PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2022/1315

Date: 28 April 2023

Queensland Government

ARCADIS Design & Consultancy for natural and built assets

# 4653 – 4691 MOUNT LINDESAY HIGHWAY, NORTH MACLEAN

## Site Based Stormwater Management Plan

13 MARCH 2023

Incorporating Hyder

# CONTACT


**DARLAN CASTRO**
**Principal Engineer**

T + 61 7 5503 4822
M + 61 410 720 757
E darlan.castro@arcadis.com



**GARY ELLIS**
**Technical Director**

T + 61 7 3337 0859
M + 61 41 817 290
E gary.ellis@arcadis.com



**THEA FANNING**
**Civil Engineer**

T + 07 3337 0803
M + 61 405 972 982
E thea.fanning@arcadis.com


ARCADIS Design & Consultancy for natural and built assets


Arcadis
Level 35, 111 Eagle Street
Brisbane City, QLD 4000

# MACLEAN ESTATES PTY LTD
# 4653 – 4691 MOUNT LINDSAY HIGHWAY, NORTH MACLEAN

## Site Based Stormwater Management Plan

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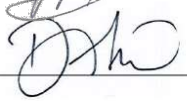
|---|---|---|
| **Author** | Thea Fanning |  |
| **Checker** | Gary Ellis |  |
| **Approver** | Darlan Castro<br>RPEQ 19918 |  |
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## REVISIONS

| Revision | Date | Description | Prepared by | Approved by |
|---|---|---|---|---|
| 01 | 08/07/2022 | Draft Issue for Review | TF | DC |
| 02 | 18/07/2022 | Issue to EDQ | TF | DC |
| 03 | 28/10/2022 | Draft Response to RFI | TF | DC |
| 04 | 25/01/2023 | Response to RFI | TF | DC |
| 05 | 03/03/2023 | Basin sections added | TF | DC |
| 06 | 13/03/2023 | Revised Lot Layout | TF | DC |

# CONTENTS

# APPENDICES

# 1 EXECUTIVE SUMMARY

Arcadis has been engaged by Maclean Estates Pty Ltd to prepare a Site Based Stormwater Management Plan (SBSMP) for the proposed industrial development, situated at 4563 - 4691 Mount Lindesay Highway, North Maclean. The site is located in the Greater Flagstone Priority Development Area located within the Logan City Council local government area. The proposed development involves the reconfiguration of one lot into two lots nominated for proposed 'Industry' and 'Environment Conservation' uses.

This report demonstrates the proposed development will be constructed and operated in accordance with the Water Sensitive Urban Design (WSUD), requirements of Council, the South-East Queensland State Planning Policy (SPP), the Queensland Development Code, the Queensland Urban Drainage Manual (QUDM), Economic Development Queensland (EDQ) PDA guidelines, and the Environmental Protection (Water) Policy (2009).

The two primary objectives of this SBSMP are to ensure that:

1. Suitable measures are incorporated into the development to ensure that there are no adverse impacts to downstream receiving waterways, property or infrastructure resulting from any increase to stormwater runoff peak flow rates.

This report therefore includes stormwater quantity calculations and hydrological modelling which demonstrate, that due to change in stormwater catchment parameters, there is an increase in peak flow rate during the post development scenario for both the eastern and western developed catchments. Subsequently, detention systems have been proposed and designed to control flow rates discharged from the industrial lot to no greater than corresponding catchment existing peak flow rates at the proposed points of interest with respect to discharge from the site, from 63.2% Average Exceedance Probability (AEP) to 1% AEP storm events.

2. Details of a proposed stormwater quality treatment train are provided to ensure the discharge of stormwater from the site is of adequate quality standards to comply with the requirements of Economic Development Queensland (EDQ), Logan City Council (LCC) and the State Planning Policy 2017 (SPP 2017).

A stormwater quality assessment is provided which demonstrates that a specially tailored treatment system will be required to satisfy the pollutant removal targets of LCC and the South-East Queensland Healthy Waterways Partnership during the operational phase of the proposed development. It is noted that this solution is for demonstration purposes only and may change with any subsequent application for Material Change of Use concerning the proposed Lot 1.

## 1.1 Revision 03

Revision 03 was prepared in response to Items 1 and 5 of the Further Issues letter received from EDQ on 20 September 2022. In response to these items, the developed catchments have been adjusted to better replicate the existing catchment boundaries, resulting in a second combined detention and water quality treatment system proposed to the west of the industrial pad. The previously proposed combined detention and bioretention system situated in the eastern portion of the property has been replaced with a smaller detention tank, containing a proprietary cartridge system.

## 1.2 Revision 04

The Hydraulic Impact Assessment revealed that the previously proposed combined detention and bioretention basin proposed for the western catchment caused adverse flood impacts upstream of the proposed development. As such, this report (Revision 4) proposes that the western basin will no longer contain bioretention filter media, therefore increasing the storage capacity of the detention basin. Stormwater quality treatment will instead be provided by incorporating a proprietary treatment system for water quality purposes.

Further to this, additional retaining walls have been incorporated into the design, thus increasing the developable area, resulting in a larger detention systems and additional filtration cartridges.

The drainage channel has been separated from Proposed Lot 1, forming a third lot.

## 1.3 Revision 05

Additional details and sections of the proposed western detention basin have been provided in Appendix B in response to the email from Michael Fallon of EDQ, dated 28 February 2023. Table 6-4 has also been amended.

## 1.4 Revision 06

Following further discussions, the proposed layout has been amended to reflect the two proposed lots with an easement, road reserve and service road resumption. The SBSMP has been updated accordingly.

# 2 INTRODUCTION

Arcadis has been engaged by Maclean Estates Pty Ltd to prepare a Site Based Stormwater Management Plan (SBSMP) for a Reconfiguration of Lot (ROL) application for the proposed industrial development situated at 4563 - 4691 Mount Lindesay Highway, North Maclean. The site is situated within the Greater Flagstone Priority Development Area (PDA) located within the Logan City Council (LCC) local government area.

The proposed development involves the reconfiguration of the existing lot into two lots:

- Proposed Lot 1: 17.438ha with an 'Industry' land use;
- Proposed Lot 2: 16.592ha with an 'Environment and Conservation' use.

An additional 1.4015ha land strip along the eastern site boundary is to be dedicated to the Department of Transport and Main Roads (DTMR) / Council for the widening of Mount Lindsay Highway / extension of the service road. This has been referred to as the "Service Road Resumption".

A second 0.553ha land strip situated between Proposed Lot 1 and the Service Road Resumption is to be dedicated as road reserve.

Finally, a third 0.470ha land strip along the south-east of Proposed Lot 1 forms an easement.

The proposed lot reconfiguration is shown in Figure 2-1, below.

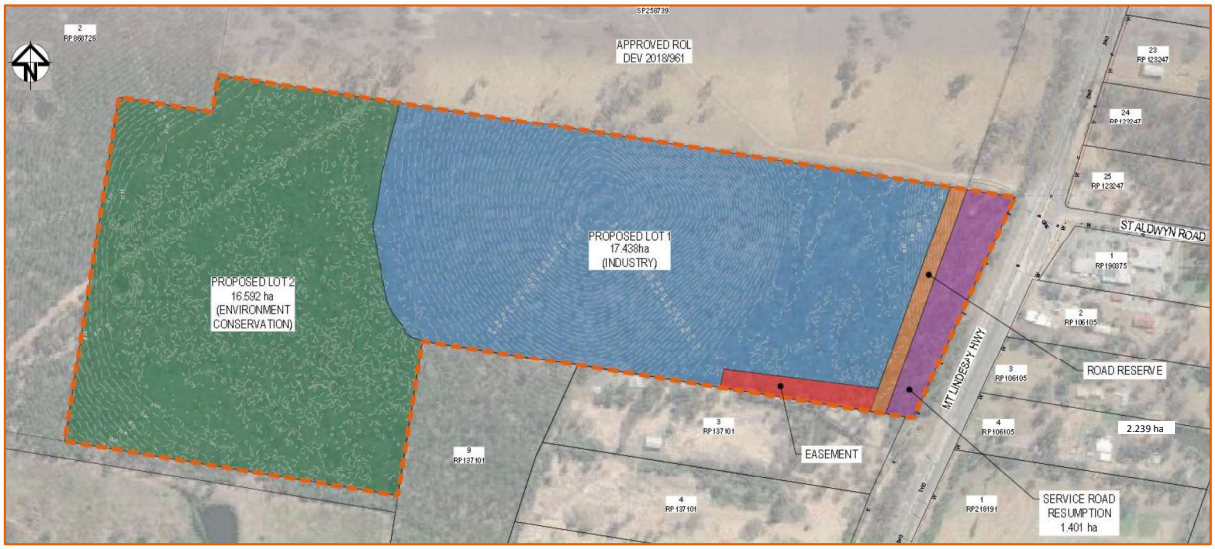



**Figure 2-1 - Proposed Reconfiguration of Lot Layout**

The following report demonstrates the proposed development will be constructed and operated in accordance with the Water Sensitive Urban Design (WSUD) requirements of Council, the Queensland State Planning Policy (SPP 2017), the Queensland Development Code, the Queensland Urban Drainage Manual (QUDM), Economic Development Queensland (EDQ) PDA guidelines and the Environmental Protection (Water) Policy (2009) with respect to the attenuation of stormwater runoff from both quality and quantity perspectives.

# 3 SITE CHARACTERISTICS

## 3.1 Site Description

The subject site is located within Logan, South-East Queensland, Australia on the following lot:

- Lot 1 on RP113251 (4653-4691 Mount Lindesay Highway, North Maclean)

The site in generally bounded by the following co-ordinates (GDA94 / MGA zone 56)

- North-West: 500713, 6928697
- South-East: 501553, 6928285

## 3.2 Existing Land Usage

The subject site is currently occupied by trees and grassed open areas and adjoins 4499-4651 Mount Lindesay Highway to the north which has an approved ROL decision (DEV 2018/961). The site currently has direct property frontage to Mount Lindesay Highway to the east and predominantly cleared land to the west. An operational works approval for earthworks has been obtained for the land to the south and is currently underway.

A MEDQ Approved context plan published 10 September 2021 includes the subject site. The site is approved for specific land use "*Industry and Business Zone*" with overlay for indicative future bio-diversity corridor. An existing High Voltage electrical easement has been identified running through the site into the existing rural residential dwelling to the north. It is understood that as part of the adjacent approval to the north, this electrical easement is set to undergo works and the electricity supply will be temporarily switched off. Figure 3-1 below shows the site locality plan in relation to the discussed items above.


**Figure 3-1- Development Locality Plan (Source: NearMap, June 2022)**

## 3.3 Existing topography and Site Drainage

Based on the LiDAR data obtained for the site, the natural site generally grades in radial directions from the existing highpoint located within the centre of the site (approximately RL36m) to low lying land (approximately RL26) in the western and eastern portions of the site which form a natural overland flow path for the external upstream catchments. Grades vary between approximately 2.7% towards the eastern portion of the overland flow path and 3.39% towards the western portion of the overland flow path.

The external upstream catchments are shown in Figure 3-2.

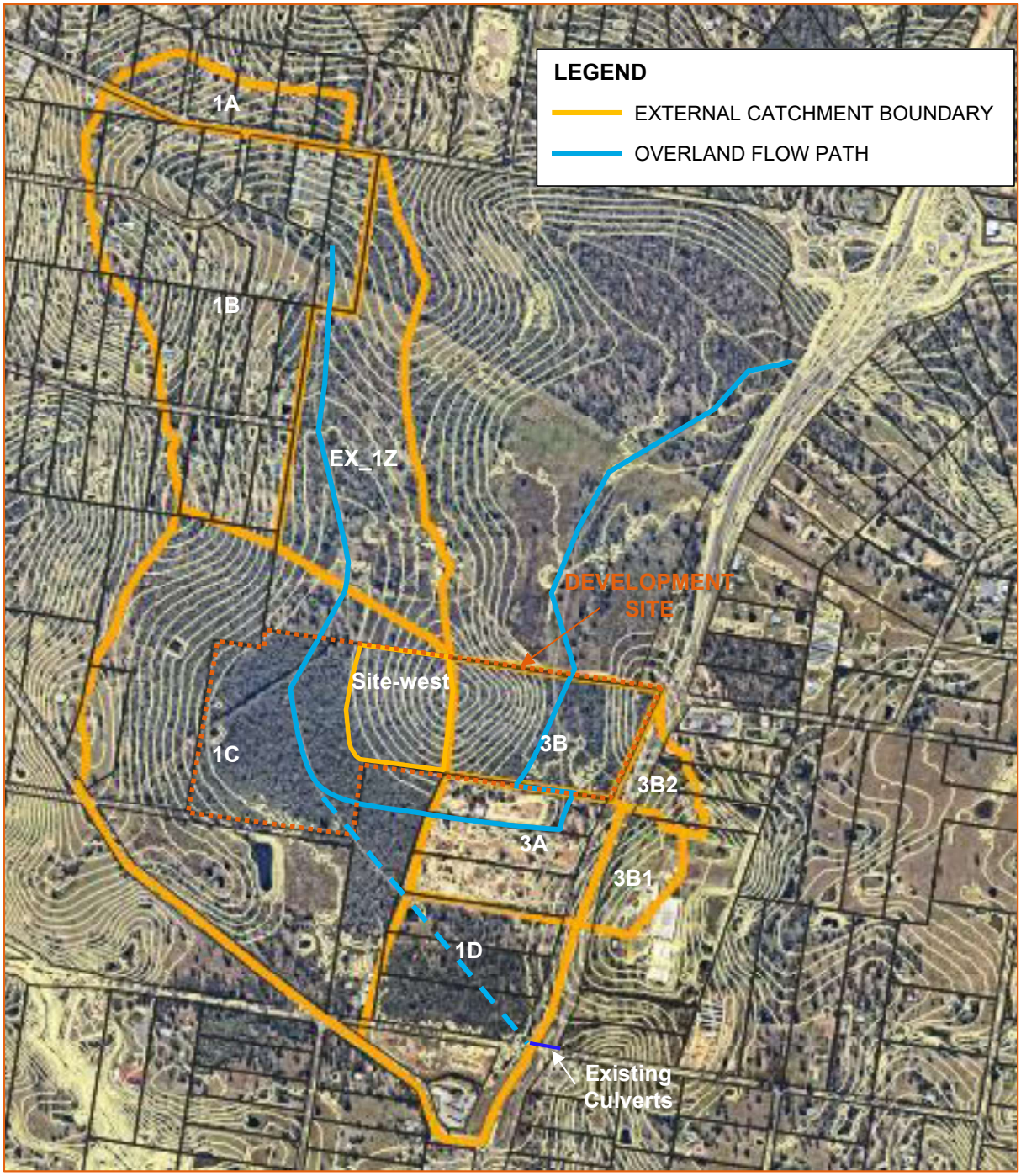



Figure 3-2 - Existing External Catchments (Image Source: NearMap 2022)

As can be seen in Figure 3-2, above, the overland flow path enters the site across the northern boundary from in the western portion of the site and exits the site before re-entering across the southern boundary in the eastern portion of the site. The overland flow path is fed by an extensive area external to the site.

Figure 3-3 shows the proposed earthwork levels across the site. As seen in the figure, the existing mound is to be flattened with the remaining levels to lifted to achieve a more even level across proposed Lot 1. It is proposed that the eastern portion of the site grades towards the north boundary of the eastern section of the overland flow path. No earthworks are proposed in proposed Lot 2, thus the existing flow path and grading shall remain. The nominated discharge points for the site can be indicated by thick red lines along the property boundary. The proposed drainage channel has been shaped to allow for the conveyance of flows from the overland flow path through the site, without inundating the developable land.

Detailed earthworks plans and survey have been included within the engineering plans enclosed with Appendix B.

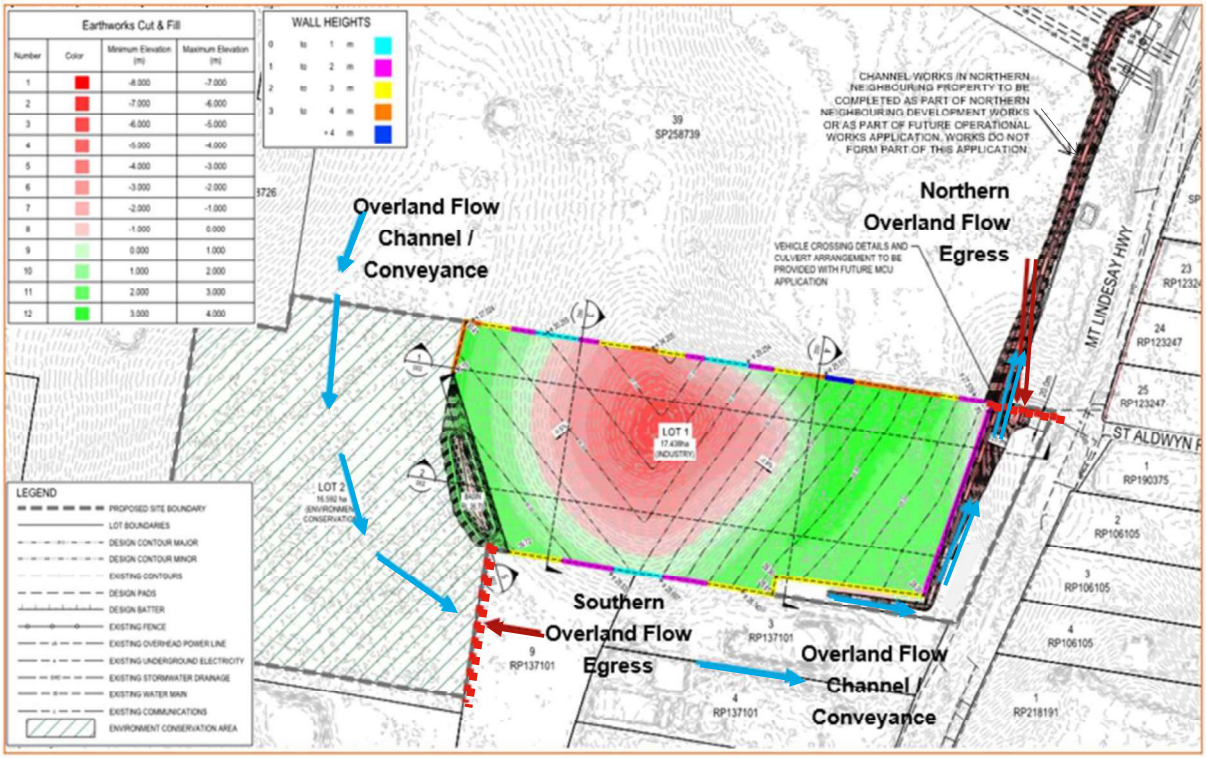



**Figure 3-3 – Concept Proposed Bulk Earthworks Layout**

## 3.3.1 Neighbouring Approvals

Figure 3-4 shows the location of adjacent approval (DEV 2018/961) in relation to the proposed development site. The approved site is described as 4499-4651 Mount Lindesay Highway, North Maclean, with a real property description of Lot 39 on RP25373. It is understood that this approval is for a PDA Development Permit for a reconfiguring a lot – 1 lot into 4 lots with associated roads and open space. As part of this approval Operational Works Approvals have been awarded, these works include:

- Construction of a service road along the western side of the Mount Lindesay Highway accessed via the existing Crowson Lane / Mount Lindesay Highway off ramp roundabout;
- Construction of a trunk rising sewer main running through the existing electrical main of the proposed development, ending at Greenbank Road;
- Connection to existing potable water mains along Crowson Lane and the Mount Lindesay Highway;
- Proposed stormwater infrastructure;
- Construction of internal roads; and
- Proposed connection to existing underground electrical and telecommunication services along Crowson Lane and the Mount Lindesay Highway.

Further details on the works associated with the adjacent approval can be found within the relevant Decision Notice attached within Appendix C.


**Figure 3-4 – Location of Neighbouring Approval**

# 4 PROPOSED DEVELOPMENT

The proposed development involves the reconfiguration of one lot into two with the central lot (Proposed Lot 1) to comprise an industrial development and the western lot (Proposed Lot 2) to remain an environmental conservation area. A strip along the eastern site boundary is to be dedicated for the widening of Mount Lindsay Highway / extension of the proposed service road. A second strip, situated between Proposed Lot 1 and the Service Road Resumption is to form road reserve. An easement is proposed along the south-east of Proposed Lot 1. The proposed development layout is shown in Figure 2-1. The Place Design Group Proposed ROL Plan (1121084-05-B) is included in Appendix A.

Proposed Lot 1 is generally divided into two catchments, east and west, with the western catchment draining to an overland flow path in Proposed Lot 2, flowing south-east, and the eastern catchment grading to the same flow path as it traverses north through the site.

The developed catchment boundaries roughly align with the existing catchment boundaries. It is anticipated in the future the stormwater from the proposed industrial pad will be conveyed to the respective eastern and western detention systems within a pit and pipe system prior to being discharged to the overland flow path. Detailed flood modelling has been undertaken to ensure modifications to the overland flow path does not have adverse impacts on properties upstream or downstream of the development site. Please refer to the Arcadis Hydraulic Impact Assessment (GA002-30139050-AAR) for further details.

The development of the site will also require stormwater quality treatment to meet the relevant state and local government requirements. The stormwater quality management objectives would be based on the load reduction values from the SEQ Regional Plan 2009-2031 Implementation Guidelines No.7, as outlined in State Planning Policy for Healthy Waters (2017). These water quality objectives are consistent with those in WSUD Technical Design Guidelines for South East Queensland - Version 1 (Healthy Waterways 2006).

The land dedicated for the widening of Mount Lindsay Highway / extension of the proposed service road has been excluded from the stormwater quantity and quality calculations.

# 5 DISCHARGE LOCATIONS

## 5.1 Pre-Developed Discharge Characteristics

As previously outlined in this report, the site in its pre-developed state consists of multiple catchments, discharging via both overland sheet flow and channelised flow into a natural overland flow path. Presently, two points of interest have been recognised for the site, as previously mentioned and documented in Figure 3-3, namely the northern boundary of the eastern section of the overland flow path and the south-eastern boundary of the western section of the overland flow path.

## 5.2 Proposed Discharge Characteristics and Objectives

This report demonstrates the proposed development will be constructed and operated in accordance with the Water Sensitive Urban Design (WSUD) requirements of Council, the Queensland State Planning Policy (SPP 2017), the Queensland Development Code, the Queensland Urban Drainage Manual (QUDM) and the Environmental Protection (Water) Policy (2009).

The primary objectives of this SBSMP are to ensure that:

- Suitable measures are incorporated into the development to ensure that there are no adverse impacts to downstream receiving waterways, property or infrastructure resulting from any increase to stormwater runoff peak flow rates;
- waterway flow management measures are implemented to ensure no adverse stability impacts to downstream receiving unlined waterways; and
- suitable treatment train measures are determined and are either future infrastructure or incorporated in the development to achieve required water quality objectives.

All standard Average Exceedance Probability (AEP) design events attenuation is proposed for the 4563 - 4691 Mount Lindesay Highway, North Maclean development. The site assessment will demonstrate compliance with LCC Policy by discharging pre-detained 63.2%, 50%, 20%, 10%, 2% and 1% AEP flows to the points of interest.

# 6 HYDROLOGICAL ASSESSMENT

Detailed hydraulic and hydrological modelling (RAFTS and DRAINS) of the existing and developed catchments (respectively) was undertaken as a part of the present report. The following sections provides details on the overall stormwater quantity strategy and modelling results.

## 6.1 Temporal Patterns

Rainfall Intensities Frequency Duration data were obtained from The Bureau of Meteorology (http://www.bom.gov.au/water/designRainfalls/revised-ifd/?year=2016). The Latitude and Longitude of used for the site is summarised in Table 6-1 below.

**Table 6-1 Site Latitude & Longitude**

| Parameter | Value |
|---|---|
| Latitude | -27.7679 |
| Longitude | 153.0109 |

## 6.2 Catchment Analysis

As discussed in section 3, the development site drains to two points of interest. Catchment 1C has been assessed under two scenarios with a third scenario analysed for Proposed Lot 1:

- **Pre-development Scenario –** Catchments Site-west, 1C and 3B in their current state;
- **Development Scenario –** The proposed industrial development (Proposed Lot 1 – divided into Site-west and Site_east) and the remaining areas of Catchments 1C and 3B.
- **Mitigated Scenario –** The proposed industrial development (Proposed Lot 1 – divided into Site-west and Site_east), as per the proposal with the calculated detention infrastructure in place and the remaining area of Catchment 3B.

Most importantly the site's performance has been assessed at the two points of interest. This methodology ensures that peak flow concentrations from the catchments are assessed and mitigated appropriately at these points of interest.

Tables 6-2 and 6-3, below, summarises the catchment parameters used to assess the pre and post development flows.

**Table 6-2 – Pre-development Catchment Parameters**

| Catchment | Model Method | Area (ha) | Fraction Impervious (%) | Slope (%) | Manning's n |
|---|---|---|---|---|---|
| Site-west | RAFTS | 6.987 | 0.5% | 4.3 | 0.1 |
| 1C | RAFTS | 67.269 | 0.5% | 1.26 | 0.1 |
| 3B | RAFTS | 14.09 | 0 | 2.91 | 0.1 |

**Table 6-3 – Post-development Catchment Parameters**

| Catchment | Model Method | Area (ha) | Fraction Impervious (%) | Slope (%) | Manning's n | Pervious tc (minutes) | Impervious tc (minutes) |
|---|---|---|---|---|---|---|---|
| Site-west | ILSAX | 6.987 | 90% | N/A | N/A | 5 | 5 |
| 1C | RAFTS | 67.269 | 0 | 1.26 | 0.1 | N/A | N/A |
| Site-east | ILSAX | 10.031 | 90% | N/A | N/A | 7 | 9 |
| 3B | RAFTS | 3.780 | 5% | 0.45 | 0.1 | N/A | N/A |

## 6.3 Attenuation of Developed Flows

### 6.3.1 Objective

The stormwater discharge from each catchment must not exceed pre-developed flow rates for storm events from 63.2% AEP to 1% AEP. Appropriate stormwater infrastructure for the each catchment is therefore required to ensure that there is no increase in peak discharge flow rates for the downstream overland flow path.

### 6.3.2 Methodology

A DRAINS model has been developed using a combination of the RAFTS and ILSAX methods to determine the development's hydraulic/ hydrological impacts in the context of the undeveloped case. ILSAX was used to model the developed catchments with RAFTS used to model the relatively undeveloped existing and external catchments.

The critical storm event was determined via an investigation of storm durations ranging from 10mins to 1080mins. The model was then used to route post-developed runoff from the eastern catchment through the proposed detention structure to determine the most efficient onsite detention system to comply with aforementioned objective.

Each catchment was modelled using a split catchment approach, with the first sub-catchment representing impervious areas and the second pervious. This allows for an accurate representation of Manning's roughness coefficients and applicable loss parameters.

### 6.3.3 Detention System Design

Table 6-4 presents the parameters for the proposed on-site detention, which has been iteratively optimised to ensure no post development increase to pre-developed flow rates from 63.2% AEP up to and including the 1% AEP storm event. Reference should be made to Engineering Drawings in Appendix B for a conceptual illustration of the earthworks forming the extents of the detention basin and the culvert outlet location.

**Table 6-4 Detention System Design Parameters**

| Catchment | Internal Base Area | Maximum Water Depth | Detention Storage Volume | Control Outlets |
|---|---|---|---|---|
| **Western Basin** | 1293 $m^2$ @ RL26.7m AHD | 2.01 m (1% AEP) | 4,489 $m^3$ | • 375mm dia low flow pipe at base of basin.<br>• 2m wide weir @ RL28.3m AHD |
| **Eastern Tank** | 7500 $m^2$ | 0.95 m (1% AEP) | 7,094 $m^3$ | • 825mm dia low flow pipe at base of tank;<br>• 4m wide weir 0.8m above base |

Please refer to the Bulk Earthworks Sketch Plan (30139050-AAP-WS00OP-CV-SKT-001-06) and the Bulk Earthworks Sections (30139050-AAP-WS00OP-CV-SKT-002-05 and 30139050-AAP-WS00OP-CV-SKT-003-01) in Appendix B for further details of the proposed western detention basin.

## 6.4 Model Results

### 6.4.1 Western Catchment

The following results have been captured from the DRAINS models following the implementation of the detention basin described in Table 6-4. Table 6-5, below, lists the peak median flow rates discharged to the from Site-west to catchment 1C for each identified critical storm across the assessed AEP range.

**Table 6-5 Summary of DRAINS hydrologic/hydraulic results – Western Catchment**

| Scenario | AEP (%) | 63.2% | 50% | 20% | 10% | 5% | 2% | 1% |
|---|---|---|---|---|---|---|---|---|
| Existing [1] | Median Peak Flow ($m^3/s$) | 0.247 | 0.320 | 0.534 | 0.715 | 0.922 | 1.158 | 1.377 |
| Developed | Median Peak Flow ($m^3/s$) | 1.602 | 1.868 | 2.664 | 3.246 | 3.828 | 4.573 | 5.156 |
| Mitigated [2] | Median Peak Flow ($m^3/s$) | 0.239 | 0.258 | 0.309 | 0.341 | 0.555 | 0.982 | 1.307 |
| | Difference [2] – [1] | -0.008 | -0.062 | -0.225 | -0.374 | -0.367 | -0.176 | -0.070 |

As can be seen in Table 6-5, the proposed detention basin has been sized sufficiently to ensure the post-development flow rates discharged from the site do not exceed the pre-development flow rates in the ultimate development (mitigated) scenario for the 63.2% AEP to 1% AEP design events.

### 6.4.2 Eastern Catchment

The following results have been captured from the DRAINS models following the implementation of the detention tank described in Table 6-4. Table 6-6 summarises the peak median flow rates discharged to the northern boundary of the eastern portion of the overland flow path for each identified critical storm across the assessed AEP range.

**Table 6-6 Summary of DRAINS hydrologic/hydraulic Results – Eastern Catchment (3B and Site_East)**

| Scenario | AEP (%) | 63.2% | 50% | 20% | 10% | 5% | 2% | 1% |
|---|---|---|---|---|---|---|---|---|
| Existing [1] | Median Peak Flow ($m^3/s$) | 0.373 | 0.453 | 0.807 | 1.132 | 1.439 | 1.756 | 2.106 |
| Developed | Median Peak Flow ($m^3/s$) | 2.180 | 2.527 | 3.596 | 4.324 | 5.013 | 5.877 | 6.544 |
| Mitigated [2] | Median Peak Flow ($m^3/s$) | 0.268 | 0.333 | 0.586 | 0.770 | 0.961 | 1.513 | 1.865 |
| | Difference [2] – [1] | -0.105 | -0.120 | -0.221 | -0.362 | -0.478 | -0.243 | -0.241 |

As can be seen in Table 6-6, the proposed detention tank has been sized sufficiently to ensure the post-development flow rates discharged from the site do not exceed the pre-development flow rates in the ultimate development (mitigated) scenario. A hydraulic impact assessment has been undertaken for the overland flow path and the surrounding area to ensure the development does not cause actionable nuisance. ***Concerning flood impact investigation and analysis of upstream and downstream properties, the Arcadis report GA002-30139050-AAR HIA should be referred to for the outcomes of this assessment.***

# 7 ENVIRONMENTAL VALUES AND WATER QUALITY OBJECTIVES (WQO)

Water quality parameters and the proposed limits applicable for this site have been selected in accordance with South-East Queensland Healthy Waterways Partnership's Water by Design MUSIC Modelling Guidelines – Consultation Draft (Version 3, 2018). The Water Quality reduction targets stipulated by the State Planning Policy are presented in Table 7-1.

**Table 7-1 Water Quality Operational Phase Performance Criteria**

| Pollutant | Criteria |
|---|---|
| Total Suspended Solids | 80% |
| Total Phosphorus | 60% |
| Total Nitrogen | 45% |
| Gross Pollutants | 90% |

## 7.1 Stormwater Quality Treatment Approach

A variety of stormwater treatment devices are proposed for inclusion within the development layout to treat run-off from the development site, including proprietary litter baskets, cartridge systems and rainwater tanks for roofwater harvesting and reuse. As a layout for the industrial development is yet to be developed, the following assumptions have been applied across both the eastern and western catchments for the division of the sub-catchments:

- 80% of site area comprises roof catchment;
- 50% of runoff from roof catchment harvested in rainwater tanks;
- Remaining site predominantly hardstand (parking, storage and circulation roadways) with 15% landscaping.

Please note that only the developable area has been modelled in MUSIC.

Table 7-2 below provides stormwater sub-catchment pervious/impervious area information.

**Table 7-2 Stormwater Catchments Areas**

| Sub-catchment | Source Node Type | Area (ha) | Fraction Impervious |
|---|---|---|---|
| Industrial Roof to Tanks (east) | Industrial Roof | 4.012 | 100% |
| Industrial Roof (east) | Industrial Roof | 4.012 | 100% |
| Industrial Hardstand and Landscaping (east) | Industrial Road | 2.006 | 85% |
| Industrial Roof to Tanks (west) | Industrial Roof | 2.578 | 100% |
| Industrial Roof (west) | Industrial Roof | 2.579 | 100% |
| Industrial Hardstand and Landscaping (west) | Industrial Road | 1.290 | 85% |
| **TOTAL** | | **16.477** | **97%** |

## 7.2 Proposed Stormwater Quality Improvement Devices

Water Sensitive Urban Design (WSUD) aims to minimise the impact of a development on the natural water cycle by reducing the export of pollutants, sediments and nutrients from the site into the natural watercourse. To treat the stormwater runoff from the site, various treatment devices can be used throughout the development area and these concepts can be integrated into the overall design of the road layouts, road cross sections, stormwater layouts and water supply reticulation systems. Stormwater from the development will follow a specially designed stormwater quality treatment train prior to discharge from the site, which will ensure compliance with the water quality objectives.

### 7.2.1 Proprietary Cartridge Filtration System

The Ocean Protect StormFilter cartridge filter device is a stormwater quality improvement device (SQID) designed to meet regulatory requirements and pollution reduction targets. The StormFilter removes the most challenging stormwater pollutants – including fine solids, soluble heavy metals, oil, and total nutrients – using media filled cartridges. Refer to Figure 7-1 for an image of the Ocean Protect StormFilter. Alternative equivalent proprietary treatment devices may be used provided regulatory requirements and pollution reduction targets are met.

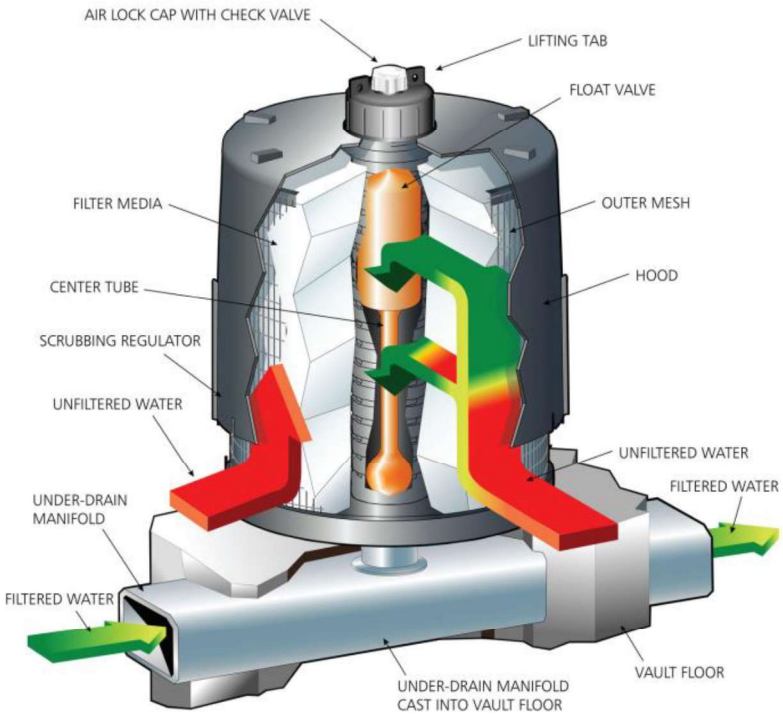



*Figure 7-1 StormFilter System (courtesy of Ocean Protect)*

The StormFilter is designed to be used in conjunction with a network of litter baskets to further increase the capture of gross pollutants.

The proprietary cartridge filtration system is proposed to be installed within the proposed detention tank to treat stormwater runoff prior to discharge into the proposed conveyance channel.

### 7.2.2 Essential Stormwater Harvesting Tanks

Essential rainwater harvesting tanks behave as stormwater quality improvement devices by removing stormwater from the treatment train which is used for irrigation. Two 20kL rainwater harvesting tanks are proposed to be included in the development layout and will capture stormwater from the warehouse roof(s) for irrigation across the site.

### 7.2.3 Litter Baskets

Litter baskets are designed to be installed within stormwater pits to capture gross pollutants, total suspended solids and attached pollutants as stormwater enters the pits. Litter baskets are proposed to be installed within the stormwater drainage network to treat stormwater runoff prior to discharge into the tertiary treatment systems.

## 7.3 Modelling of the Development Site

In developing the modelling parameters for the site, the Water Sensitive Design concepts for the developed site were produced with the proposed method of improvement as follows:

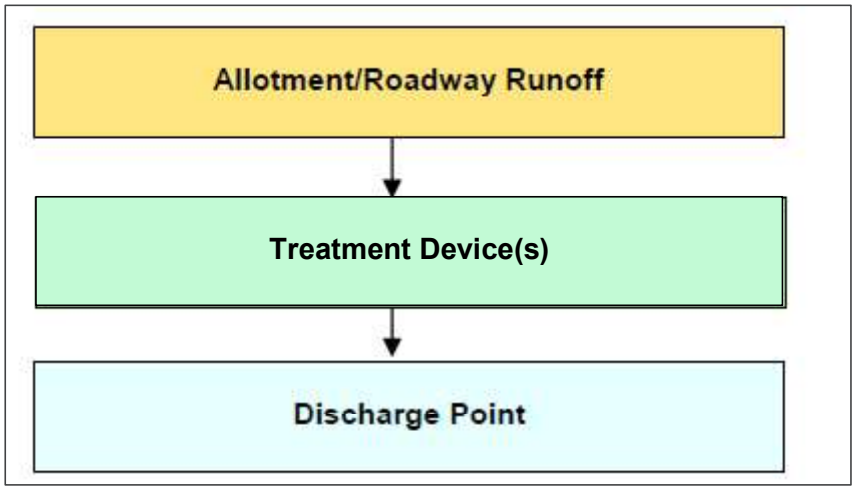



*Figure 7-2 Modelling Strategy*

This treatment train will be adopted to control stormwater quality from the development area. Modelling of the site was undertaken using the 'Model for Urban Stormwater Improvement Conceptualisation (MUSIC)' as promoted by the South-East Queensland Healthy Waterways Partnership. An appropriate type of land use was applied to all developed sub-catchments based on the proposed development's characteristics for either a residential or commercial land use. Each individual treatment system was assigned the relevant modelling treatment module. Consequently, a treatment train was established for each sub-catchment and ultimately combined to control the total discharge from the development area.

Meteorological data for input to MUSIC was obtained from the Bureau of Meteorology for the Thompson Road Greenbank Station (40659), which is located approximately 10km north-west of the site. Six minute time step rainfall data was obtained from the years 1980 to 1989.

The catchment parameters of the MUSIC modelling were amended in accordance with the South-East Queensland Healthy Waterways Partnerships' Water by Design MUSIC Modelling Guidelines – Consultation Draft (2018)'.

### 7.3.1 Pollutant Source Node Details

The following tables show the pollutant source node parameters that were input to the MUSIC model, as determined using the South-East Queensland Healthy Waterways Partnership's *Water by Design MUSIC Modelling Guidelines for South-East Queensland*.

**Table 7-3 Urban Residential Rainfall-Runoff Parameters**

| Parameter | Industrial |
|---|---|
| Soil Storage Capacity (mm) | 18 |
| Initial Storage (%) | 10 |
| Field Capacity (mm) | 80 |
| Infiltration Capacity Coefficient A | 243 |
| Infiltration Capacity Coefficient B | 0.6 |
| Initial Depth (mm) | 50 |
| Daily Recharge Rate (%) | 0 |
| Daily Baseflow Rate (%) | 31 |

**Table 7-4 Pollutant Export Parameters (Log Values)**

| Flow Type | Pollutant Source | TSS Log Values | | TP Log Values | | TN log values | |
|---|---|---|---|---|---|---|---|
| | | Mean | Std. Dev. | Mean | Std. Dev. | Mean | Std. Dev. |
| **Industrial** | | | | | | | |
| Baseflow | Roof | N/A | N/A | N/A | N/A | N/A | N/A |
| | Roads | 0.78 | 0.45 | -1.11 | 0.48 | 0.14 | 0.20 |
| Stormflow | Roof | 1.30 | 0.44 | -0.89 | 0.36 | 0.25 | 0.32 |
| | Roads | 2.43 | 0.44 | -0.30 | 0.36 | 0.25 | 0.32 |

## 7.3.2 Treatment Device Details

Stormwater run-off from the developed site will be collected via a series of drainage systems flowing into the various treatment devices prior to being discharged to the northern point of interest. The following section provides details of how each treatment device was modelled.

### 7.3.2.1 Rainwater Tanks

The rainwater tanks and reuse have been modelled specifically in accordance with the Water By Design MUSIC Modelling Guidelines (2018). The reuse has been calculated based on an annual irrigation application of 730mm/m$^2$/yr across the landscaped areas. It was assumed that 3% of the developable area is landscaped.

Table below summarises the parameters used to model the rainwater tank.

**Table 7-5 Rainwater Tank Modelling Parameters**

| Parameter | Eastern Tank | Western Tank |
|---|---|---|
| Number of Tanks | 1 | 1 |
| Volume below overflow pipe (kL) (per tank) | 20 | 20 |
| Depth above overflow pipe (kL) | 0.2 | 0.2 |
| Surface Area ($m^2$) (per tank) | 10 | 10 |
| Initial Volume (kL) | 0 | 0 |
| Overflow Pipe Diameter (mm) (per tank) | 90 | 90 |
| Max Drawdown Height (m) | 2 | 2 |
| Demand (kL/yr) | 2,197 | 1,412 |

### 7.3.2.2 Litter Baskets

The litter baskets have been modelled using the approved Ocean Protect parameters; however, an engineer approved equivalent may be used provided the WQOs are met. The Ocean Protect litter basket modelling requirements are outlined in Table 7-6. Please note that number of OceanGuards have been modelled indicatively only. An OceanGuard will be required in each stormwater pit throughout the development site.

**Table 7-6 Ocean Protect Litter Basket Modelling Parameters**

| Parameter | Eastern Catchment | | Western Catchment | |
|---|---|---|---|---|
| | Input | Output | Input | Output |
| Number of Baskets | 21 | | 11 | |
| Low Flow By-Pass ($m^3/s$) | 0 | | 0 | |
| High Flow By-Pass ($m^3/s$ | 0.42 | | 0.22 | |
| Gross Pollutants (kg/ML) | 14.7808 | 0 | 14.7808 | 0 |
| Total Suspended Solids (mg/L) | 100 | 48 | 100 | 48 |
| Total Phosphorus (mg/L) | 10 | 3.4 | 10 | 3.4 |
| Total Nitrogen (mg/L) | 50 | 29.5 | 50 | 29.5 |

During detail design the above unit number will have to be confirmed based on drainage network design.

### 7.3.2.3 Proprietary Cartridge System

The Ocean Protect StormFilter cartridge system has been modelled with OceanGuard StormFilter 690mm PSorb cartridges and a StormFilter chamber. Tables 7-7 – 7-8 provide the modelling parameters adopted to represent the different devices.

**Table 7-7 StormFilter Chamber Modelling Parameters**

| Modelling Parameter | East | West |
|---|---|---|
| Low Flow By-pass ($m^3/s$) | 0 | 0 |
| High Flow By-pass ($m^3/s$) | 100 | 100 |
| Surface Area ($m^2$) | 287 | 186 |
| Extended Detention Depth (m) | 0.77 | 0.77 |
| Permanent Pool Volume ($m^3$) | 0 | 0 |
| Initial Volume ($m^3$) | 0 | 0 |
| Exfiltration Rate (mm/h) | 0 | 0 |
| Evaporative Loss as % of PET | 0 | 0 |
| Equivalent Pipe Diameter (mm) | 296 | 296 |
| Overflow Weir Width (m) | 2 | 2 |
| Notional Detention Time (h) | 0.324 | 0.324 |

**Table 7-8 StormFilter Modelling Parameters**

| Modelling Parameter | East | | West | |
|---|---|---|---|---|
| Number of Cartridges | 185 x 690mm PSorb | | 120 x 690mm PSorb | |
| Low Flow By-pass ($m^3/s$) | 0 | | 0 | |
| High Flow By-pass ($m^3/s$) | 0.1665 | | 0.1080 | |
| | Input | Output | Input | Output |
| Flow ($m^3/s$) | 10 | 10 | 10 | 10 |
| Gross Pollutants (kg/ML) | 15 | 0 | 15 | 0 |
| Total Suspended Solids (mg/L) | 1000 | 120 | 1000 | 120 |
| Total Phosphorus (mg/L) | 10 | 2.22 | 10 | 2.22 |
| Total Nitrogen (mg/L) | 100 | 47 | 100 | 47 |

## 7.3.3 MUSIC Model Layout

The development site has been modelled in MUSIC based on the assumptions outlined in section 7.1. Appropriate percentage impervious factors have been applied to all nodes as per Table 7-2.

A diagrammatic view of the MUSIC model layout is presented in Figure 7-3.

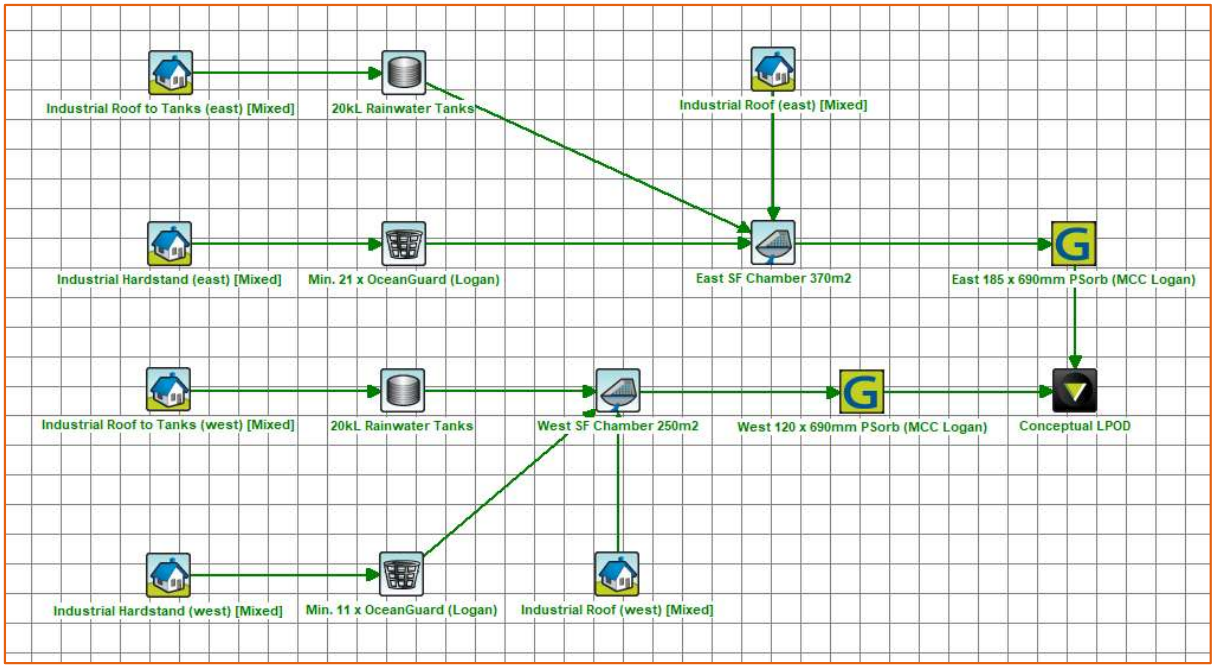



Figure 7-3 MUSIC Model Layout

## 7.3.4 MUSIC Results

The reduction in pollutant loadings at the discharge location for the eastern and western catchments are presented in the table below.

Table 7-9 Treatment Train Effectiveness - % Pollutant Reduction

| Pollutant | WQO | Eastern Catchment | Western Catchment |
|---|---|---|---|
| Total Suspended Solids | **80%** | 80% | 80 % |
| Total Phosphorus | **60%** | 72% | 73% |
| Total Nitrogen | **45%** | 46% | 47% |
| Gross Pollutants | **90%** | 100% | 100% |

As can be seen in Table 7-9, above, the proposed treatment train attains the Water Quality Objectives set out in the Queensland State Planning Policy.

# 8 CONSTRUCTION PHASE WATER QUALITY

During the construction phase of the development, an Erosion and Sediment Control Program will be implemented to minimise water quality impacts. A detailed Erosion and Sediment Control Program will be employed throughout the site; the sediment control measures shall include silt fences, cut-off drains for polluted stormwater and diversion channels for clean stormwater run-off, gully pit sediment barriers, field inlet sediment traps.

Details of the sediment and erosion control measures shall be provided on the engineering drawings for the clearing, site earthworks and civil engineering works. The contractor shall be responsible for the provision of the construction phase water quality objectives which shall be enforced by the preparation and implementation of an Erosion and Sediment Control Program.

The following information is provided to identify controls and procedures, and who is responsible for them, which will be incorporated into the Erosion and Sediment Control Program.

## 8.1 Pre-construction

- Establish a single stabilised entry/exit point (rumble pad) for each stage of construction. This point should also include a vehicle shakedown device to mitigate the transportation of dust and dirt.
- Sediment fences are to be placed along the low side of the site to slow flows, reduce scour and capture some sediment runoff.
- Sediment fences are to be constructed at the base of fill embankments.
- Divert up-slope water around the work site and appropriately stabilise any drainage channels.
- Areas for plant and construction material storage are to be designated along with associated diversion drains and spillage holding ponds.
- Diversion banks are to be created at the upstream boundary of construction activities to ensure upstream runoff is diverted around any areas to be exposed. Catch drains are to be created at the downstream boundary of construction activities.
- Construction of temporary sediment basins.
- Site personnel are to be educated to the sediment and erosion control measures implemented on site.

## 8.2 During Construction

- Progressive re-vegetation of filled areas and fill batters.
- Construction activities are to be confined to the necessary construction areas.
- The provision of a construction exit to prevent the tracking of debris from tyres of vehicles onto public roads.
- The topsoil stockpile location will be nominated to coincide with areas previously disturbed. A sediment fence is to be constructed around the bottom of the stockpile to trap sediment. A diversion drain is to be installed upstream of the stockpile if required.
- Transport loads that are subject to loss through wind or spillage shall be covered or sealed to prevent entry of pollutants to the stormwater system.
- Regular inspection and maintenance of silt fences, sediment basins and other erosion control measures. Following rainfall events greater than 50mm inspection of erosion control measures and removal of collected material should be undertaken. Replacement of any damaged equipment should be performed immediately.

## 8.3 Operational Management and Maintenance Plan

### 8.3.1 Aims and Objectives

Long term management and maintenance of the proprietary treatment devices on the site is required after construction has finished. The objective of the proprietary treatment devices is to allow stormwater from the development to be treated through the system before discharging into the downstream catchment. By having an Operational Management and Maintenance Plan (OMMP) in place, the proprietary treatment devices can be maintained to ensure that it is operating to optimal functionality.

## 8.3.2 Maintenance Requirements and Locations

Proprietary stormwater quality device maintenance is to be carried out by the manufacturer at a frequency dependent on the pollutant load characteristics of each site. Maintenance tasks includes but is not limited to:

- Using a vacuum unit to remove floatable pollutants
- Decant water until water level reaches accumulated sediment
- Removal of accumulated sediment
- Inspection of screening areas
- High pressure cleaning

The Sediment and Erosion Control Management Plans should be provided to all people involved with the site, including sub-contractors, private certifiers, home owners and regulators. These guidelines have been formed in accordance with the Healthy Waterways Fact Sheet 'Erosion and Sediment Control Management Plans' and the 'Best Practice Erosion and Sediment Control.

## 8.3.3 Personnel Responsible

The Contractor/Developer will be responsible for the maintenance of erosion and sediment control and stormwater devices from the possession of the site until the site is accepted 'Off Maintenance' or until stabilisation has occurred to the satisfaction of the superintendent and Council.

After "Off Maintenance", all devices remain the property of the developer and their responsibility for maintenance.

## 8.3.4 Scheduling of Inspections and Monitoring

*Regular Maintenance* is used for activities that require a small number of resources. These activities include weeding and removing litter and debris. Table 8-1 below sets out recommended frequency for inspections and regular maintenance of stormwater quality treatment devices.

**Table 8-1 Inspection and Maintenance Frequency**

| Asset Type | Wet Season | Dry Season |
|---|---|---|
| Cartridge System | 6 Months | 6 Months |
| Litter Baskets | 3 Months | 6 Months |

*Responsive Maintenance* is used to check for erosion and the condition of structures. This should be carried out at least once a year during or immediately after a significant rainfall event. A check that the system is free-draining should also be carried out at this time.

The OceanProtect Ocean Guard Operations Maintenance Manual (Appendix G) recommends that the filter bag be replaced and the support frame be rectified as required. The timing of which depends on the catchment pollutant load and the regularity of maintenance.

# 9 CONCLUSION

This SBSMP has been prepared to provide a design proposal and guide to the stormwater quantity and quality management techniques for the site.

The two primary objectives of this SBSMP have been to ensure that:

1. **Suitable measures are incorporated in the development to ensure that there are no adverse impacts to downstream receiving waterways, property or infrastructure resulting from any increase to peak discharging stormwater flow rates.**

This report includes stormwater quantity calculations which demonstrate, that due to change in stormwater catchment parameters, there is an expected increase in peak flow rates during the post development scenario. Detention systems have been proposed to control the rate of stormwater runoff discharged from the development site for all storm events, up to and including the 1% AEP storm event, to both of the two points of interest with respect to discharge from the development site.

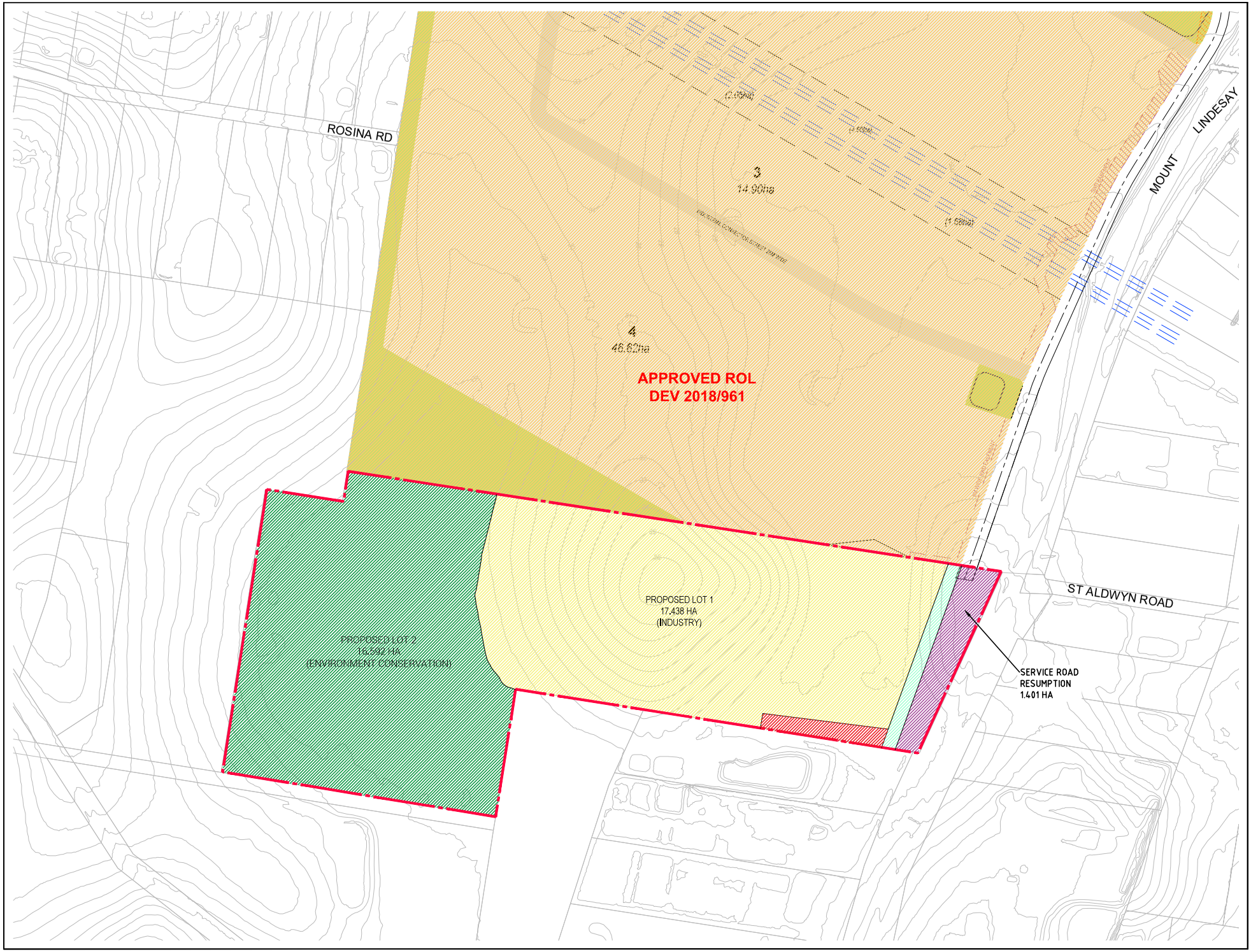
2. **Details of a proposed stormwater quality treatment train are provided to ensure the discharge of stormwater from the site is of adequate quality standards to comply with the requirements of Economic Development Queensland (EDQ), Logan City Council (LCC) and the South-East Queensland Healthy Waterways Partnership.**

A stormwater quality assessment is provided which demonstrates that a specially tailored treatment system will be required to meet the pollutant removal targets of LCC during the operational phase of the proposed development. The proposed treatment system includes routing of stormwater through rainwater harvesting tanks with reuse, litter baskets and a cartridge filter system prior to discharge to the receiving overland flow path.

Construction phase sediment control devices are to be implemented during construction works in accordance with requirements associated with Type 1 sediment discharge zones, comprising of a vehicle shakedown, sediment fences, gully inlet protection, sediment basin and check dams.

# APPENDIX A

## Proposed ROL Plan




place design group.

BRISBANE
131 Robertson Street
PO Box 419
Fortitude Valley QLD 4006
T + 61 7 3852 3922



PROJECT

4653-4691 MOUNT LINDESAY HIGHWAY

CLIENT

MACLEAN ESTATES

KEYS / NOTES

- SUBJECT SITE
- OPEN SPACE

ROAD LAYOUT

- INDICATIVE ROAD LAYOUT

OTHER FEATURES

- SERVICE ROAD RESUMPTION
- PROPOSED LOT 2
- PROPOSED LOT 1
- ROAD RESERVE
- EASEMENT

DRAWING TITLE

PROPOSED ROL PLAN

DESIGN : TW
DOCUMENT : RT
PROJECT : 1121084
SCALE :

NORTH

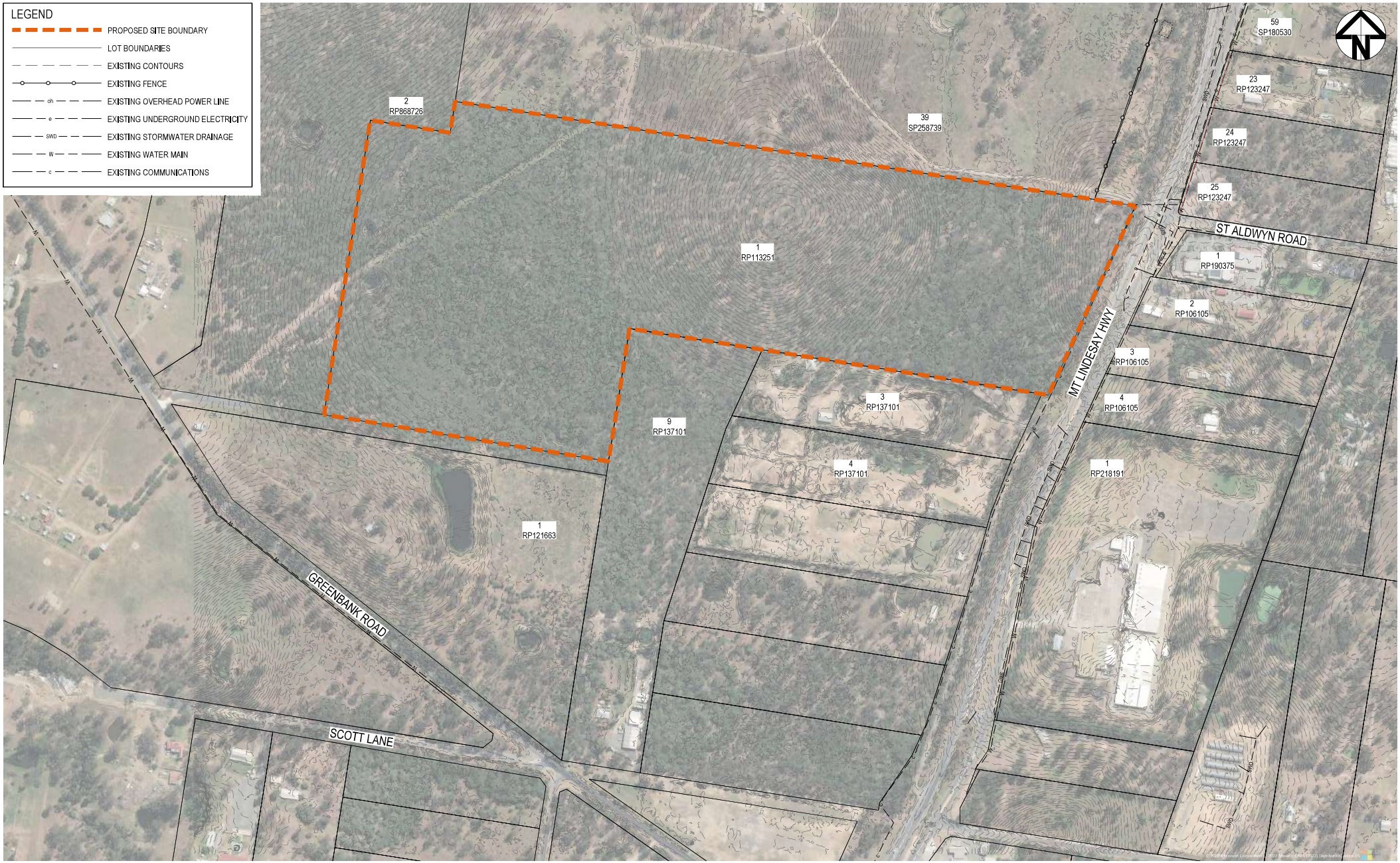
SCALE 1:2500 @ A1 1:5000 @ A3

DRAWING NUMBER 1121084 - 05

REVISION B

# APPENDIX B

## Engineering Drawings and Site Topography

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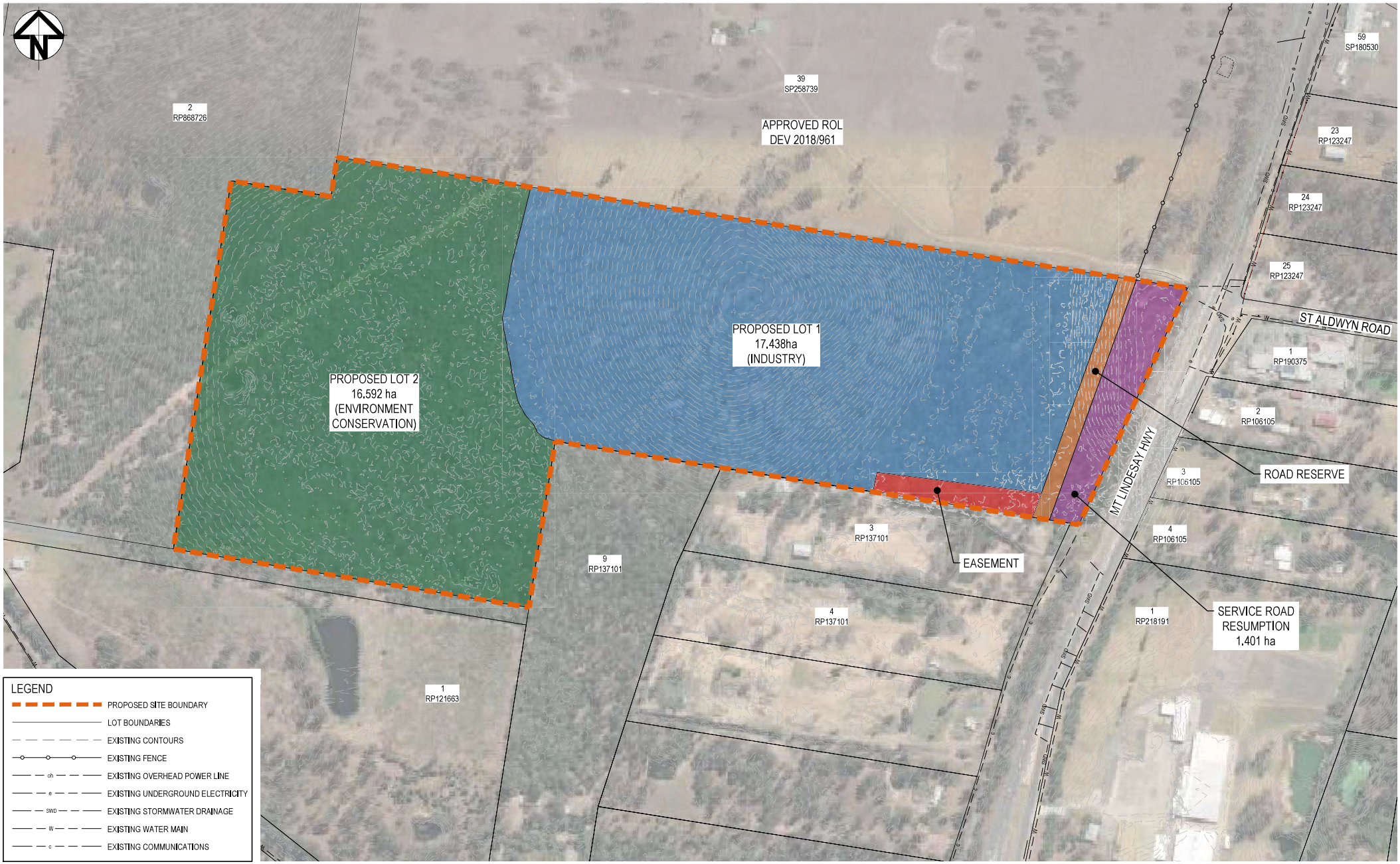


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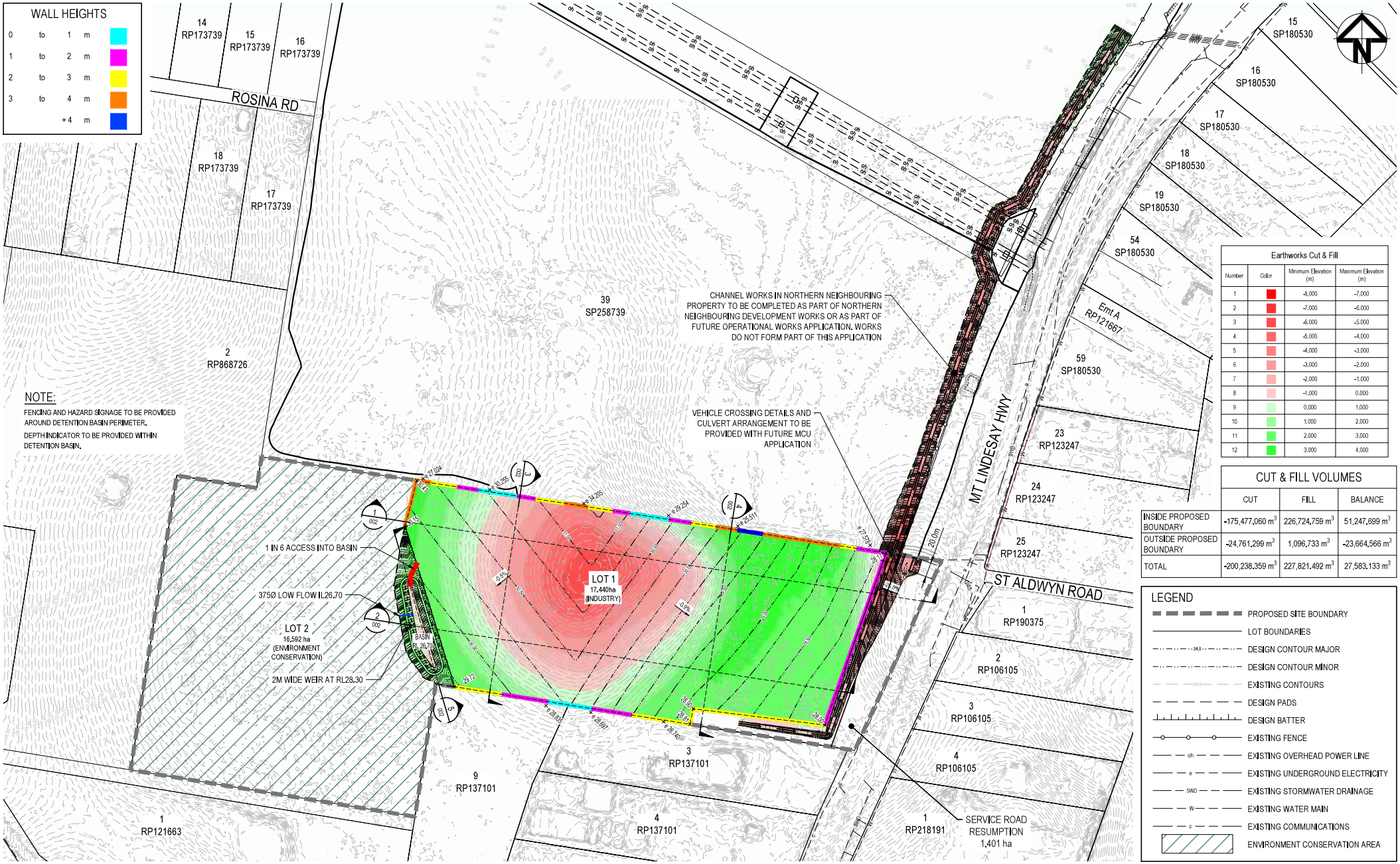


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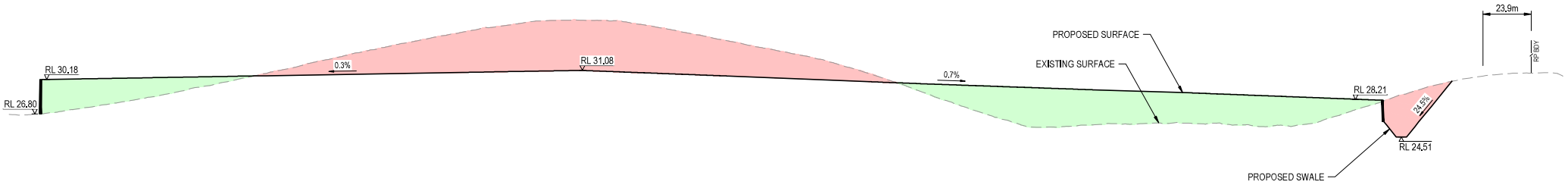


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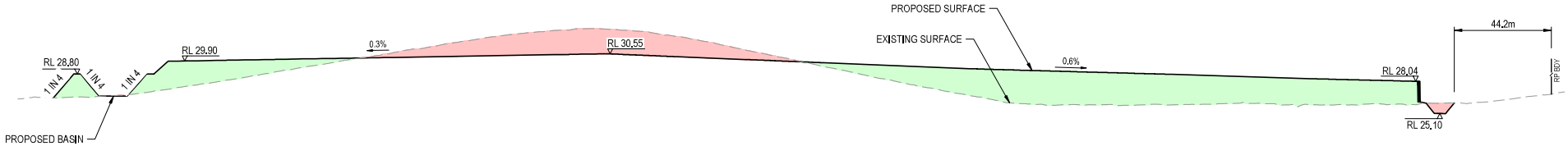


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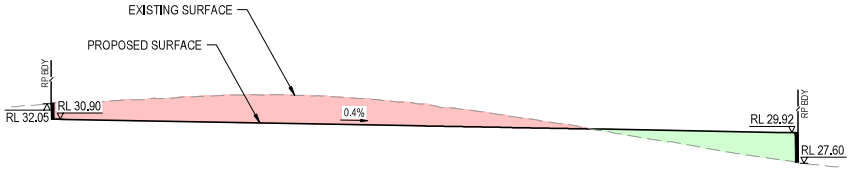


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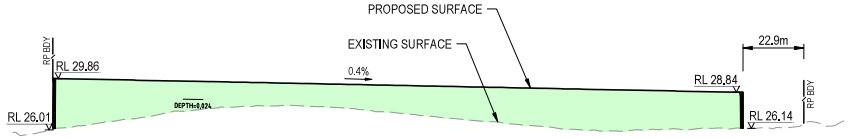


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Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
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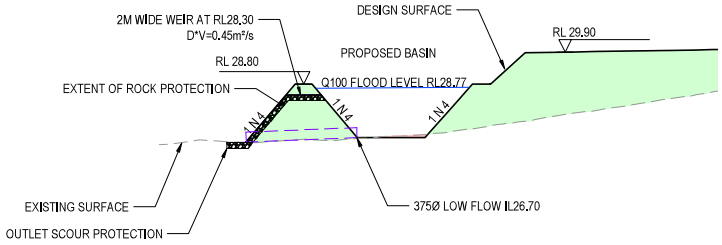


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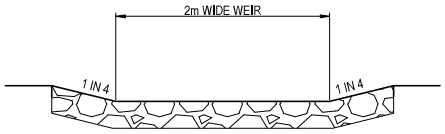


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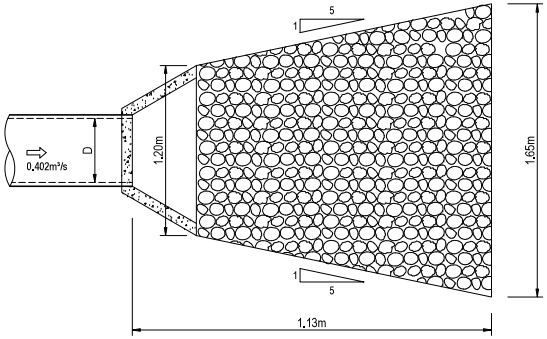


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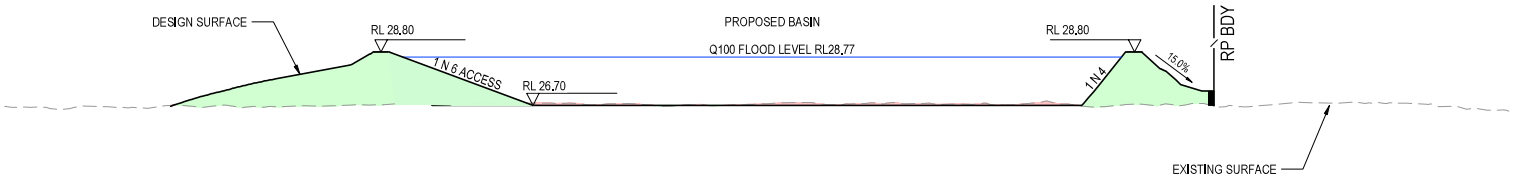


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100mm on Original

Scales
0 10 20 30 40 50m
1 : 500 HORIZONTAL
0 2 4 6 8 10m
1 : 100 VERTICAL

Surveyor
WOLTER consulting group
Planning Urban Design Landscape Environment Surveying

Architect

Client
MACLEAN ESTATES PTY LTD

Status
CONCEPT DESIGN ONLY
NOT TO BE USED FOR CONSTRUCTION

Original Issue Signatures

| | | | |
|---|---|---|---|
| Drawn | J.GRIEBELER | Original Size | A1 |
| Designed | J.GRIEBELER | Height Datum | AHD |
| Project Manager | G.ELLIS | Grid | |
| Verified | G.ELLIS | | |

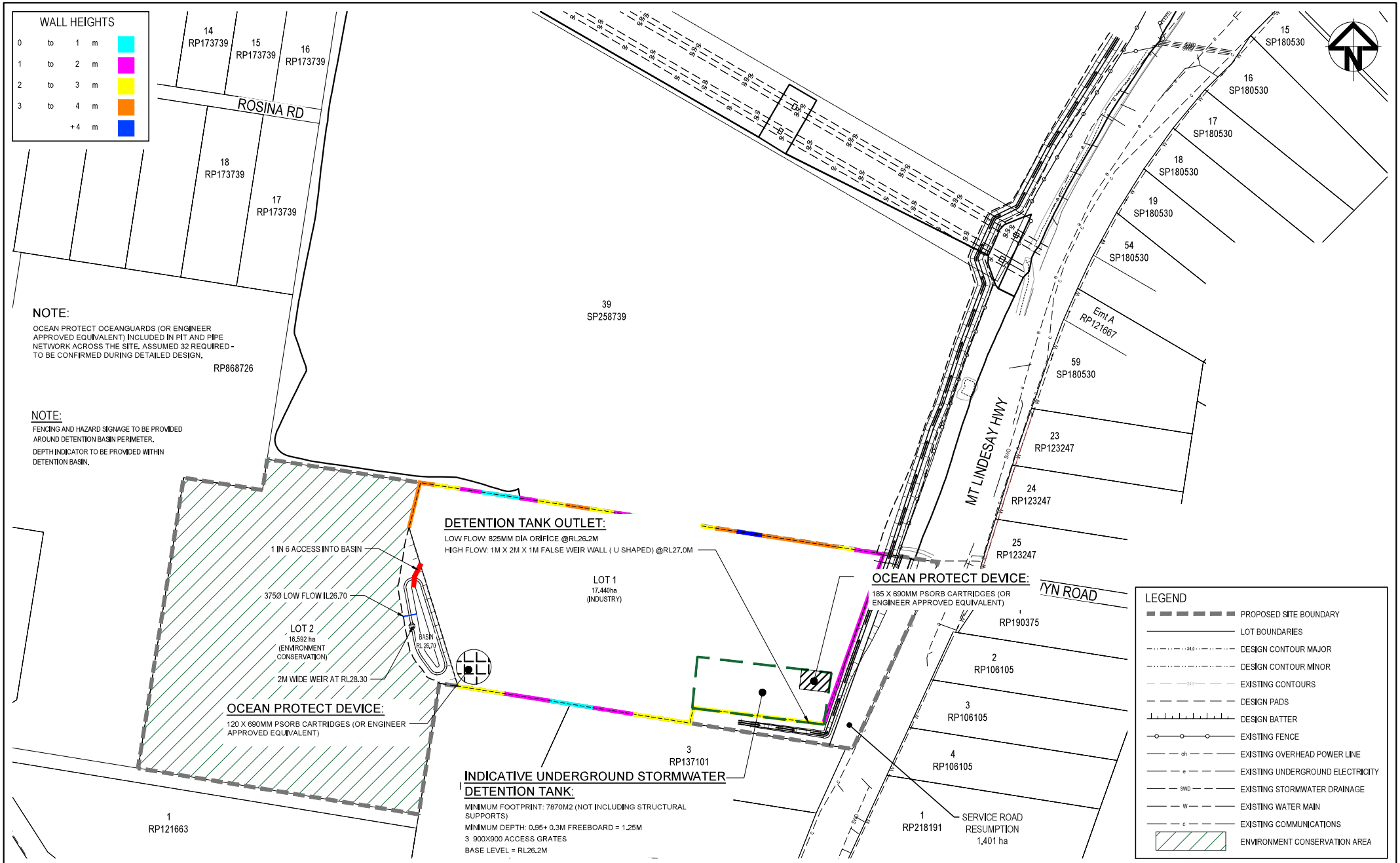
Project
4653-4691 MOUNT LINDESAY HIGHWAY, NORTH MACLEAN

Title
BULK EARTHWORKS SECTIONS SHEET 2

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

| Project No. | Folder Prefix | Zone | Stage | Phase | Discipline | Type | Drawing No. | Issue |
|---|---|---|---|---|---|---|---|---|
| 30139050 - | AAP | - WS00OP - | CV | - SKT - | 003 | - | 01 | |

Date Plotted: 3 Mar 2023 - 09:41AM File Name: C:\Users\SSAZ3927\ACDocs\Arcadis\AAU-30139050-North Maclean 2\Project Files\01_WIP\01_STG-00_Civil_CV\Drawings\30139050-AAP-WS000R-CV-SKT-002-80-EWSections.dwg V1




| Issue | Description | DR | CH | VE | Date |
|---|---|---|---|---|---|
| 01 | ORIGINAL ISSUE | JG | SS | GE | 02.03.23 |

Scales: 0 50 100 150 200 250m — 1 : 2500

Surveyor: WOLTER consulting group (Planning, Urban Design, Landscape, Environment, Surveying)

Architect

Client: MACLEAN ESTATES PTY LTD

Status: CONCEPT DESIGN ONLY
NOT TO BE USED FOR CONSTRUCTION



Original Issue Signatures

| | | | |
|---|---|---|---|
| Drawn | J.GRIEBELER | Original Size | A1 |
| Designed | J.GRIEBELER | Height Datum | AHD |
| Project Manager | G.ELLIS | Grid | |
| Verified | G.ELLIS | | |

Project: 4653-4691 MOUNT LINDESAY HIGHWAY, NORTH MACLEAN

Title: DETENTION TANK AND PROPRIETARY PRODUCT SKETCH PLAN

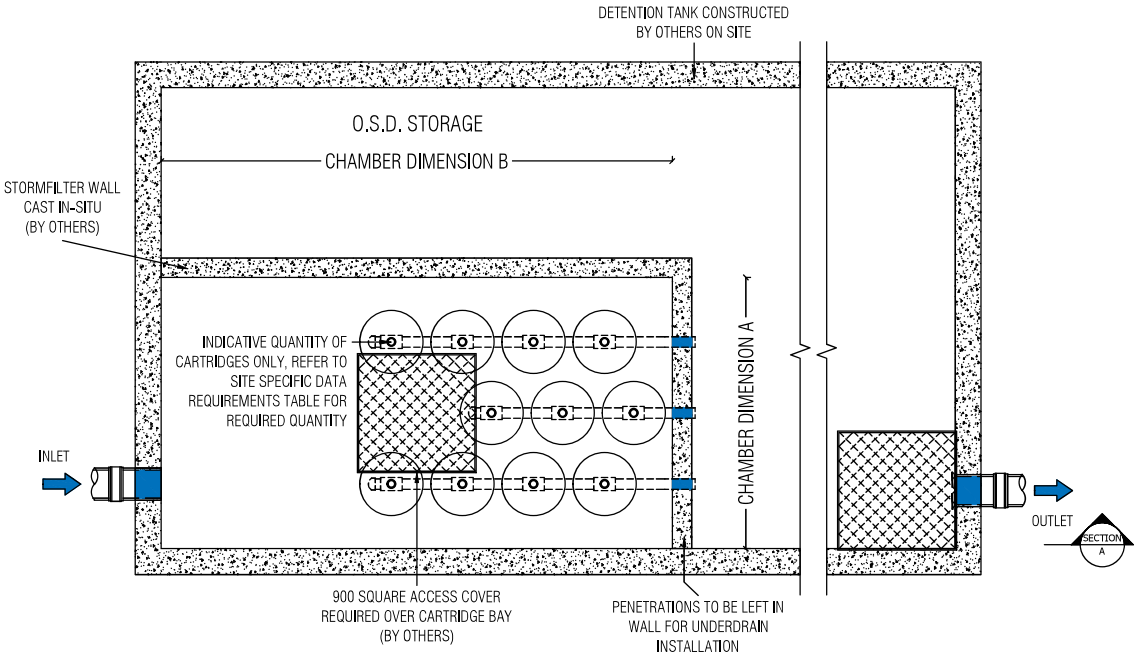
ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

| Project No. | Folder Prefix | Zone | Stage | Phase | Discipline | Type | Drawing No. | Issue |
|---|---|---|---|---|---|---|---|---|
| 30139050 - | AAP - | WS00OP - | CV - | SKT - | 004 - | | 01 | |

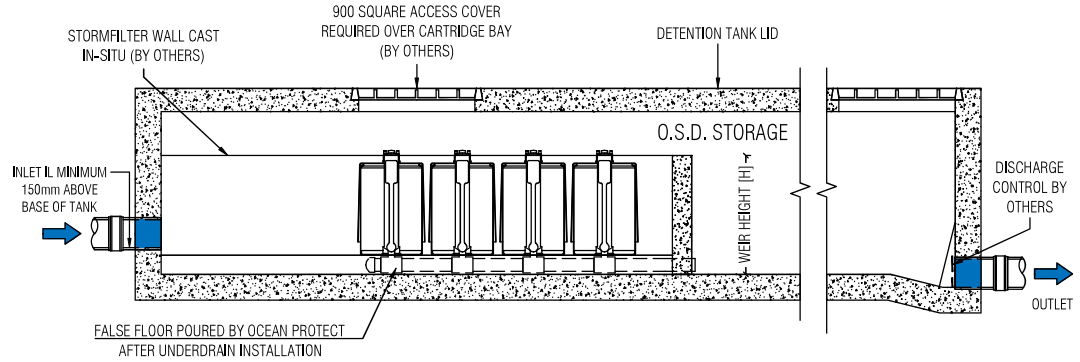
100mm on Original

Date Plotted: 13 Mar 2023 - 12:09PM File Name: C:\Users\SSAZ3927\ACCDocs\Arcadis\AAU-30139050-North Maclean 2\Project Files\01_WIP\01_STG-00_Civil_CV\Drawings\30139050-AAP-WS00OP-CV-SKT-001-BulkEW.dwg V1

NOT FOR CONSTRUCTION




## PLAN LAYOUT

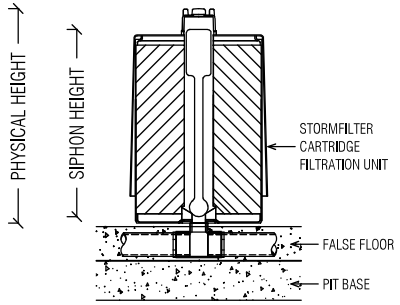



## SECTION A

## STORMFILTER DESIGN TABLE

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

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




**STORMFILTER CARTRIDGE DETAIL**

## SITE SPECIFIC DATA REQUIREMENTS

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

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

GENERAL NOTES

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

INSTALLATION NOTES

1. UNDERDRAIN AND FALSE FLOOR INSTALLED BY OCEAN PROTECT.

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

OCEAN PROTECT
STORMFILTER SYSTEM
DETENTION TANK ARRANGEMENT
SPECIFICATION DRAWING

LAST MODIFIED: 07-03-19

# APPENDIX C

## DEV 2018/961 Decision Notice

Queensland Government

Department of
**State Development, Infrastructure, Local Government and Planning**

Our ref: DEV2018/961

10 September 2021

Wearco Pty Ltd
C/- Reel Planning Pty Ltd
Att: Ms Amy Adamson
PO Box 2088
MILTON QLD 4064

Email: amy@reelplanning.com

Dear Amy

**S89(1)(a) Approval of PDA development application**
**PDA Development Permit for reconfiguring a lot – 1 lot into 4 lots, plus roads and open space at 4499-4651 Mount Lindesay Highway, North Maclean described as Lot 39 on RP253739**

On 10 September 2021, pursuant to s.85(4)(b) of the *Economic Development Act 2012,* the Minister for Economic Development Queensland (MEDQ) decided to grant **all** of the PDA development application applied for, in accordance with the attached PDA decision notice.

The PDA decision notice and approved plans / documents can also be viewed in the MEDQ Development Approvals Register via the Department website at www.dsdilgp.qld.gov.au/pda-da-applications.

If you require any further information, please contact Mr Brandon Bouda, Manager, Development Assessment, in Economic Development Queensland, by telephone on (07) 3452 7422 or at brandon.bouda@dsdilgp.qld.gov.au, who will be pleased to assist.

Yours sincerely

Jeanine Stone
**Director**
**Development Assessment**
**Economic Development Queensland**

Economic Development Queensland
GPO Box 2202
Brisbane Queensland 4001 Australia
**Website** www.edq.qld.gov.au
ABN 76 590 288 697

# PDA Decision Notice

| **Site information** | | |
|---|---|---|
| Name of priority development area (PDA) | Greater Flagstone | |
| Site address | 4499 – 4651 Mount Lindesay Highway, North Maclean | |
| Lot on plan description | Lot number | Plan description |
| | 39 | SP258739 |

| **PDA development application details** | |
|---|---|
| DEV reference number | DEV2018/961 |
| 'Properly made' date | 19 October 2018 |
| Type of application | ☒ PDA development application for:<br>☐ Material change of use<br>☐ Preliminary approval<br>☐ Development permit<br>☒ Reconfiguring a lot<br>☐ Preliminary approval<br>☒ Development permit<br>☐ Operational work<br>☐ Preliminary approval<br>☐ Development permit<br>☐ Application to change PDA development approval<br>☐ Application to extend currency period |
| Proposed development | 1 into 4 lots, with road, open space and a context plan |

| **PDA development approval details** | |
|---|---|
| Decision of the MEDQ | The MEDQ has decided to grant **all** of the PDA development approval applied for, **subject to** PDA development conditions forming part of this decision notice.<br><br>The approval is for:<br>• 1 into 4 lots, with road, open space and a context plan |
| Decision date | 10 September 2021 |
| Currency period | 6 years from the date of the decision |

Economic Development Queensland
GPO Box 2202
Brisbane Queensland 4001 Australia
**Website** www.edq.qld.gov.au
ABN 76 590 288 697

| Approved plans and documents | | | |
|---|---|---|---|
| The plans and documents approved by the MEDQ and referred to in the PDA development conditions for the PDA development approval are detailed below. | | | |
| **Approved plans and documents** | | **Number** | **Date** |
| 1. | Proposed Development Layout Plan | TIEL2020159.CIV.DA 010, Issue H | 07/07/21 (as amended in red dated 08/09/2021) |
| 2. | Staging Plan | TIELK202159.CIV.DA, Dwg No. 16, Issue C | 07/07/2021 (as amended in red date 03/09/2021) |
| 3. | Concept Earthworks Layout Plan | TIEL202159.CIV.DA, Dwg No. 015, Issue G | 07/07/21 |
| 4. | Concept Water Reticulation Layout Plan | TIEL202159.CIV.DA, Dwg No. 014, Issue G | 07/07/21 |
| 5. | Concept Sewer Reticulation Layout Plan | TIEL202159.CIV.DA, Dwg No. 012, Issue G | 07/07/21 (as amended in red dated 03/09/2021) |
| 6. | Concept Stormwater Drainage Layout Plan | TIEL202159.CIV.DA, Dwg No. 013, Issue H | 07/07/21 |
| 7. | Concept Catchment Layout Plan | TIEL202159.CIV.DA, Dwg No. 008, Issue I | 07/07/21 |
| 8. | Swale Cross Section | TIEL202159.CIV.DA.DWG No 019, Issue C | 07/07/21 |
| 9. | Swale Longitudinal Section | TIEL202159.CIV.DA, Dwg No 018, Issue B | 07/07/21 |
| 10. | Traffic Impact Assessment | 16378, Version 3 | 01/03/19 |
| 11. | Bushfire Management Plan | Report 16014, Final V3 | 13 July 2018 |
| 12. | Addendum to the bushfire management plan for the proposed development at 4499-4651 Mount Lindsay Highway, North Maclean | | 18 February 2019 |
| 13. | North Maclean Enterprise Precinct (4499-4651 Mount Lindesay Highway, North Maclean) – Progression of Ecological Issues | | 31 March 2017 |

## Supporting Plans and Documents

To remove any doubt, the following documents are not approved documents for the purposes of this PDA development approval, but rather are supporting documents.

| | **Supporting plans, reports and specifications** | **Number** *(if applicable)* | **Date** *(if applicable)* |
|---|---|---|---|
| **Endorsed Context Plan** | | | |
| 1. | North Maclean Enterprise Context Plan Land Use and Road Network | | 12/07/2021 (as amended in red dated 03/09/2021) |
| 2. | North Maclean Enterprise Context Plan Land Use and Road Network (Wider Locality) | | 12/07/2021 |
| 3. | North Maclean Enterprise Context Plan Ultimate Water and Sewer Network | | 12/07/2021 |
| 4. | North Maclean Enterprise Context Plan Ultimate Stormwater Network | | 12/07/2021 (as amended in red dated 03/09/2021) |
| **Supporting Plans, Reports and Specifications** | | | |
| 5. | Site Based Stormwater Management Plan | TEL202159, Issue A | 08 July 2021 |
| 6. | Engineering Services Report | TEL202159, Issue A | 06/07/21. |

## PDA development conditions

**PREAMBLE AND ABBREVIATIONS**

**PREAMBLE**

For the purpose of interpreting this PDA Development Approval, including the PDA Development Conditions, the following applies:

**Compliance assessment**

Where a condition of this approval requires Compliance Assessment, Compliance Assessment is required in accordance with the following:

a) The applicant must:

   i) pay to MEDQ at the time of submission the relevant fee for Compliance Assessment, including any third party peer review costs which will be charged on a 100% cost recovery basis. The Compliance Assessment fees are set out in EDQ Development Assessment Fees and Charges Schedule[1] (as amended from time to time).
   ii) submit to EDQ DA a duly completed Compliance Assessment form[2].

   iii) submit to EDQ DA the documentation as required under the relevant condition.

b) Where EDQ is satisfied the documentation submitted for Compliance Assessment meets the requirements of the relevant condition (or element of the condition), EDQ will endorse the documentation and advise by written notice.

[1] The EDQ Development Assessment Fees and Charges Schedule is available at EDQ's website.

[2] The Compliance Assessment form is available at EDQ's website. It sets out how to submit documentation for Compliance Assessment and how to pay Compliance Assessment fees.

c) Compliance Assessment and endorsement can be repeated where a different design or solution, to that already endorsed, is sought.

d) The process and timeframes that apply to Compliance Assessment are as follows:

i) applicant submits items required under a) above to EDQ DA for Compliance Assessment.

ii) **within 30 business days –** EDQ assesses the documentation and:
1. if satisfied, endorses the documentation; or
2. if not satisfied, notifies the applicant accordingly.

iii) if the applicant is notified under ii.2. above, revised documentation must be submitted **within 30 business days** from the date of notification.

iv) **within 30 business days –** EDQ assesses the revised documentation and:
1. if satisfied, endorses the revised documentation; or
2. if not satisfied, notifies the applicant accordingly.

v) where EDQ notifies the applicant as stated under iv.2. above, repeat steps iii. and iv. above. If either party is not satisfied by the outcome of this process, that party can elect to enter into a mediation process with an independent mediator agreed to by both parties.

Despite note v. above, the condition (or element of the condition) is determined to have been met only when EDQ endorses relevant documentation.

***SUBMITTING DOCUMENTATION TO EDQ:***

Where a condition of this approval requires documentation to be submitted to either EDQ DA or EDQ TS, submit the documentation to:

a) EDQ DA at: pdadevelopmentassessment@dsdmip.qld.gov.au.

b) EDQ TS at: EDQ_PrePostConstruction@dsdmip.qld.gov.au.

**ABBREVIATIONS**

For the purposes of interpreting the PDA Development Conditions, the following is a list of abbreviations utilised:

1. **AILA** means a Landscape Architect registered Australian Institute Landscape Architect.

2. **Certification Procedures Manual** means the document titled *Certification Procedures Manual*, prepared by the Department of Infrastructure, Local Government and Planning, dated 16 October 2017 (as amended from time to time).

3. **Contributed Asset** means an asset constructed under a PDA development approval or Infrastructure Agreement that will become the responsibility of an External Authority. For the purposes of operational works for a Contributed Asset, the following definitions apply:
   a. **External Authority** means a public-sector entity other than the MEDQ;
   b. **Parkland** means carrying out operational work related to the provision of parkland infrastructure;

c. **Roadworks** means carrying out any operational work within existing or proposed road(s), to a depth of 1.5m measured from the top of kerb, and includes Streetscape Works;
d. **Sewer Works** means carrying out any operational work related to the provision of wastewater infrastructure;
e. **Streetscape Works** means carrying out any operational work within the verge of a road, including footpath surface treatments, street furniture, street lighting and landscaping;
f. **Stormwater Works** means carrying out any operational work related to the provision of stormwater infrastructure; and
g. **Water Works** means carrying out any operational work related to the provision of water infrastructure.

4. **Council** means Logan City Council.

5. **DSDILGP** means The Department of State Development, Infrastructure, Local Government and Planning

6. **EDQ** means Economic Development Queensland

7. **EDQ DA** means Economic Development Queensland's – Development Assessment team.

**8.** **EDQ TS** means Economic Development Queensland's – Technical Services team.

9. **IFF** means Infrastructure Funding Framework.

10. **MEDQ** means The Minister of Economic Development Queensland.

11. **PDA** means Priority Development Area.

12. **RPEQ** means Registered Professional Engineer of Queensland

| No. | Condition | Timing |
|---|---|---|
| **General** | | |
| **1.** | **Carry out the approved development**<br><br>Carry out the approved development generally in accordance with the approved plans and documents; and any other documentation endorsed via Compliance Assessment as required by these conditions. | Prior to survey plan endorsement for the relevant stage |
| **2.** | **Street naming**<br><br>Submit to EDQ DA a schedule of street names approved by Council. | Prior to survey plan endorsement for the relevant stage |
| **Construction** | | |
| **3.** | **Hours of work - construction**<br><br>Unless otherwise endorsed, via Compliance Assessment for out of hours work, construction hours for the approved development are limited to Monday to Saturday between 6:30am to 6:30pm, excluding public holidays. | During construction unless otherwise endorsed |

| | | |
|---|---|---|
| **4.** | **Out of hours work - Compliance Assessment**<br><br>Where out of hours work is proposed, submit to EDQ DA, for Compliance Assessment, an out of hours work request. The out of hours work request must include a duly completed out of hours work request form[3]. | Minimum of 10 business days prior to proposed out of hours work commencement date |
| **5.** | **Certification of Operational Work**<br><br>Carry out all Operational Work under this approval in accordance with the *Certification Procedures Manual.* | At all times |
| **6.** | **Construction management plan**<br><br>a) Submit to EDQ TS a site-based Construction Management Plan (CMP), prepared by the principal site contractor and reviewed by a suitably qualified and experienced person responsible for overseeing the site works, to manage construction impacts, including:<br>i) noise and dust in accordance with the EP Act;<br>ii) stormwater flows around and through the site without increasing the concentration of total suspended solids or Prescribed Water Contaminants (as defined in the EP Act), causing erosion, creating any ponding and causing any actionable nuisance to upstream and downstream properties;<br>iii) contaminated land, where required under a site suitability statement prepared in accordance with section 389 of the EP Act;<br>iv) complaints procedures;<br>v) site management:<br>1. for the provision of safe and functional alternative pedestrian routes, past, through or around the site;<br>2. to mitigate impacts to public sector entity assets, including street trees, on or external to the site;<br>3. for safe and functional temporary vehicular access points and frequency of use;<br>4. for the safe and functional loading and unloading of materials including the location of any remote loading sites;<br>5. for the location of materials, structures, plant and equipment;<br>6. of waste generated by construction activities;<br>7. detailing how materials are to be loaded/unloaded;<br>8. of proposed external hoardings and gantries (with clearances to street furniture and other public sector entity assets);<br>9. of employee and visitor parking areas;<br>10. of anticipated staging and programming;<br>11. for the provision of safe and functional emergency exit routes; and<br>12. any out of hours work as endorsed via Compliance Assessment.<br><br>b) A copy of the CMP submitted under part a) of this condition must be current and available on site. | a) Prior to commencing work for the relevant stage<br><br>b) During construction |

[3] The out of hours work request form is available at EDQ's website.

| | | |
|---|---|---|
| | c) Carry out all construction work generally in accordance with the CMP submitted under part a) of this condition. | c) During construction |
| **7.** | **Erosion and sediment management**<br><br>a) Submit to EDQ TS an Erosion and Sediment Control Plan (ESCP), certified by a RPEQ or an accredited professional in erosion and sediment control, and prepared generally in accordance with the following:<br>i) construction phase stormwater management design objectives of the *State Planning Policy 2017* (Appendix 2 Table A);<br>ii) *Healthy Land and Water Technical Note: Complying with the SPP – Sediment Management on Construction Sites*.<br><br>b) Implement the certified ESCP submitted under part a) of this condition. | a) Prior to commencing work for the relevant stage<br><br>b) During construction |
| **8.** | **Dispersive soil management**<br><br>a) Submit to EDQ TS a Dispersive Soil Management Plan, prepared by a soil science/soil chemistry specialist that details for the design, construction, and operational phases of the development including:<br>i. the suite of methods required to identify and address potential issues associated with the exposure and re-use of dispersive soils,<br>ii. details of the areas where dispersive soils will be disturbed and treated/rehabilitated.<br><br>b) Implement and monitor the actions identified in the Dispersive Soil Management Plan as required under part a) of this condition. | a) Prior to commencing site works<br><br>b) At all times during construction |
| **9.** | **Traffic Management Plan**<br><br>a) Submit to EDQ TS a Traffic Management Plan (TMP), certified by a person holding a current Traffic Management Design qualification. The TMP must include the following:<br>i) provision for the safe and functional management of traffic around and through the site during and outside of construction work hours;<br>ii) provision for the safe and functional management of pedestrian traffic, including alternative pedestrian routes past, through or around the site;<br>iii) provision of parking for workers and materials delivery;<br>iv) risk identification, assessment and identification of mitigation measures;<br>v) ongoing monitoring, management review and certified updates (as required); and<br>vi) traffic control plans and/or traffic control diagrams, prepared in accordance with *Austroads Guide to Temporary Traffic Management*, for any temporary part or full road closures.<br><br>b) Carry out all construction work generally in accordance with the certified TMP submitted under part a) of this condition, which is to be current and available on site. | a) Prior to commencing work for the relevant stage<br><br>b) During construction |

| | | |
|---|---|---|
| | ***Advice Note**: Operational traffic changes, such as temporary and permanent lane modifications, relaxation of clearway zone hours or footpath closures may require authorisation from Council or DTMR as road manager. It is recommended that applicants engage directly with the applicable road manager.* | |
| **10.** | **Public infrastructure (damage, repairs and relocation)**<br><br>a) Repair any damage to existing public infrastructure caused by works carried out in association with the approved development.<br><br>b) Where existing public infrastructure require repair or relocation, due to the approved development and/or works associated with the approved development, repair and/or relocate the public infrastructure at no cost to others and in accordance with statutory requirements and adopted design standards.<br><br>***Advice Note**: It is recommended applicants record their own dated photographic evidence of the condition of relevant existing public infrastructure both before and after works carried out in association with the approved development.* | a) Prior to survey plan endorsement for the relevant stage<br><br>b) Prior to survey plan endorsement for the relevant stage |
| **Earthworks and retaining walls** | | |
| **11.** | **Compliance Assessment - Earthworks**<br><br>a) Submit to EDQ DA for Compliance Assessment detailed earthworks plans, certified by a RPEQ, and designed generally in accordance with:<br>i) Australian Standard AS3798 – 2007 Guidelines on Earthworks for Commercial and Residential Developments and<br>ii) the approved Concept Earthworks Layout Plan, Plan No. TIEL202159.CIV.DA, Dwg No. 015, Issue G, Prepared by Telford Civil, dated 07/07/21.<br><br>The certified earthworks plans are to:<br>i) include a geotechnical soils assessment of the site;<br>ii) accord with the Erosion and Sediment Control Plan, as required by condition 7 – Erosion and sediment management;<br>iii) accord with the Dispersive Soil Management Plan, as required by condition 8 – Dispersive soil management;<br>iv) include the location and finished surface levels of any cut and/or fill;<br>v) provide details of any areas where surplus soils are to be stockpiled;<br>vi) detail protection measures to:<br>1. ensure adjoining properties and roads are not impacted by ponding or nuisance stormwater resulting from earthworks associated with the approved development;<br>2. preserve all drainage structures from structural loading impacts resulting from earthworks associated with the approved development. | a) Prior to commencing earthworks for the relevant stage |

| | | |
|---|---|---|
| | b) Carry out earthworks generally in accordance with the certified plans endorsed by EDQ through part a) of this condition.<br><br>c) Submit to EDQ TS RPEQ certification that:<br>i) all earthworks have been carried out generally in accordance with the certified plans submitted under part a) of this condition; and<br>ii) any unsuitable material encountered has been treated or replaced with suitable material. | b) Prior to survey plan endorsement for the relevant stage<br><br>c) Prior to survey plan endorsement for the relevant stage |
| **12.** | **Retaining walls (excluding the western boundary retaining wall)**<br><br>a) Submit to EDQ TS detailed engineering plans, certified by a RPEQ, of all retaining walls 1m or greater in height. Retaining walls must be:<br>i) certified to achieve a minimum 50 year design life;<br>ii) designed generally in accordance with *AS4678 – Earth Retaining Structures* and relevant material standards (e.g. *AS3600 – Concrete Structures*);<br><br>b) Construct retaining walls generally in accordance with the certified plans required under part a) of this condition.<br><br>c) Submit to EDQ TS certification from an RPEQ that all retaining wall works 1.0m or greater in height have been constructed generally in accordance with the certified plans submitted under part a) of this condition. | a) Prior to commencing earthworks for the relevant stage<br><br>b) Prior to survey plan endorsement for the relevant stage<br><br>c) Prior to survey plan endorsement for the relevant stage |
| **13.** | **Compliance Assessment – Western boundary retaining wall**<br><br>a) Submit to EDQ DA for Compliance Assessment preliminary engineering plans, certified by a RPEQ, of the proposed western boundary retaining wall adjoining the swale. The retaining wall must be:<br>i) fully contained, including footings, within the private lots;<br>ii) designed based on a professional geotechnical advice;<br>iii) take into consideration scour and flood impacts from the adjoining swale; and<br>iv) appropriately fenced (fauna exclusion).<br><br>b) Submit to EDQ TS detailed engineering plans, certified by a RPEQ, of the proposed retaining wall along the western swale, generally in accordance with the endorsed plans required under part a) of this condition. The retaining wall must be:<br>i) certified to achieve a minimum 100 year design life;<br>ii) designed generally in accordance with *AS4678 – Earth Retaining Structures* and relevant material standards (e.g. *AS3600 – Concrete Structures*);<br><br>c) Construct retaining walls generally in accordance with the certified plans required under part b) of this condition. | a) Prior to commencing earthworks for Stage 2<br><br>b) Prior to survey plan endorsement for Stage 2<br><br>c) Prior to survey plan endorsement for Stage 2 |

| | | |
|---|---|---|
| | d) Submit to EDQ TS:<br>i) 'as-constructed' plans, certified by a RPEQ, demonstrating that the retaining wall has been constructed generally in accordance with the certified plans submitted under part a) of this condition.<br>ii) A survey plan identifying the location of wall and footings to the property boundary. | d) Prior to survey plan endorsement for Stage 2 |
| **Roadworks, urban servicing and stormwater management** | | |
| **14.** | **Compliance Assessment - Road 1, Road 3 and Road 4** | |
| | a) Submit to EDQ DA for Compliance Assessment functional layout plans, certified by a RPEQ, for Road 1, Road 3 and Road 4 generally in accordance with:<br>i) PDA Guideline No. 13 Engineering standards; and<br>ii) Proposed Development Layout Plan, Plan No. TIEL202159.CIV.DA, Dwg No. 010, Issue H, prepared by Telford Civil and dated 07/07/21<br>iii) Industrial Connector Street Cross-Section as identified in the Engineering Services Report prepared by Telford Civil and dated 06/07/21.<br><br>The roads are to be designed to allow for the use of heavy vehicles (B-doubles). | a) Prior to commencing site works |
| | b) Submit to EDQ TS detailed engineering plans, certified by a RPEQ, for roadworks for Road 1, Road 3 and Road 4, including parking bays, traffic devices and footpaths generally in accordance with:<br>i) PDA Guideline No. 13 Engineering standards; and<br>ii) functional layout plans endorsed under part a) of this condition. | b) Prior to commencing roadworks for the relevant stage |
| | c) Construct roadworks generally in accordance with the certified plans submitted under part b) of this condition. | c) Prior to survey plan endorsement for the relevant stage |
| | d) Submit to EDQ TS:<br>i) certification from a RPEQ that all roadworks have been constructed generally in accordance with the certified plans submitted under part a) of this condition; and<br>ii) all documentation as required by the *Certification Procedures Manual*.<br>iii) as-constructed drawings, asset register and test results, certified by a RPEQ, in a format acceptable to the end asset owners for all roadworks constructed under this condition. | d) Prior to survey plan endorsement for the relevant stage |
| **15.** | **Compliance assessment – Crowson Lane and Greenhill Road intersection interim layout**<br><br>Unless ultimate intersection works are already delivered by Council as part of the Crowson Lane augmentation project: | |
| | a) Submit to EDQ DA for Compliance Assessment engineering design and construction drawings, certified by a RPEQ, for the auxiliary left-turn treatment and channelised right turn lane | a) Prior to commencing intersection works |

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| | treatment at the Crowson Lane/Greenhill Road intersection, generally in accordance with the following plans/documents:<br>i. PDA Guideline No. 13 Engineering standards; and<br>ii. Traffic Impact Assessment, Report No. 16378, Version 3 prepared by Rytenskild Traffic Engineering and dated 1 March 2019. | |
| | b) Construct the works generally in accordance with the endorsed plans submitted under part a) of this condition. | b) Prior to survey plan endorsement for the first stage |
| | c) Submit to EDQ TS:<br>i) certification from a RPEQ that the intersection works have been constructed generally in accordance with the certified plans submitted under part b) of this condition; and<br>ii) all documentation as required by the Certification Procedures Manual.<br>iii) as-constructed drawings, asset register and test results, certified by a RPEQ, in a format acceptable to the end asset owners for all roadworks constructed under this condition. | c) Prior to survey plan endorsement for the first stage |
| **16.** | **Mount Lindesay Highway Service Road (Road 2)** | |
| | a) Submit to EDQ TS, approval from the Department of Transport and Main Roads for the Mount Lindesay Highway service lane, identified as Road 2 on Proposed Development Layout Plan, Plan No. TIEL202159.CIV.DA, Dwg No. 010, Issue H, prepared by Telford Civil and dated 07/07/21<br><br>The service lane is to be designed to allow for the use of heavy vehicles (B-doubles). | a) Prior to commencing works for Stage 1 |
| | b) Construct the extent of Road 2 as shown on Proposed Development Layout Plan, Plan No. TIEL202159.CIV.DA, Dwg No. 010, Issue H, prepared by Telford Civil and dated 07/07/21 from the intersection with Road 1 to the Crowson Lane Interchange with the first stage of development in accordance with the approval from DTMR as required under part a) | b) As indicated |
| | c) Construct the extent of Road 2 as shown on Proposed Development Layout Plan, Plan No. TIEL202159.CIV.DA, Dwg No. 010, Issue H, prepared by Telford Civil and dated 07/07/21 from the intersection with Road 3 to the intersection of Road 1 with the second stage of development in accordance with the approval from DTMR as required under part a). | c) As indicated |
| | d) Submit to EDQ TS, certification from a RPEQ that all roadworks have been constructed generally in accordance part a) of this condition.<br><br>***Advice Note**: Construction of this service lane in accordance with the Industrial Connector cross-section or as alternatively agreed to by EDQ and meets EDQ's minimum requirements for offsetable infrastructure, can be considered offsetable.* | d) Prior to survey plan endorsement for the relevant stage |

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| **17.** | **Street lighting**<br><br>Comply with either parts a) and c) or parts b) and c) of this condition. | |
| | a) Design and install a Rate 2 street lighting system, certified by a RPEQ, to all roads, including footpaths/bikeways within road reserves. The design of the street lighting system must:<br>i) meet the relevant standards of Energex;<br>ii) be endorsed by Energex as 'Rate 2 Public Lighting';<br>iii) be endorsed by Council as the Energex 'billable customer';<br>iv) be generally in accordance with *Australian Standards AS1158 – 'Lighting for Roads and Public Spaces*. | a) Prior to survey plan endorsement for the relevant stage |
| | b) Design and install a Rate 3 street lighting system, certified by a suitably qualified and experienced RPEQ, to all roads, including footpaths/bikeways within road reserves. The design of the street lighting system must:<br>i) be in accordance with *Australian Standards AS1158 – 'Lighting for Roads and Public Spaces'*<br>ii) meet the requirements of AS3000 – '*SAA Wiring Rules'.*<br>iii) meet the requirements of Energex for unmetered supply<br>iv) be endorsed by the relevant ownership authority. | b) Prior to survey plan endorsement for the relevant stage |
| | c) Submit to EDQ TS 'as-constructed' plans and test documentation, certified by a RPEQ, in a format acceptable to Council. | c) Prior to survey plan endorsement for the relevant stage |
| **18.** | **Compliance Assessment - Water reticulation** | |
| | a) Submit to EDQ DA for Compliance Assessment a detailed water network plan, supported by hydraulic analysis, certified by RPEQ. The water network plan shall be prepared in accordance with:<br>i) *SEQ Water Supply and Sewerage Design and Construction Code*; and<br>ii) Concept Water Reticulation Layout Plan, Plan no. TIEL202159.CIV.DA, Dwg No 014, Issue G, prepared by Telford Civil and dated 07/07/21. | a) Prior to commencing works for Stage 1 |
| | b) Submit to EDQ TS detailed water reticulation design plans, certified by a RPEQ. The certified water reticulation design plans must be designed generally in accordance with:<br>i) *SEQ Water Supply and Sewerage Design and Construction Code*; and<br>ii) the endorsed water network analysis required under part a) of this condition. | b) Prior commencing water reticulation work for the relevant stage |
| | c) Construct water reticulation works generally in accordance with the certified plans submitted under part a) of this condition. | c) Prior to survey plan endorsement for the relevant stage |

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| | d) Submit to EDQ TS 'as constructed' plans, certified by a RPEQ, of all water reticulation infrastructure constructed in accordance with this condition, including an asset register, pressure and bacterial test results in accordance with:<br>i) SEQ Water Supply and Sewerage Design and Construction Code - Asset Information. | d) Prior to survey plan endorsement for the relevant stage |
| **19.** | **Compliance Assessment – Internal Sewer reticulation** | |
| | a) Submit to EDQ DA for Compliance Assessment a detailed internal sewerage network plan, supported by hydraulic analysis, certified by RPEQ. The internal sewer network plan shall be prepared in accordance with:<br>i) *SEQ Water Supply and Sewerage Design and Construction Code*; and<br>ii) Concept Sewer Reticulation Layout Plan, Plan No. TIEL202159.CIV.DA, Dwg No 012, Issue G, prepared by Telford Civil and dated 07/07/21.<br><br>The sewerage network plan shall include the extension of the internal sewer reticulation to the southern boundary to service the external catchment falling to the site. | a) Prior to commencing works for the relevant stage |
| | b) Submit to EDQ TS detailed sewer reticulation design plans, certified by a RPEQ. The certified sewer reticulation design plans must be designed generally in accordance with:<br>i) *SEQ Water Supply and Sewerage Design and Construction Code;* and<br>ii) the endorsed sewer network plan required under part a) of this condition | b) Prior to commencing works for the relevant stage |
| | c) Construct the internal sewer reticulation works generally in accordance with the certified plans submitted under part b) of this condition. | c) Prior to survey plan endorsement for the relevant stage |
| | d) Submit to EDQ TS 'as constructed' plans, certified by an RPEQ, of all internal sewer reticulation infrastructure constructed in accordance with this condition, including an asset register, pressure and CCTV results in accordance with:<br>*i) SEQ Water Supply and Sewerage Design and Construction Code - Asset Information.*<br><br>**Advice Note:** *The Sub-Regional sewerage pump station NM1 and external sewer rising main will be constructed and put in operation by Council.* | d) Prior to survey plan endorsement for the relevant stage |
| **20.** | **Temporary sewage tankering of wastewater**<br><br>Unless the Sub-Regional sewerage pump station NM1 and external rising main is completed and in operation by Council: | |
| | a) Enter into a tankering agreement with Council for the collection and disposal of wastewater for any lots created; and | a) Prior to survey plan endorsement for the first stage |
| | b) Maintain the tankering agreement required by part a) of this condition until Sub-Regional sewerage pump station NM1 is commissioned. | b) As indicated |

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| **21.** | **Compliance Assessment – Updated Site Based Stormwater Management Plan**<br><br>Submit to EDQ DA for Compliance Assessment an updated Site Base Stormwater Management Plan (SBSMP), certified by a RPEQ, for the management of stormwater within the site to ensure non-worsening to downstream properties, including Mt Lindesay Highway, generally in accordance with *PDA Guideline No. 13 Engineering standards, Stormwater Quantity and Stormwater Quality*.<br><br>The updated SBSMP shall include the following:<br>i) Confirmation that the subject site is not impacted by flooding. This confirmation is to be provided through the undertaking of a site based flood model. If impacted by flood, provide further details on the Q100 line and the type of inundation – conveyance and/or storage<br>Or<br>Demonstrate that the updated current solution identified in the SBSMP ensures that there is no worsening at lawful point of discharge based on Council's nominated 1% AEP flood level at Mt Lindesay Highway.<br><br>ii) he on-site detention/bio-retention basins form part of the overall solution. Provide an engineering and legal strategy/mechanism (e.g. Easement) to ensure that these devices can continue to perform as designed into the future.<br>iii) Demonstrate that the design of the road stormwater system will convey runoff from the road reserve and the pre-developed lots to the proposed detention / bio-retention basin.<br>iv) Demonstrate that the configuration, sizing and operation of the proposed detention / bio-retention basin system will accommodate runoff from the road stormwater system as per part (iii) above and result in no net worsening downstream of the site.<br>v) Conveyance of existing external flows to the existing lawful point of discharge, ensuring no-net worsening downstream of the site. | Prior to commencing works |
| **22.** | **Stormwater Conveyance System**<br><br>a) Submit to EDQ TS detailed engineering drawings and hydraulic calculations, certified by a RPEQ, for the stormwater conveyance system designed generally in accordance with:<br>i) *PDA Guideline No. 13 Engineering standards* – Stormwater quantity; and<br>ii) Updated Site Based Stormwater Management Plan, required by Condition 21 of this approval.<br><br>b) Construct stormwater network generally in accordance with the certified plans submitted under part a) of this condition. | a) Prior to commencing works for the relevant stage<br><br>b) Prior to survey plan endorsement for the relevant stage |

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| | c) Submit to EDQ TS "as constructed" plans, certified by a RPEQ including an asset register in a format acceptable to Council. | c) Prior to survey plan endorsement for the relevant stage |
| **23.** | **Compliance Assessment - Stormwater detention/bio-retention basin**<br><br>a) Submit to EDQ DA for Compliance Assessment detailed engineering drawings and hydraulic calculations, certified by a RPEQ, for the proposed detention/bio-retention basin designed generally in accordance with:<br>i) PDA Guideline No. 13 Engineering standards – Stormwater Quantity and Stormwater Quality; and<br>ii) Updated Site Based Stormwater Management Plan, required by Condition 21 of this approval.<br><br>b) Construct the basin generally in accordance with the endorsed plans required under part a) of this condition.<br><br>c) Submit to EDQ TS "as constructed" plans, certified by a RPEQ including an asset register in a format acceptable to Council.<br><br>**Advice Note:** *The proposed industrial allotments will have lot-based on-site stormwater detention and water quality treatment measures in the post-development phase. These treatment devices will be installed by the future lot owner with their size and location being allocated to suit the end use. Maintenance of these devices will be the responsibility of the future lot owners.* | a) Prior to commencing works<br><br>b) Prior to survey plan endorsement for the first stage<br><br>c) Prior to survey plan endorsement for the first stage |
| **24.** | **Compliance Assessment – Swale**<br><br>a) Submit to EDQ DA for Compliance Assessment detailed engineering drawings and hydraulic calculations, certified by a RPEQ, for the stormwater swale on the western boundary of the land designed generally in accordance with:<br>i) PDA Guideline No. 13 Engineering standards – Stormwater quantity and:<br>ii) Concept Catchment Layout Plan, Plan No. TIEL202159.CIV.DA, Dwg No. 008 Issue I, Prepared by Telford Civil and dated 07/07/2021<br>iii) Swale Longitudinal Section, Plan No. TIEL202159.CIV.DA, Dwg No 018 Issue B, Prepared by Telford Civil and dated 07/07/2021<br>iv) Swale Cross Sections, Plan No. TIEL202159.CIV.DA, Dwg No 019 Issue C, Prepared by Telford Civil and dated 07/07/2021<br><br>The detailed design shall ensure that the swale:<br>i) has adequate capacity to convey overland flow up to including the 1 in 100year event with appropriate freeboard<br>ii) is free flowing with no ponding<br>iii) is provided with an adjacent track to allow future maintenance<br>iv) maintain a depth*velocity product not exceeding 0.6 up to including 1 in 100year event unless agreed in writing by Council | a) Prior to commencing works |

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| | v) is appropriately fenced (fauna exclusion) along the eastern side of the swale. | |
| | b) Construct the swale generally in accordance with the endorsed plans required under part a) of this condition. | b) Prior to survey plan endorsement for Stage 2 |
| | c) Submit to EDQ TS swale "as constructed" plans, certified by a RPEQ including an asset register in a format acceptable to Council. | c) Prior to survey plan endorsement for Stage 2 |
| **25.** | **Electricity** | |
| | a) Submit to EDQ TS a Certificate of Electricity Supply from ENERGEX for the provision of electricity supply to the approved development. | a) Prior to survey plan endorsement for the relevant stage |
| | b) Connect the approved development in accordance with the Certificate of Electricity Supply submitted under part a) of this condition. | b) Prior to survey plan endorsement for the relevant stage |
| **26.** | **Telecommunications** | |
| | a) Submit to EDQ TS documentation from an authorised telecommunication service provider confirming that an agreement has been entered into for the provision of underground telecommunication services to the approved development. | a) Prior to survey plan endorsement for the relevant stage |
| | b) Connect the approved development in accordance with the documentation submitted under part a) of this condition. | b) Prior to survey plan endorsement for the relevant stage |
| **27.** | **Broadband** | |
| | a) Submit to EDQ TS written agreement, from an authorised telecommunications service provider, confirming that fibre-ready pit and pipe infrastructure designed to service the approved development can accommodate services compliant with *Industry Guideline G645:2017 Fibre-Ready Pit and Pipe Specification for Real Estate Development Projects*. | a) Prior to survey plan endorsement for the relevant stage |
| | b) Construct the fibre-ready pit and pipe infrastructure specified in the agreement submitted under part a) of this condition. | b) Prior to survey plan endorsement for the relevant stage |
| **28.** | **Gas** | |
| | a) Submit to EDQ TS, documentation from an authorised gas service provider, confirming that an agreement has been entered into for the provision of underground gas services to the proposed development. | a) Prior to survey plan endorsement for the relevant stage |
| | b) Connect the development to underground gas services in accordance with the agreement mentioned in part a) of this condition. | b) Prior to survey plan endorsement for the relevant stage |

| Landscape and environment | | |
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| **29.** | **Streetscape works – Compliance Assessment**<br><br>a) Submit to EDQ DA, for Compliance Assessment, detailed streetscape works drawings, certified by an AILA, for proposed streetscape works of Roads 1, 3 and 4, including a schedule of proposed standard and non-standard Contributed Assets to be transferred to Council.<br><br>The certified drawings are to include, where relevant:<br>1. location and type of street lighting in accordance with AS1158 –*'Lighting for Roads and Public Spaces';*<br>2. footpath treatments;<br>3. location and specifications of streetscape furniture;<br>4. location and size of stormwater treatment devices; and<br>5. street trees and plants, including species, size and location generally in accordance with Council's adopted planting schedules and guidelines.<br><br>b) Construct streetscape works generally in accordance with the streetscape plans endorsed under part a) of this condition.<br><br>c) Submit to EDQ TS 'as constructed' plans, certified by an AILA, and asset register in a format acceptable to Council. | a) Prior to commencing streetscape work for the relevant stage<br><br>b) Prior to survey plan endorsement for the relevant stage<br><br>c) Prior to survey plan endorsement for the relevant stage |
| **30.** | **Vegetation Clearing**<br><br>a) Submit to EDQ TS a vegetation clearing plan prepared by an ecologist for each stage that excludes the 25m buffer corridor and lot identified for open space.<br><br>b) Undertake vegetation clearing generally in accordance with the plan submitted under part a) of this condition. The clearing is to be undertaken with the stage to be developed.<br><br>c) Vegetation clearing is to be supervised by an Ecologist.<br><br>d) Submit to EDQ TS written certification from an Ecologist that vegetation clearing has been carried out generally in accordance with part b) of this condition. | a) Prior to commencement of clearing for relevant stage<br><br>b) At all times<br><br>c) At all times<br><br>d) Within 3 months of completion of clearing of the relevant stage |
| **31.** | **Fauna Spotter**<br><br>a) A licensed Wildlife Spotter/Catcher under the N*ature Conservation Act 1992* is to undertake a survey of the site to identify any fauna or habitat features (e.g. nests, tree hollows) and certify that any necessary fauna protection measures or relocation procedures have been implemented.<br><br>b) A licensed Wildlife Spotter/Catcher must be present during the vegetation clearing. | a) Prior to commencement of vegetation clearing for the relevant stage<br><br>b) At all times during vegetation clearing |

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| | c) Submit to EDQ TS certification from the licensed Wildlife Spotter/Catcher that vegetation clearing and fauna protection measures was carried out generally in accordance with the conditions of approval.<br><br>**Advice Note:** *Where an Environmental Protection and Biodiversity Conservation Act 1999 (EPBC) approval has been granted and includes fauna spotter requirements, the fauna spotter requirements under this condition will not be applicable for the same matters under the EPBC approval*. | c) Within 3 months of the completion of vegetation clearing of the relevant stage |
| **32.** | **Vegetation – Compensatory Planting** | |
| | a) Submit to EDQ TS a planting plan certified by an ecologist showing the extent of compensatory planting to be undertaken in lot identified as 'Open Space' on Proposed Development Layout Plan, Plan No. TIEL2020159.CIV.DA, Dwg 10, Issue H dated 07/07/2021, excluding the minimum 25m buffer on the western boundary, including, type and extent of planting, as set out in the EDQ Guideline 17: Remnant Vegetation and Koala Habitat Obligations in Greater Flagstone and Yarrabilba PDAs dated May 2015. | a) Prior to commencement of vegetation clearing for the relevant stage |
| | b) Undertake compensatory planting in accordance with a) of this condition. | b) Within 3 months of commencement of vegetation clearing |
| | c) Once compensatory planting has been undertaken, submit to EDQ TS confirmation from a qualified arborist (AQF Level 5) or ecologist that the compensatory planting has been undertaken in accordance with b) of this condition. | c) Within 12 months of commencement of vegetation clearing of the relevant stage |
| **33.** | **Bushfire management** | |
| | a) Carry out bushfire management works in accordance with:<br>(i) Section 6 of the approved Bushfire Management Plan, Report 16014, Final V3, dated 13 July 2018<br>(ii) Addendum to the Bushfire Management Plan for the proposed development at 4499-4651 Mount Lindsay Highway, North Maclean dated 18 February 2021. | a) Prior to survey plan endorsement for the relevant stage |
| | b) Submit to EDQ TS verification from a suitably qualified professional that the works required for bushfire management and mitigation within the relevant stages have been carried out generally in accordance with the relevant approved plans and documents.<br><br>**Advice Note**: *If the adjoining landowner obtains approval for vegetation clearing that reduces bushfire impact, then this can be articulated though an updated context plan supported by a new bushfire advice.* | b) Prior to survey plan endorsement for the relevant stage |

| Surveying, land transfers and easements | | |
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| **34.** | **Land transfers - contaminated land**<br><br>Submit to EDQ TS a copy of a site suitability statement, as required under the EP Act, confirming that all land conditioned to be transferred to a trustee is suitable for the intended purpose(s). The site suitability statement must be prepared by a suitably qualified person and be certified by an approved auditor in accordance with the EP Act.<br><br>*NOTES:*<br>*For the purpose of this condition a suitably qualified person is defined in the EP Act.*<br><br>*A list of approved auditors can be found at the following website:* https://www.qld.gov.au/environment/pollution/management/contaminated-land/auditor-engagement. | Prior to survey plan endorsement for the relevant stage |
| **35.** | **Land transfers – drainage and offset area**<br><br>Transfer, in fee simple, to Council as trustee, the Lot identified as Open Space as shown on the approved plans for drainage and offset open space purposes. | At registration of survey plan for Stage 2 |
| **36.** | **Land transfers – Sewerage pump station**<br><br>a) Submit to EDQ TS, confirmation from Council on the size and location of the Sewer pump station site.<br><br>b) Transfer in fee simple, to Council as trustee, land for the proposed sub-regional pump station generally in accordance as shown on:<br>i) Concept Sewer Reticulation Layout Plan, Plan No. TIEL202159.CIV.DA, Dwg No. 012, Issue G, prepared by Teleford Civil and dated 07/07/21.<br><br>The land metes and bounds must be to the satisfaction of the Chief Executive Officer of the authority.<br><br>***Advice Note**: This land forms part of the sub-regional sewer infrastructure to be delivered by Council. Offsets for the land may be available.* | a) Prior to survey plan endorsement of the first stage<br><br>b) At registration of survey plan for the first stage |
| **37.** | **Rising main easement**<br><br>Provide a 6m wide easement, in favour of and at no cost to the Council, along the southern boundary for the proposed sub-regional sewerage rising main generally in accordance as shown on:<br>i) Concept Sewer Reticulation Layout Plan, Plan No. TIEL202159.CIV.DA, Dwg No. 012, Issue G, prepared by Teleford Civil and dated 07/07/21.<br><br>The terms of public utility easements are to be to the satisfaction of the Chief Executive Officer of the authority which is to accept and maintain the Contributed Assets.<br>***Advice Note:** If an alternative route for the rising main is pursued, the easement can be cancelled at the agreement of Council.* | At registration of survey plan for the first stage |

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| **38.** | **Easements over infrastructure**<br><br>Provide public utility easements, in favour of and at no cost to the grantee, over infrastructure located in land (other than road) for Contributed Assets. .<br><br>The terms of public utility easements are to be to the satisfaction of the Chief Executive Officer of the authority which is to accept and maintain the Contributed Assets. | At registration of survey plan for the relevant stage |

**STANDARD ADVICE**

Please note that to lawfully undertake development, it may be necessary to obtain approvals other than this PDA development approval. For advice on other approvals that may be necessary in relation to your proposal, it is recommended that you seek professional advice.

**** End of Package ****

# APPENDIX D

## Ocean Protect Ocean Guard and Storm Filter Operations & Maintenance Manual

# OceanGuard™

# Operations & Maintenance Manual

# Table of Contents

# 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 as recommended by the manufacturer.

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, total suspended solids and attached pollutants as either a standalone technology or as part of a treatment train with our StormFilter or Jellyfish Filtration products. OceanGuard pit baskets are highly effective, easy to install and simple to maintain.

## Why do I need to perform maintenance?

Adhering to the maintenance schedule of each 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 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 pit insert, 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:

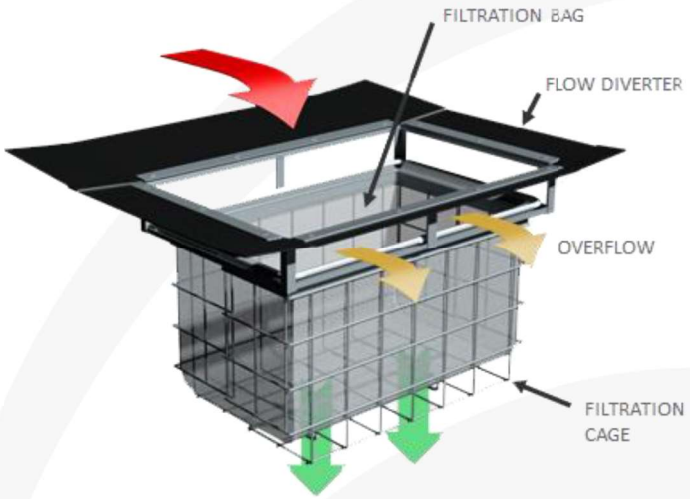
- Puncture resistant gloves
- Steel capped safety boots,
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

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 pit insert 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 dry. The waste then starts to dry which reduces the magnitude of organic material decomposition transitioning between maintenance intervals.

## Maintenance Procedures

To ensure that each OceanGuard pit insert achieves optimal performance, it is advisable that regular maintenance is performed. Typically the OceanGuard requires 2-4 minor services annually, 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.

| | Description of Typical Activities | Frequency |
|---|---|---|
| **Minor Service** | Filter bag inspection and evaluation<br>Removal of capture pollutants<br>Disposal of material | 2-4 Times Annually |
| **Major Service** | Filter Bag Replacement<br>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 device 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 pit insert
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 pit insert
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 system, 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 Reasons 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 OceanGuards internal high flow bypass functionality is designed to minimise the potential of blockages/flooding. 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 insert 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 pit insert 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 system 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

# StormFilter

# Operations & Maintenance Manual

# Table of Contents

# 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 the manufacturer.

The StormFilter is designed and sized to meet stringent regulatory requirements. It removes the most challenging target pollutants (including fine solids, soluble heavy metals, oil, 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 each 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 unit requires removing heavy access covers/grates, and it is necessary to enter into 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:

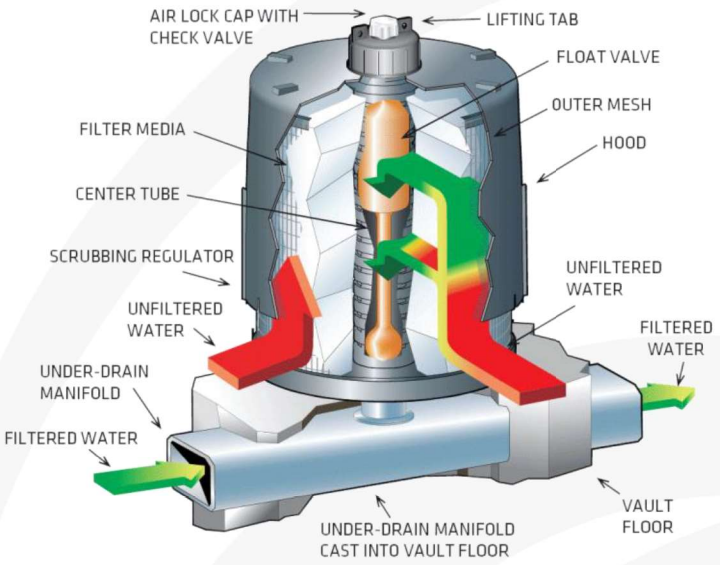
- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

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?

Stormwater enters the cartridge chamber, passes through the filtration media and begins filling the cartridge center tube. When water reaches the top of the cartridge the float valve opens and filtered water is allowed to drain at the designed flow rate. Simultaneously, a one-way check valve closes activating a siphon that draws stormwater evenly throughout the filter media and into the center tube. Treated stormwater is then able to discharge out of the system through the underdrain manifold pipework.




As the rain event subsides, the water level outside the cartridge drops and approaches the bottom of the hood, air rushes through the scrubbing regulators releasing the water column and breaking the siphon. The turbulent bubbling action agitates the surface of the cartridge promoting trapped sediment to drop to the chamber floor. After a rain event, the chamber is able to drain dry by way of an imperfect seal at the base of the float valve.

## 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.

| | Description of Typical Activities | Frequency |
|---|---|---|
| **Inspection** | Visual Inspection of cartridges & chamber<br>Remove larger gross pollutants<br>Perform minimal rectification works (if required) | Every 6 Months |
| **Minor Service** | Evaluation of cartridges and media<br>Removal of accumulated sediment (if required)<br>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, 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 higher than normal 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

The accumulated pollutants found in the StormFilter 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 filter media 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.

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