need to enter the pit. However depending on the installation configuration, location and site specific maintenance requirements it may be necessary to enter a confined space occasionally. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry.

How does it work?

OceanGuard® is designed to intercept stormwater as it enters the stormwater pits throughout a site. The OceanGuard® has diversion panels that sit flush with the pit walls, this ensures that as stormwater enters at the top of the pit it is directed to the middle of the insert where the Filtration bag is situated. The filtration bag allows for screening to occur removing 100% of pollutants greater than the opening of the filtration material (200micron, 1600micron bags available).

During larger rain events the large flows overflow slots in the flow diverter of the OceanGuard® ensure that the conveyance of stormwater is not impeded thus eliminating the potential for surface flooding. As the flow subsides, the captured pollutants are held in the OceanGuard® filtration bag. The waste then starts to dry which reduces the magnitude of organic material decomposition transitioning between maintenance intervals.

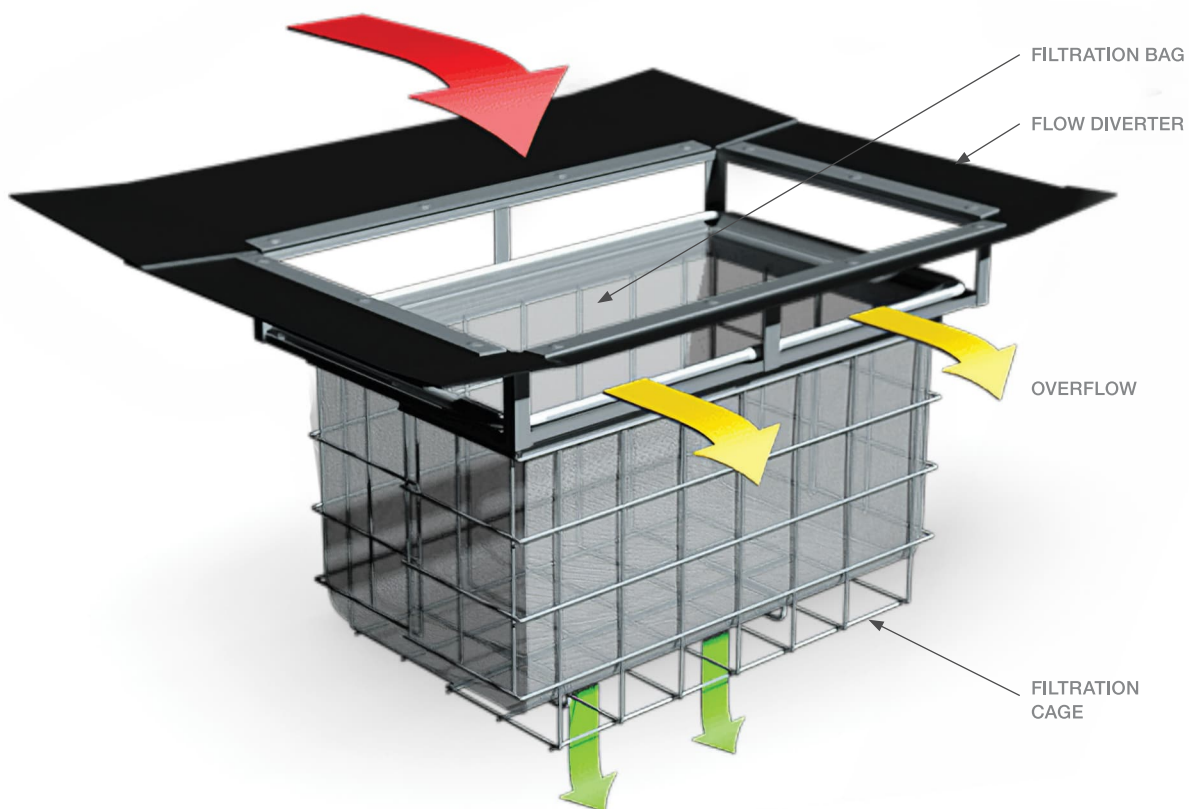


Figure 1: OceanGuard® components

Maintenance Procedures

To ensure that each OceanGuard® achieves optimal performance, it is advisable that regular maintenance is performed. The OceanGuard® requires 1-6 minor services annually (3 to 4 typical), pending the outcome of these inspections additional maintenance servicing may be required.

Primary types of maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the OceanGuard®.

Service Type	Description of Typical Activities	Frequency
Minor Service	Filter bag inspection and evaluation Removal of capture pollutants Disposal of material	1-6 Times Annually
Major Service	Filter Bag Replacement Support frame rectification	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Minor Service

This service is designed to return the OceanGuard® back to optimal operating performance. This type of service can be undertaken either by hand or with the assistance of a Vacuum unit.

Hand Maintenance

- 1 Establish a safe working area around the OceanGuard®
- 2 Remove access cover/grate
- 3 Use two lifting hooks to remove the filtration bag
- 4 Empty the contents of the filtration bag into a disposal container
- 5 Inspect and evaluate the filtration bag
- 6 Inspect and evaluate remaining OceanGuard® components (i.e. flow diverter, filtration cage and supporting frame)
- 7 Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
- 8 Re-install filtration bag and replace access cover/grate

Vacuum Maintenance

- 1 Establish a safe working area around the OceanGuard®
- 2 Remove access cover/grate
- 3 Vacuum captured pollutants from the filtration bag
- 4 Remove filtration bag
- 5 Inspect and evaluate the filtration bag
- 6 Inspect and evaluate remaining OceanGuard® components (i.e. flow diverter, filtration cage and supporting frame)
- 7 Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
- 8 Re-install filtration bag and replace access cover/grate

Major Service (Filter Bag Replacement)

For the OceanGuard®, a major service is a reactionary process based on the outcomes from the minor service.

Trigger Event from Minor Service	Maintenance Action
Filtration bag inspection reveals damage	Replace the filtration bag ^[1]
Component inspection reveals damage	Perform rectification works and if necessary replace components ^[1]

^[1] Replacement filtration bags and components are available for purchase from Ocean Protect

Additional Types of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, all OceanGuard® pits that potentially received flow should be inspected and cleaned. Specifically, all captured pollutants from within the filtration bag should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. All filtration bags should be rejuvenated (replaced if required) and re-installed.

Blockages

The OceanGuard's internal high flow bypass functionality is designed to minimise the potential of blockages/flooding and this configuration has been field proven for over twenty years. Flooding caused by an OceanGuard® style of pit basket is extremely rare and in the unlikely event that flooding occurs around the stormwater pit the following steps should be undertaken to assist in diagnosing the issue and implementing the appropriate response.

- 1 Inspect the OceanGuard® flow diverter, ensuring that they are free of debris and pollutants
- 2 Perform a minor service on the OceanGuard®
- 3 Remove the OceanGuard® to access the pit and inspect both the inlet and outlet pipes, ensuring they are free of debris and pollutants

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the OceanGuard® after a major storm event. The inspection should focus on checking for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants disposed.

Disposal of Waste Materials

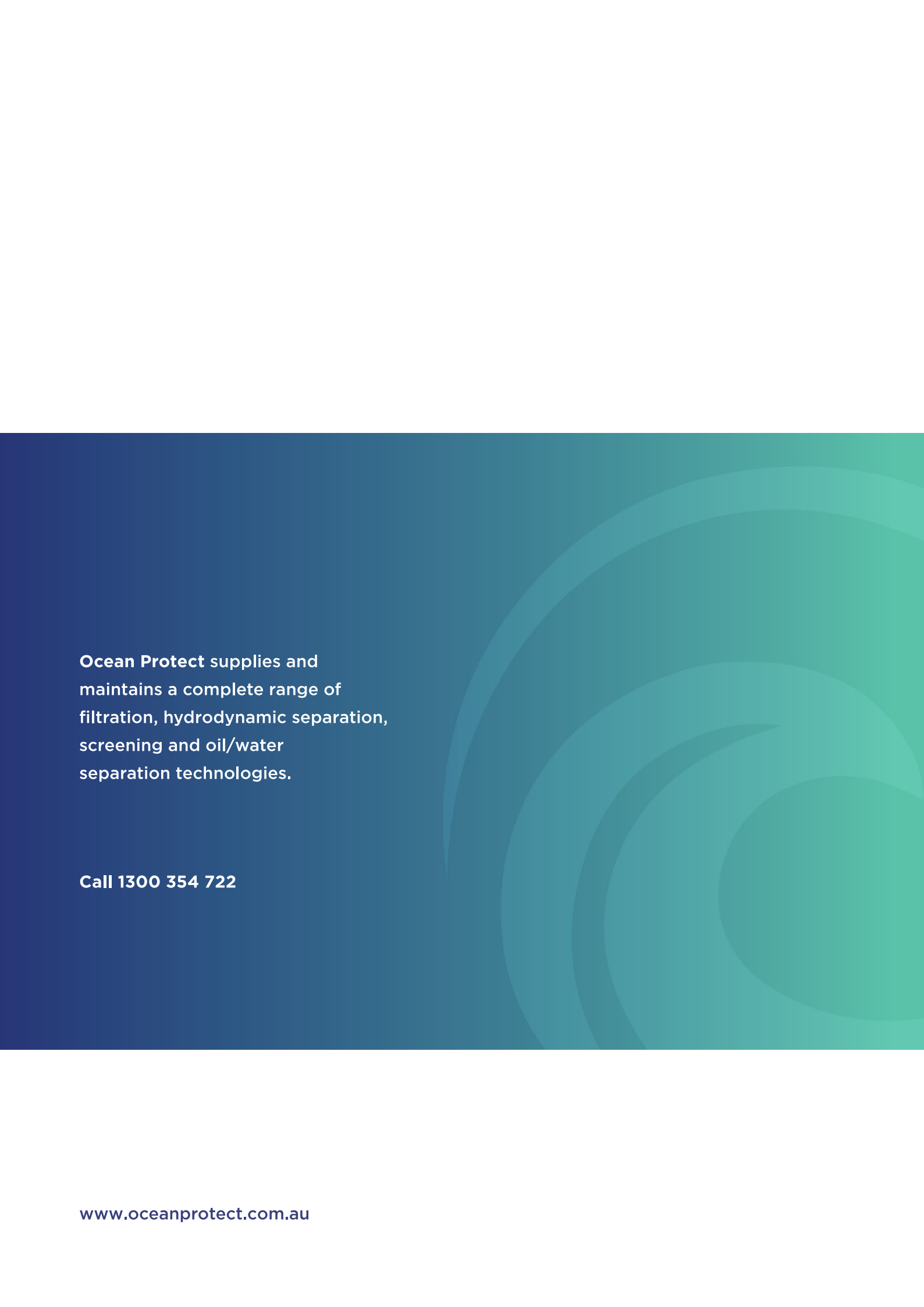
The accumulated pollutants found in the OceanGuard® must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filtration bag has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our OceanGuard®, we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement filter bags.

For more information please visit
www.oceanprotect.com.au



Ocean Protect supplies and maintains a complete range of filtration, hydrodynamic separation, screening and oil/water separation technologies.

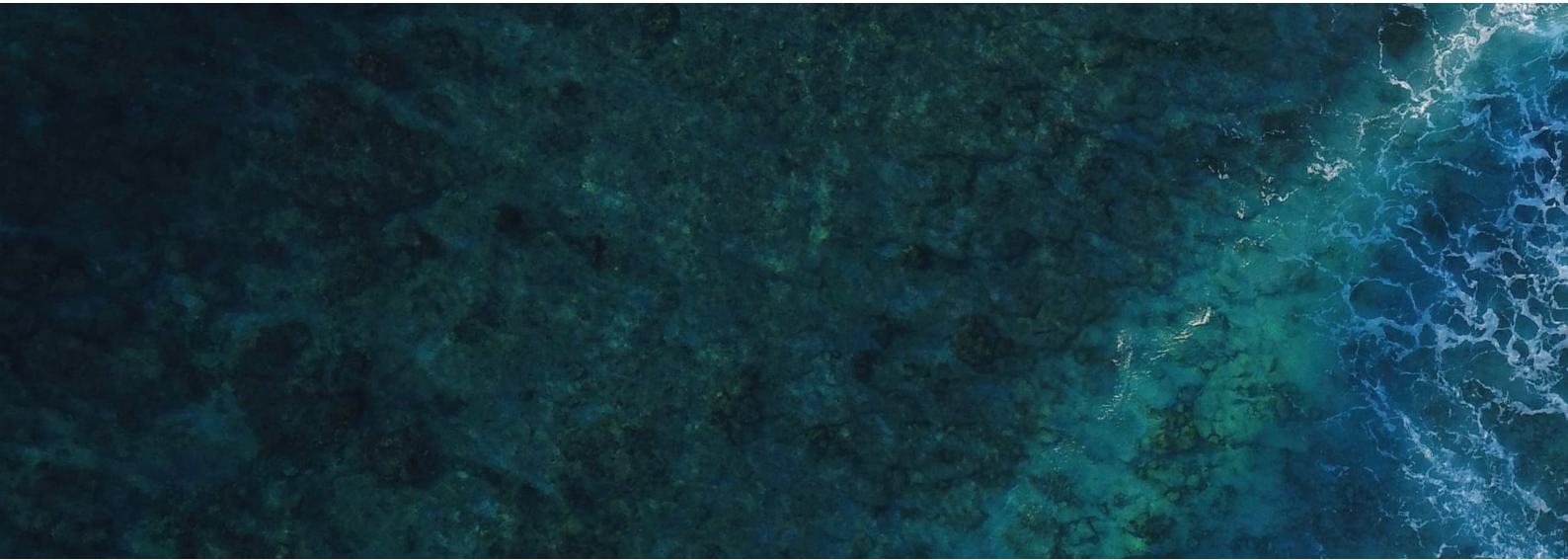
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StormFilter®

Operations & Maintenance Manual



Stopping Pollution Entering Waterways



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Introduction	3
Health and Safety	4
How does it work?	5
Maintenance Procedures	6
Maintenance Services	8



Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes for the StormFilter®, as recommended by us.

The StormFilter® is designed and sized to meet stringent regulatory requirements. It removes the most challenging target pollutants (including total suspended solids, soluble heavy metals, oil, particulate and soluble nutrients) using a variety of media. For more than two decades, StormFilter® has helped clients meet their regulatory needs and, through ongoing product enhancements, the design continues to be refined for ease of use and improved performance.

Why do I need to perform maintenance?

Adhering to the inspection and maintenance schedule of any stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the StormFilter®.

Health and Safety

Access to a StormFilter® system requires removing access covers/grates, and it is necessary to enter a confined space. Pollutants collected by the StormFilter® will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or objects such as broken glass and syringes. For these reasons, all aspects of maintaining and cleaning your StormFilter® require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel. As a result, it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the StormFilter®, precautions should be taken in order to minimise (or, if possible, prevent) contact with sediment and other captured pollutants by maintenance personnel. The following personal protective equipment (PPE) is subsequently recommended (but not limited to):

- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities, it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site-specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

Whilst some aspects of StormFilter® maintenance can be performed from surface level, there will be a need to enter the StormFilter® system (confined space) during a major service. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry applications.

How does it work?

During a storm, runoff percolates through the filtration media and starts filling the cartridge central tube. The air inside the hood is purged through a one-way check valve as the water rises. When water reaches the top of the float, buoyant forces pull the float free and allow filtered water to exit the cartridge.

A siphon is established within each cartridge that draws water uniformly across the full height of the media profile ensuring even distribution of pollutants and prolonged media longevity.

As the storm subsides and the water level in the structure starts falling, a hanging water column remains under the cartridge hood until the water level reaches the scrubbing regulators at the bottom of the hood. Air then rushes through the regulators breaking the siphon and creating air bubbles that agitate the surface of the filter media causing accumulated sediment to settle on the treatment chamber floor. This unique surface-cleaning mechanism helps prevent surface blinding and further extends cartridge life.

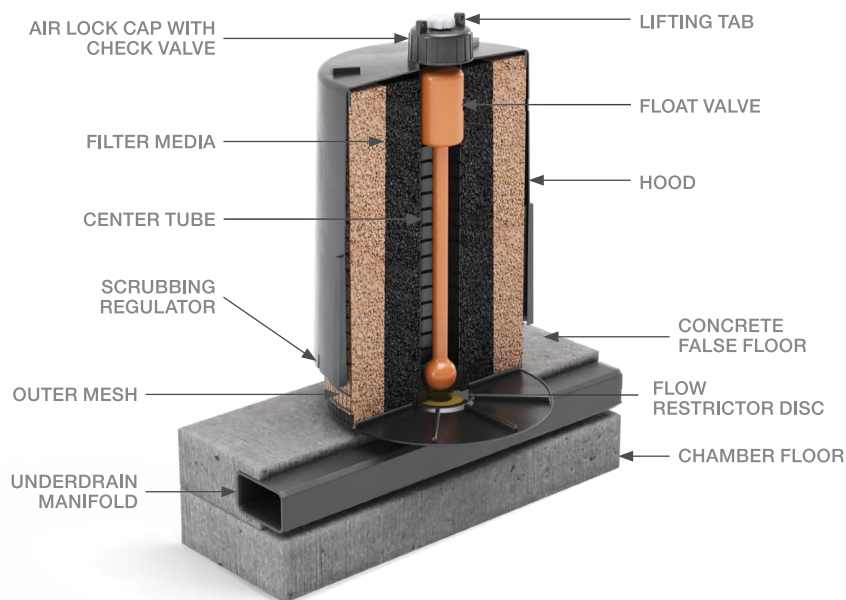


Figure 1: StormFilter® components

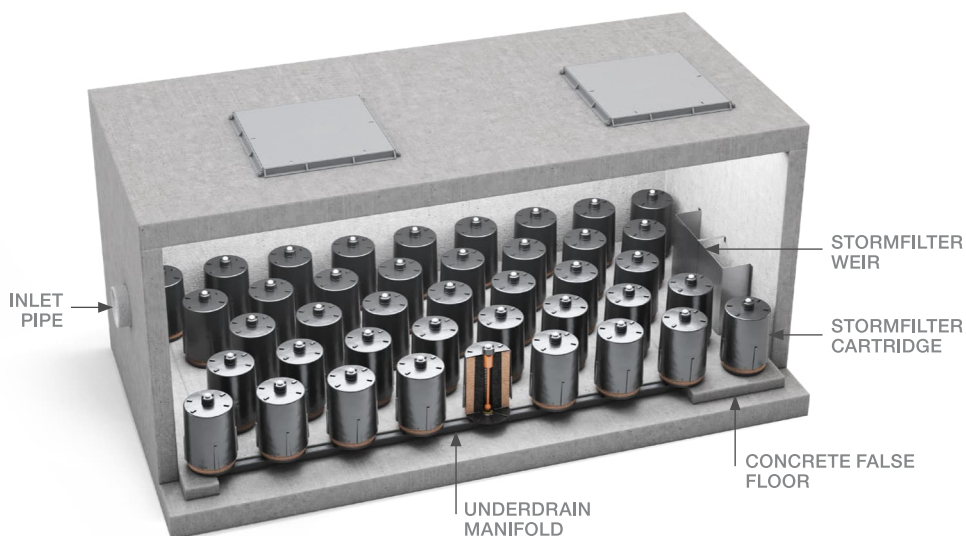


Figure 2: Example conceptual diagram of a StormFilter® system

Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically, the StormFilter® requires an inspection every 6 months with a minor service at 12 months. Additionally, as the StormFilter® cartridges capture pollutants the media will eventually become occluded and require replacement (expected media life is 1-3 years).

Primary types of maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the StormFilter®.

Service Type	Description of Typical Activities	Frequency
Inspection	Visual Inspection of cartridges & chamber Remove larger gross pollutants Perform minimal rectification works (if required)	Every 6 Months
Minor Service	Evaluation of cartridges and media Removal of accumulated sediment (if required) Wash-down of StormFilter® chamber (if required)	Every 12 Months
Major Service	Replacement of StormFilter® cartridge media	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Inspection

The purpose of the inspecting the StormFilter® system is to assess the condition of the StormFilter® chamber and cartridges. When inspecting the chamber, particular attention should be taken to ensure all cartridges are firmly connected to the connectors. It is also an optimal opportunity to remove larger gross pollutants and inspect the outlet side of the StormFilter® weir.

Minor Service

This service is designed to ensure the ongoing operational effectiveness of the StormFilter® system, whilst assessing the condition of the cartridge media.

- 1 Establish a safe working area around the access point(s)
- 2 Remove access cover(s)
- 3 Evaluate StormFilter® cartridge media (if exhausted schedule major service within 6 months)
- 4 Measure and record the level of accumulated sediment in the chamber (if sediment depth is less than 100 mm skip to step 9)
- 5 Remove StormFilter® cartridges from the chamber
- 6 Use vacuum unit to removed accumulated sediment and pollutants in the chamber
- 7 Use high pressure water to clean StormFilter® chamber
- 8 Re-install StormFilter® cartridges
- 9 Replace access cover(s)

Major Service (Filter Cartridge Replacement)

For the StormFilter® system a major service is reactionary process based on the outcomes from the minor service, specifically the evaluation of the cartridge media.

Trigger Event	Maintenance Action
Cartridge media is exhausted ^[1]	Replace StormFilter® cartridge media ^[2]

^[1] Multiple assessment methods are available, contact Ocean Protect for assistance

^[2] Replacement filter media and components are available for purchase from Ocean Protect

This service is designed to return the StormFilter® device back to optimal operating performance.

- 1 Establish a safe working area around the access point(s)
- 2 Remove access cover(s)
- 3 By first removing the head cap, remove each individual cartridge hood to allow access to the exhausted media
- 4 Utilise a vacuum unit to remove exhausted media from each cartridge
- 5 Use vacuum unit to remove accumulated sediment and pollutants in the chamber
- 6 Use high pressure water to clean StormFilter® chamber
- 7 Inspect each empty StormFilter® cartridges for any damage, rectify damage as required
- 8 Re-fill each cartridge with media in line with project specifications
- 9 Re-install replenished StormFilter® cartridges
- 10 Replace access cover(s)

Additional Types of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, the StormFilter® unit should be inspected and cleaned. Specifically, all captured pollutants and liquids from within the unit should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. Additionally, it will be necessary to inspect the filter cartridges and assess them for contamination – and, depending on the type of spill event, it may be necessary to replace the filtration media.

Blockages

In the unlikely event that flooding occurs upstream of the StormFilter® system, the following steps should be undertaken to assist in diagnosing the issue and determining the appropriate response.

- 1 Inspect the upstream diversion structure (if applicable) ensuring that it is free of debris and pollutants
- 2 Inspect the StormFilter® unit checking the underdrain manifold as well as both the inlet and outlet pipes for obstructions (e.g. pollutant build-up, blockage), which if present, should be removed

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the StormFilter® after a major storm event. The focus is to inspect for damage and abnormally high sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants should be removed and disposed

Disposal of Waste Materials

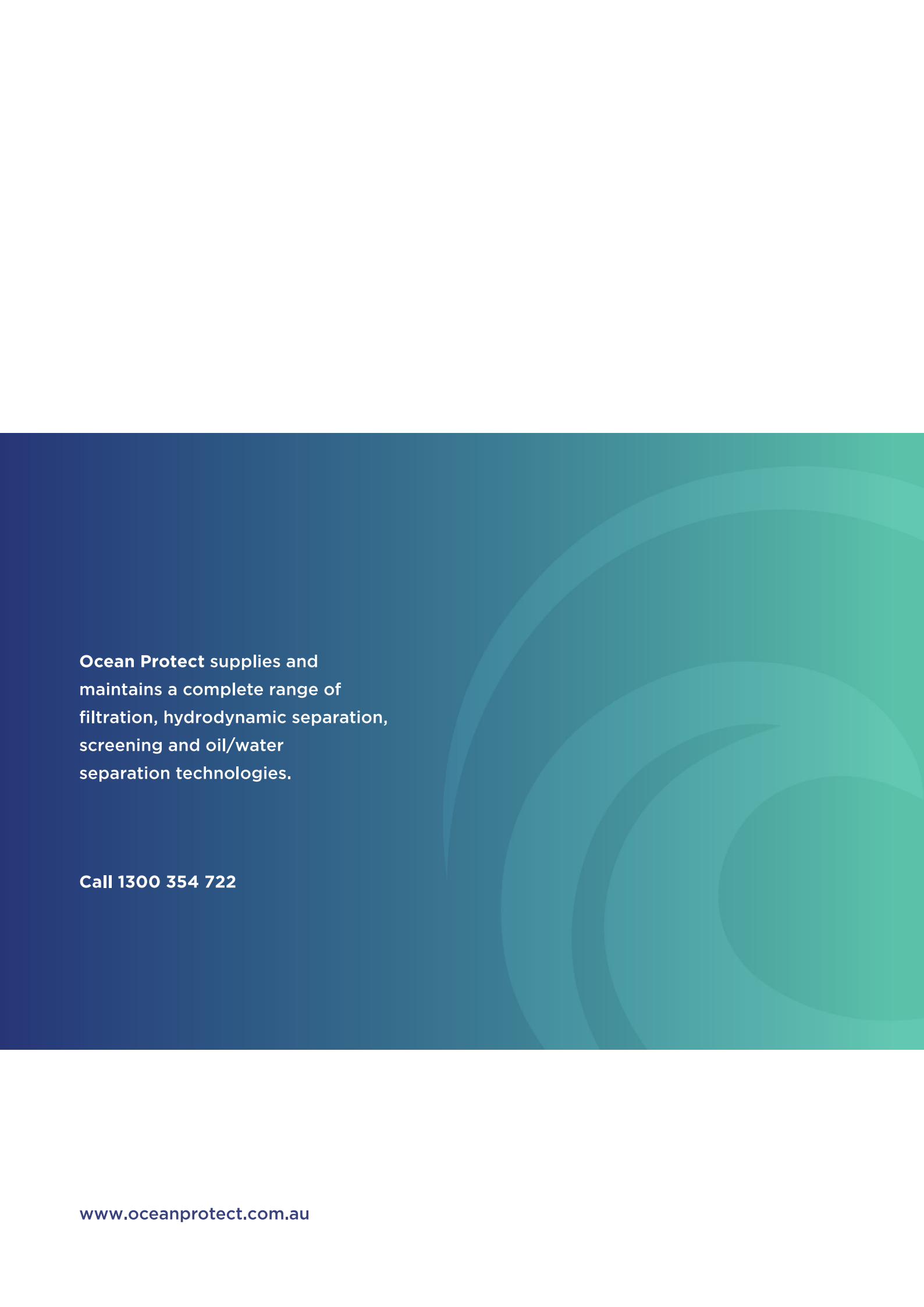
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