

SITE BASED STORMWATER MANAGEMENT PLAN

**54 GEORGE ALEXANDER WAY - WEST**

**COOMERA GA PTY LTD ATF THE COOMERA GA UNIT TRUST**



IMPROVING QUALITY OF LIFE

# 54 GEORGE ALEXANDER WAY - WEST

## SITE BASED STORMWATER MANAGEMENT PLAN

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## GLOSSARY OF TERMS

Australia Rainfall and Runoff (ARR) 2019 recommends adaptation of new terminology relating to storm events summarised in Table A below. As recommended, this report documents data with respect to AEP (%).

The following definitions should be noted:

- EY = Number of exceedances per year.
- AEP = Annual Exceedance Probability.
- AEP (1 in x) =  $1/\text{ARI}$ .
- ARI = Average Recurrence Interval (years).

The below table should be referred to for a comparison of storm events.

**Table A – Adopted Terminology**

| EY   | AEP (%) | AEP (1 in ....) | ARI  |
|------|---------|-----------------|------|
| 1    | 63.21   | 1.58            | 1    |
| 0.69 | 50      | 2               | 1.44 |
| 0.5  | 39.35   | 2.54            | 2    |
| 0.22 | 20      | 5               | 4.48 |
| 0.2  | 18.13   | 5.52            | 5    |
| 0.11 | 10      | 10              | 9.49 |
| 0.05 | 5       | 20              | 20   |
| 0.02 | 2       | 50              | 50   |
| 0.01 | 1       | 100             | 100  |

## ASSOCIATED MODELLING FILES

For internal reference, the following modelling file packages are associated with this report.

- 30157884-02- E- DRAINS Model -20250321
- 30157884-02-D- MUSIC Model
- 30157884-02-A- MUSIC Model - 66 George

## 1 EXECUTIVE SUMMARY

Coomera GA Pty Ltd ATF The Coomera GA Unit Trust has commissioned Arcadis to prepare a Site Based Stormwater Management Plan (SBSMP) for a residential development application for the site located over the following allotment on George Alexander Way, Coomera:

- Lot 96 on RP187418 (54 George Alexander Way, Coomera, 4209).

The proposed development intended for the site is for the creation of 3 residential apartment buildings and 10 townhouses. Supporting infrastructure such as roads, basement parking, utilities, communal spaces and stormwater management areas are also proposed.

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), Australian Rainfall and Runoff (2019) and the Environmental Protection (Water) Policy (2009). The primary objectives of this Site Based Stormwater Management Plan are achieved as follows:

### Lawful Point of Discharge (LPD)

Stormwater will be discharged to the existing three lawful points of discharge, being Talpa Street to the north of the site, the lot to the south of the site (Lot 95 on RP187418) and the low point on the northern boundary within the site and its downstream drainage corridor. Stormwater is only considered for the western portion of the site as this application does not propose any development within the eastern catchment.

It was determined that an external catchment drain through the site, provisions have been made to capture this catchment in the stormwater detention system.

### Stormwater Quantity

The site proposes to mitigate the increase in peak run off, expected to occur at lawful points of discharge, through the use of a combination of stormwater quality systems and a detention basin area and reductions in catchment areas.

The flows from proposed extension of Talpa Street will be directed north to LPD 3. It is understood Talpa Street will drain to an existing detention basin located north of the site (Lot 1 on SP312031). The approved Conceptual Stormwater Management Plan prepared by Biome under application number ROL/2017/439 has accounted for a portion of the development site in their model in an existing condition.

### Stormwater Quality

A stormwater quality assessment is provided which demonstrates that a specially tailored treatment system will be required in order to meet the pollutant removal targets of City of Gold Coast (CoGC) during the operational phase of the proposed development. The proposed treatment system features specifically design Altan tanks. Regular maintenance of the treatment devices must be undertaken to ensure the continuing performance of the stormwater quality treatment train.

### Waterway Stability

The development does not trigger the application requirement specified under Table 4.12 of City Plan SC6.11 Part 4. Discharge to the road reserve does not trigger the application requirement.

### Erosion and Sediment Control

Erosion and sediment control measures during construction shall be undertaken in accordance with the SPP and Council requirements.

## 1.1 Revision 02

Revision 02 of this report has been prepared in response to the Information Request issued by Council on the 19<sup>th</sup> of September (COM/2024/236) and the updated development layout. An updated stormwater strategy has been adopted to reflect these changes as outlined in Sections 6 and 7.

## 2 SITE CHARACTERISTICS

### 2.1 Location Details

The subject site is located within George Alexander Way, Coomera, Australia over the following allotment:

- Lot 96 on RP 187418 (54 George Alexander Way, Coomera, QLD, 4209)

The site is bounded by George Alexander Way to the west, a rural residential allotment to the south and residential dwellings to the north and east.

The Gold Coast City Council is the local government authority.

The total area of the site is approximately 30,100m<sup>2</sup>.

An existing approval (OPW/2023/1508) bounds the eastern portion of the site. This approval is for 22 residential lots and supporting infrastructure. This report seeks to support a development application for the balance of the land.

### 2.2 Land Usage

In its current state, the project site consists of a residential dwelling and its associated driveway. Figure 2-1 below provides a current locality plan of the site.



Figure 2-1 Site Locality Plan (Aerial Imagery Courtesy of Nearmap)

## 2.3 Topography and Features

The site has slopes ranging from 5 to 12%. The high point is at the centre of the site at RL34m therefore, everything slopes away from the centre of the site. The low point of the site is within the north eastern corner at RL29m. There is also another low point in the north western corner of the site at RL25m and within the south eastern corner RL32m.

There are two existing dams located on the site, one large dam in the north western corner and a smaller dam located in the northeastern corner.

Further catchment and topographic information can be seen on the Engineering Drawings attached in Appendix B.

### 3 PROPOSED DEVELOPMENT

The proposed development involves the construction of residential units, including:

- 3 x medium-rise residential buildings.
- Townhouses.
- Municipal and private road network.
- Basement parking.
- Open communal space.
- Stormwater management areas.

A rendered plan extract of the proposed development has been provided in Figure 3-1.

A full set of development proposal plans are provided within the development application package and should be referred to for further information.



Figure 3-1 Proposed Development Layout (Courtesy of Archipelago)

## 4 LAWFUL POINT OF DISCHARGE AND DRAINAGE

### 4.1 Existing Stormwater Drainage

This report only focuses on the area that are proposed to be developed on the western section of the lot; therefore, the eastern portion of the site has not been considered in this assessment. Refer to OPW/2023/1508 for details of the eastern side.

In its existing state the site has three LPD, being Talpa Street to the north of the site, the low point along the northern boundary and the lot to the south of the site (Lot 95 on RP187418).

The catchment delineation is derived from Councils lidar data. Based on Councils lidar data and street imagery it was found that a portion of lot 95 on RP187418 and George Alexander Way drains through the site.

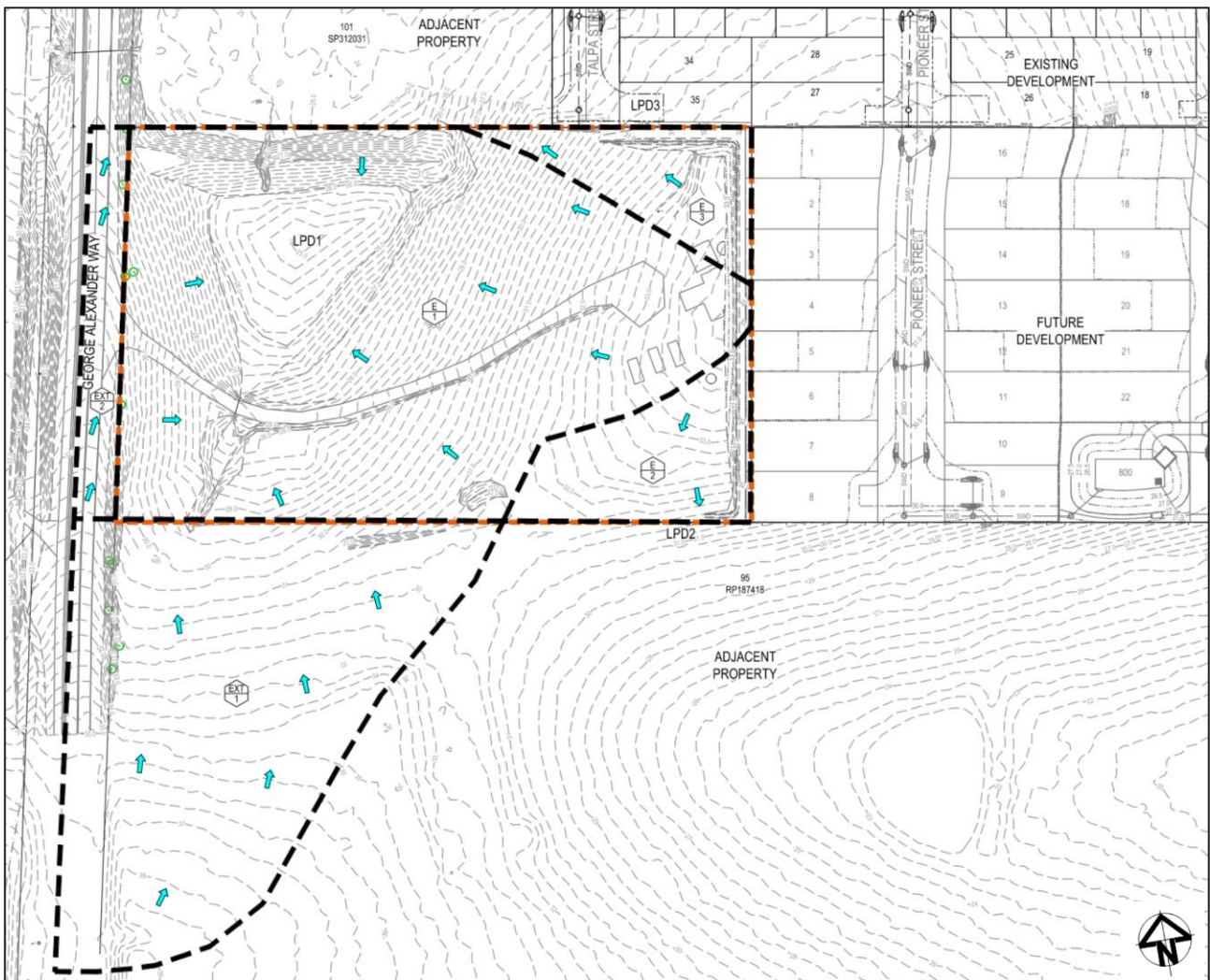


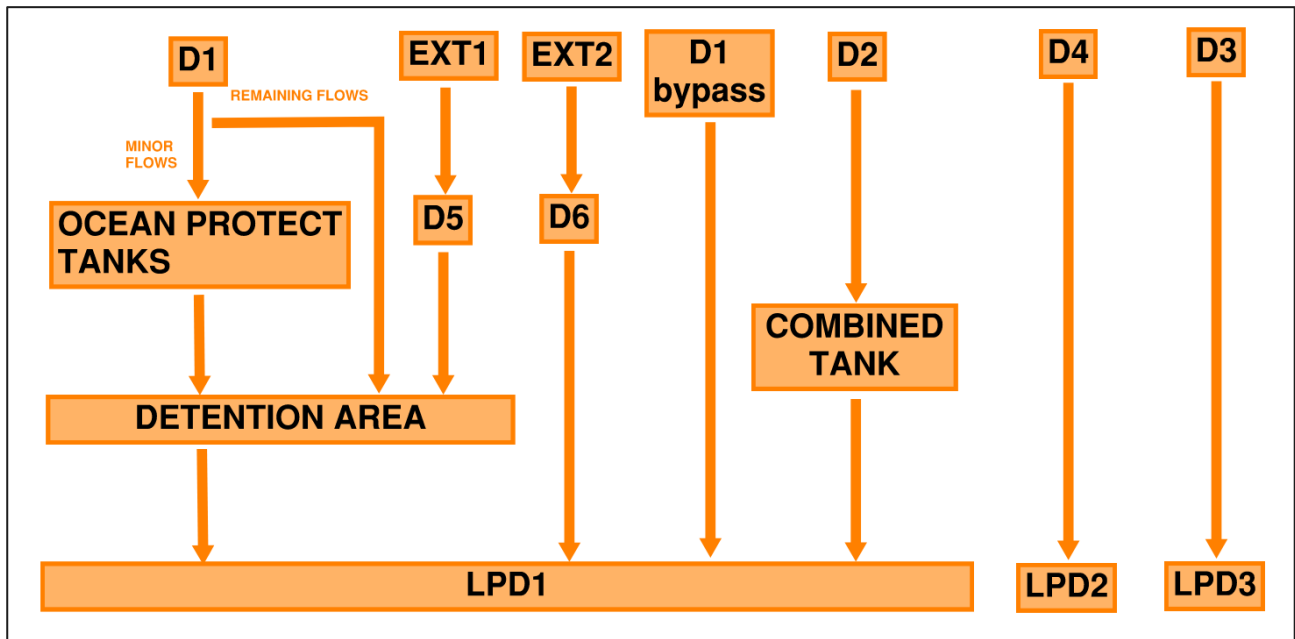
Figure 4-1 Existing Stormwater Catchments

## 4.2 Proposed Drainage Characteristics and LPD Test

The below diagram illustrates proposed drainage philosophy for the site, which is adopted for the purposes of detailed calculations in subsequent reporting sections.

The site proposes to maintain the three LPD's being the northern boundary low point and its downstream area located within the site, Talpa Street and lot 95 on RP187418. Through the use of a stormwater detention area, stormwater quality tanks and catchment reductions, flows will be mitigated to predeveloped flow.

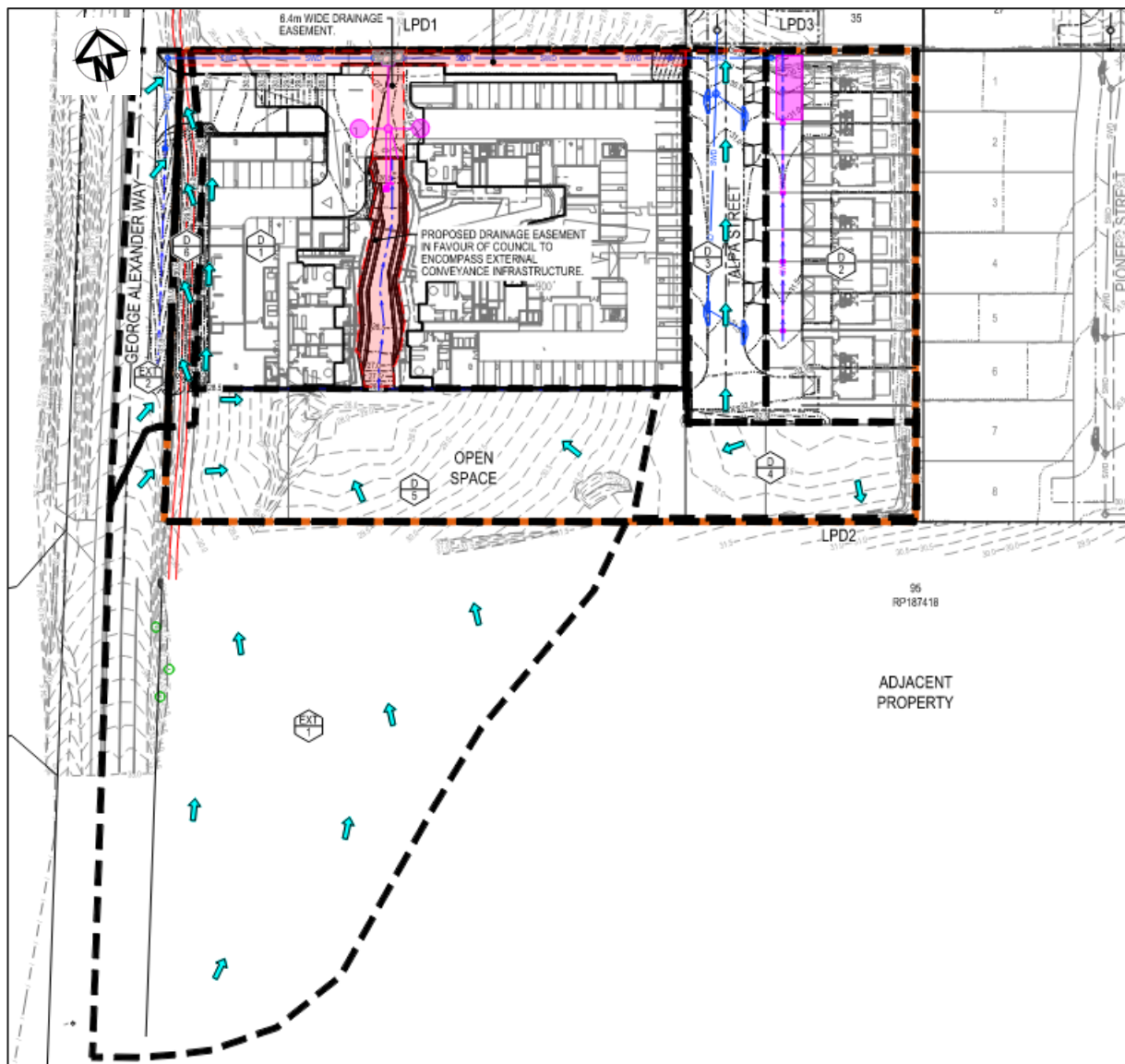
The external catchment will continue to discharge to LPD1 via the detention area.



**Figure 4-2 Drainage Philosophy**

The site proposes to send flows from D3 (Talpa Street) into the existing Basin A in the site to the north (Lot 1 on SP312031). The approved Conceptual Stormwater Management Plan prepared by Biome under application number ROL/2017/439 has accounted for a portion of the development site in their model. Therefore, this quantity assessment has replicated the catchments from ROL/2017/439 to correctly assess stormwater quantity.

Further details can be found on Engineering Drawings in Appendix B.



**Figure 4-3 Developed Stormwater Catchments**

In the developed case, the site demonstrates compliance with the QUDM as follows:

*The location of the discharge is under the lawful control of the local government or other statutory authority from whom permission to discharge has been received. This will include park, drainage or road reserve, stormwater drainage easement.*

The site will demonstrate compliance with QUDM (2017) by maintaining as much as practically possible the existing discharge characteristics, by discharging controlled flows to the existing lawful points of discharge.

At a minimum, 4EY flows from the site catchment areas are to be directed to the stormwater quality treatment system as documented in Section 7 of this report.

*That in discharging in that location, the discharge will not cause an actionable nuisance. In general terms this implies no worsening as a result of discharge.*

Sections 5, 6, 7 and 8 of this report provide detailed calculations and discussions illustrating no actionable nuisance anticipated. It is noted that optimisation of the development sites drainage system will be undertaken during the operational works phase of the development.

Engineering drawings in Appendix B provide further details of the proposed system.

## 5 STORMWATER QUANTITY

### 5.1 Objective

The following assessment has been undertaken to demonstrate that the proposed development will not adversely affect the existing drainage conditions adjacent to the site. Existing drainage characteristics are assessed to determine peak flow rates for the median storm event up to and including the 1% AEP.

### 5.2 Temporal Patterns

In accordance with CoGC's City Plan SC6.12.4.4.3 & ARR2019, 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 5-1 below.

**Table 5-1 Site Latitude and Longitude**

| Parameter | Value    |
|-----------|----------|
| Latitude  | -27.8480 |
| Longitude | 153.3227 |

### 5.3 Catchments

Two hydrologic conditions were modelled to appropriately demonstrate the stormwater quantity objective:

- **Existing Scenario (E)** – The catchment including the site in its existing state.
- **Developed Scenario (D)** – The catchment including the site in its developed state as per the proposal.

The following catchment details in Table 5-2 to Table 5-4 were determined.

**Table 5-2 Modelling Existing Catchment Details**

| Catchment | Area (ha) | Slope (%) | Impervious Area (%) | Manning's (n) |
|-----------|-----------|-----------|---------------------|---------------|
| E1        | 1.228     | 12.5      | 17%                 | 0.06          |
| E2        | 0.165     | 9.3       | 0%                  | 0.06          |
| E3        | 0.105     | 4.1       | 3%                  | 0.06          |
| EXT1      | 0.80      | 11.0      | 12%                 | 0.06          |
| EXT2      | 0.09      | 4.0       | 80%                 | 0.015         |
| EXT A*    | 0.233     | 6.0       | 0%                  | 0.045         |

\*EXT A has been taken from the stormwater management plan prepared by Biome (ROL/2017/4395) for 66 George Alexander Way.

The existing catchment draining to Talpa Street (LPD 3) has been determined by Biome in their stormwater management plan for 66 George Alexander Way (ROL/2017/4395) to be approximately 0.223ha (EXT A). Through the development of the eastern portion of the site (OPW/2023/1508) this external catchment (EXT A) discharging into Talpa Street has reduced in size to 0.10ha (E3).

**Table 5-3 Modelling Developed Internal Catchment Details**

| Catchment         | Area (ha) | Time of Concentration (min) | Impervious Area (%) |
|-------------------|-----------|-----------------------------|---------------------|
| D1 (Bypass)       | 0.110     | 5,7                         | 40%                 |
| D1 (Detention)    | 0.590     | 5,7                         | 83%                 |
| D2                | 0.237     | 5,7                         | 65%                 |
| D3 (Talpa Street) | 0.127     | 5,7                         | 80%                 |
| D4                | 0.116     | 5,7                         | 0%                  |
| D5                | 0.260     | 5,7                         | 0%                  |
| D6                | 0.040     | 5,7                         | 13%                 |

**Table 5-4 Modelling Developed External Catchment Details**

| Catchment | Area (ha) | Slope (%) | Impervious Area (%) | Manning's (n) |
|-----------|-----------|-----------|---------------------|---------------|
| EXT1      | 0.80      | 11        | 12%                 | 0.06          |
| EXT2      | 0.09      | 4         | 80%                 | 0.015         |

### 5.3.1 Detention System Design

Table 5-5 to Table 5-7 presents the design details for the proposed onsite detention system for the site which is required to achieve the objective of no post development increase up to the 1% AEP event at the assessment point. The detention system has been iteratively optimised to ensure peak performance.

A combined stormwater quality and detention tank has been designed for the D2 catchment.

Table 5-8 to Table 5-10 illustrate that there is no worsening at any of the LPD's.

**Table 5-5 Summary of Proposed Detention Tank Parameters for D2**

| Parameters                                                                             | Detention System                                                                                                                          |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Min. Required Detention Storage (m <sup>3</sup> )                                      | 75                                                                                                                                        |
| Detention Depth (m)*                                                                   | 1.15+ 0.5m freeboard                                                                                                                      |
| Min. Required Detention Area (m <sup>2</sup> ) Including Access & Outlet Control Areas | 50                                                                                                                                        |
| Outlet Orifices                                                                        | DN100 orifice @ the base of the tank,<br>DN100 orifice @ 0.5m above the base of the tank &<br>0.2m weir @ 0.8m above the base of the tank |
| Outlet Orifice Screening                                                               | Provide Maximesh Rh3030 for orifice diameters 150 mm or less with a minimum area of 50 times the orifice area.                            |
| Emergency Overflow Weir (m)                                                            | 1m weir @ 1m above the base of the tank                                                                                                   |

*\*The detention height has been based of the blocked water level.*

**Table 5-6 Summary of Proposed Detention Basin Outlet Configuration for D1**

| Parameters      | Detention System                                                                                                                                                     |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Outlet Orifices | 3 x DN300 orifices @ the base of detention &<br>900 by 900 pit at 0.35m above the base of<br>detention with a DN450 orifice @ -1.05m below<br>the start of detention |

**Table 5-7 Summary of Proposed Detention Basin Stage Storage Relationship for D1**

| Stage (m) | Surface Area (m <sup>2</sup> ) |
|-----------|--------------------------------|
| 0         | 0                              |
| 0.1       | 35.625                         |
| 0.2       | 67.726                         |
| 0.3       | 112.77                         |
| 0.4       | 133.605                        |
| 0.5       | 140.985                        |
| 0.55      | 156.097                        |

\*The blocked water level is 1.15m.

### 5.3.2 Model Results

A DRAINS model has been developed to assess the proposed development site. The following results have been captured from the DRAINS model as a result of implementing the above detention system. Table 5-9 to Table 5-10 below summarises the peak flow rates for each identified critical storm across the assessed AEP range at the LPD.

**Table 5-8 Summary of DRAINS Hydrologic/Hydraulic Results Catchment at LPD 1**

| Scenario       | AEP (%)                         | 63.2  | 50    | 20    | 10    | 5     | 2     | 1     |
|----------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Existing       | Median Flow (m <sup>3</sup> /s) | 0.335 | 0.441 | 0.640 | 0.789 | 0.936 | 1.140 | 1.323 |
| Mitigated      | Median Flow (m <sup>3</sup> /s) | 0.334 | 0.401 | 0.610 | 0.737 | 0.879 | 1.133 | 1.268 |
| Height Basin 1 | m                               | 0.29  | 0.32  | 0.42  | 0.44  | 0.48  | 0.52  | 0.55  |
| Height Tank    | m                               | 0.53  | 0.62  | 0.85  | 0.94  | 1.01  | 1.05  | 1.07  |

**Table 5-9 Summary of DRAINS Hydrologic/Hydraulic Results Catchment LPD 2**

| Scenario  | AEP (%)                         | 63.2  | 50    | 20    | 10    | 5     | 2     | 1     |
|-----------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Existing  | Median Flow (m <sup>3</sup> /s) | 0.032 | 0.027 | 0.046 | 0.054 | 0.067 | 0.080 | 0.091 |
| Developed | Median Flow (m <sup>3</sup> /s) | 0.026 | 0.021 | 0.036 | 0.045 | 0.053 | 0.063 | 0.071 |

**Table 5-10 Summary of DRAINS Hydrologic/Hydraulic Results Catchment LPD 3**

| Scenario  | AEP (%)                         | 0.5EY | 20    | 10    | 5     | 2     | 1     |
|-----------|---------------------------------|-------|-------|-------|-------|-------|-------|
| Existing* | Median Flow (m <sup>3</sup> /s) | 0.052 | 0.074 | 0.089 | 0.106 | 0.130 | 0.146 |
| Developed | Median Flow (m <sup>3</sup> /s) | 0.039 | 0.051 | 0.061 | 0.072 | 0.086 | 0.097 |

*\*These results have been extracted from the stormwater management plan prepared by Biome (ROL/2017/4395) for 66 George Alexander Way.*

## 5.4 Objective Discussion

### 5.4.1 Peak Flow Mitigation

The above hydraulic investigation and runoff-routing exercise has demonstrated that suitable measures can be included in the design of the proposed development to ensure that there is no increase in median discharge flow rates being directed off-site to existing infrastructure for 63.2% AEP events to 1% AEP events in accordance with QUDM and ARR2019.

It is clear from Table 5-10 that the Biome Report approved under application number ROL/2017/439 allowed for all of D3 to drain into their combined basin.

### 5.4.2 Sensitivity Test – Orifice Blockage Scenario

A sensitivity test has been undertaken by removing the orifice flows from the DRAINS model and relying on the capacity of the proposed weir to simulate a 100% orifice blockage scenario. The water depth within the detention system in this scenario is **1.12m**.

## 6 STORMWATER QUALITY (OPERATION)

### 6.1 Objectives

The following operational water quality objectives are set out by Council:

- Gross Pollutants (>5mm) – 90% reduction in mean annual load.
- Total Suspended Solids (TSS) – 80% reduction in mean annual load.
- Total Phosphorous (TP) – 60% reduction in mean annual load.
- Total Nitrogen (TN) – 45% reduction in mean annual load.

### 6.2 Proposed Stormwater Treatment Devices

WSUD aims to minimise the impact of the development on the natural water cycle by reducing the export of pollutants, sediments and nutrients from the site into the natural watercourse. In order 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.

A treatment train has been proposed for the site which comprises of multiple individually designed treatment devices that collectively contribute to the achievement of whole site water quality objectives.

The site proposes to send flows from D3 (Talpa Street) into the existing Bioretention Basin A in the site to the north (Lot 1 on SP312031). The approved Conceptual Stormwater Management Plan prepared by Biome under application number OPW/2022/155 has accounted for a portion of the development site in their model. Therefore, this quality assessment has replicated the catchments from OPW/2022/155 to correctly assess stormwater quality.

There has been no stormwater quality treatment proposed at LPD2 as the existing surface conditions have not changed.

A copy of the treatment devices information can be seen in Appendix C.

### 6.3 Modelling

Modelling of the site was undertaken using the 'Model for Urban Stormwater Improvement Conceptualisation (MUSIC)' as promoted by LCC and the South East Queensland Healthy Waterways Partnership. The development was modelled using the split catchment approach. An appropriate type of land use was applied to all surface types within the developed catchments; where individual treatment devices were assigned the relevant modelling treatment parameters. Consequently, a treatment train was established for the site, ensuring that water discharging from site adheres to the specified Water Quality Objectives.

Meteorological data for input into MUSIC was obtained from Hinze Dam Station 40584 from the Bureau of Meteorology. Six-minute time step rainfall data was obtained for the climate period from 1/1/1976 to 31/12/1995. The catchment parameters of the MUSIC modelling are specified within the South East Queensland Healthy Waterways Partnerships' Water by Design MUSIC Modelling Guidelines for South East Queensland Version 1 (2010), and have been modelled as such.

### 6.3.1 Pollutant Source Node Details

The pollutant source node parameters input into the MUSIC model were determined using the South East Queensland Healthy Waterways Partnership's Water by Design MUSIC Modelling Guidelines for South East Queensland version 1 (2010), specifically Tables 3.7 and 3.8 for urban residential surface types. It is noted that all base flow parameters for roof surfaces are adopted as 0.00 or N/A.

The following assumptions were made when modelling stormwater quality, the roof and road area was considered to be 100% impervious. The planter and grass areas were considered to be 0% impervious with the remaining ground area considered to be 100% impervious.

The road area for Talpa Street was considered to be 80% impervious based on council road design standards.

A summary of these nodes has been provided in Table 6-1 and Table 6-2 below.

**Table 6-1 Summary of Source Node Details for 54 George Alexander Way-West**

| Catchment               | MUSIC Source Node | Imperviousness (%) | Area (ha)* |
|-------------------------|-------------------|--------------------|------------|
| Roof (D1a)              | Roof              | 100%               | 0.14       |
| Pervious Ground (D1a)   | Ground            | 0%                 | 0.02       |
| Impervious Ground (D1a) | Ground            | 100%               | 0.05       |
| Roof (D1b)              | Roof              | 100%               | 0.25       |
| Pervious Ground (D1b)   | Ground            | 0%                 | 0.09       |
| Impervious Ground (D1b) | Ground            | 100%               | 0.05       |
| Bypass Ground (D1)      | Ground            | 40%                | 0.11       |
| Bypass Ground (D6)      | Ground            | 13%                | 0.04       |
| Roof (D2)               | Roof              | 100%               | 0.09       |
| Pervious Ground (D2)    | Ground            | 0%                 | 0.09       |
| Impervious Ground (D2)  | Ground            | 100%               | 0.04       |
| Road (D2)               | Road              | 100%               | 0.05       |
| Talpa Street (D3)       | Road              | 80%                | 0.127      |

*\*This report only focuses on the proposed developed areas; therefore, the eastern portion of the site has not been considered in this assessment nor has any undeveloped area (catchment D4 & D5).*

**Table 6-2 Summary of Source Node Details for 66 George Alexander Way (Courtesy of Conceptual Stormwater Management Plan 66 George Alexander Way, Coomera Prepared by Biome)**

| Catchment | MUSIC Source Node | Imperviousness (%) | Area (ha)* |
|-----------|-------------------|--------------------|------------|
| Roof A    | Roof              | 100%               | 0.443      |
| Road A    | Ground            | 70%                | 0.346      |
| Ground A  | Ground            | 30%                | 0.268      |

### 6.3.2 Treatment Device Node Details

An Ocean Protect treatment system has been designed specifically to ensure that the site meets the stormwater quality requirements. This treatment system includes a StormFilter cartridge system and OceanGuard filter bag(s). These are Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP) approved products by Stormwater Australia. Copies of the SQIDEP certification for all proposed devices has been provided in Appendix C of this report.

Once the site is fully developed, the stormwater run-off from sub-catchments will be collected via a private drainage system and directed to the relevant areas per Figure 4-2.

Details of the location and conceptual design of the proposed treatment devices are presented in the Engineering Drawings in Appendix B of this report, which should be referred to for further design information.

**Table 6-2 Ocean Protect Design Parameters**

|                     | OceanGuard Filter Bags                 | Stormfilter Cartridges                   |
|---------------------|----------------------------------------|------------------------------------------|
| Tank 1 (D1a)        | 1 x OceanGuard Filter (200micron bag)* | 8 x Tall (690mm) StormFilter Cartridges  |
| Tank 2 (D1b)        | 2 x OceanGuard Filter (200micron bag)* | 12 x Tall (690mm) StormFilter Cartridges |
| Tank 3 (Town House) | 2 x OceanGuard Filter (200micron bag)* | 8 x Tall (690mm) StormFilter Cartridges  |
| Bypass areas        | 2 x OceanGuard Filter (200micron bag)* | n/a                                      |

*\*All ground and road areas are to pass through an OceanGuard prior to entering the StormFilter cartridge system. The amount of OceanGuards required is noted as a minimum. A greater number of OceanGuards may be required to ensure flow from all catchment areas can be captured, depending on design levels and access constraints.*

The bio-retention area for 66 George Alexander Way was designed specifically in accordance with the bio-retention Technical Design Guidelines (2014) and local data testing of soil parameters. Details of the location and standard design of the proposed treatment device area are presented in the stormwater management plan prepared by Biome (ROL/2017/4395).

General parameters for the bio-retention treatment system have been modelled as per Table 7-3 below.

**Table 7-3 66 George Alexander Way Bio-Retention Design Parameters (Courtesy of Conceptual Stormwater Management Plan 66 George Alexander Way, Coomera Prepared by Biome)**

| Parameter                                                                      | Bio-retention Basin A |
|--------------------------------------------------------------------------------|-----------------------|
| Minimum Filter Media Area (m <sup>2</sup> )                                    | 110m <sup>2</sup>     |
| Minimum Ponding Surface Area (m <sup>2</sup> )                                 | 130m <sup>2</sup>     |
| Extended Detention Depth Within Ponding Area(m)                                | 0.30                  |
| Minimum Filter Media Depth (m) (excluding transition layer and under drainage) | 0.60                  |
| Underdrainage Layers (m)                                                       | 0.01                  |
| Minimum Saturated Hydraulic Conductivity (mm/hour)                             | 200                   |
| Maximum Filter Media Total Nitrogen (mg/kg)                                    | 400                   |
| Maximum Filter Media Orthophosphate (mg/kg)                                    | 30                    |

A diagrammatical view and pollutant reduction results can be found in Figure 6-3 below.

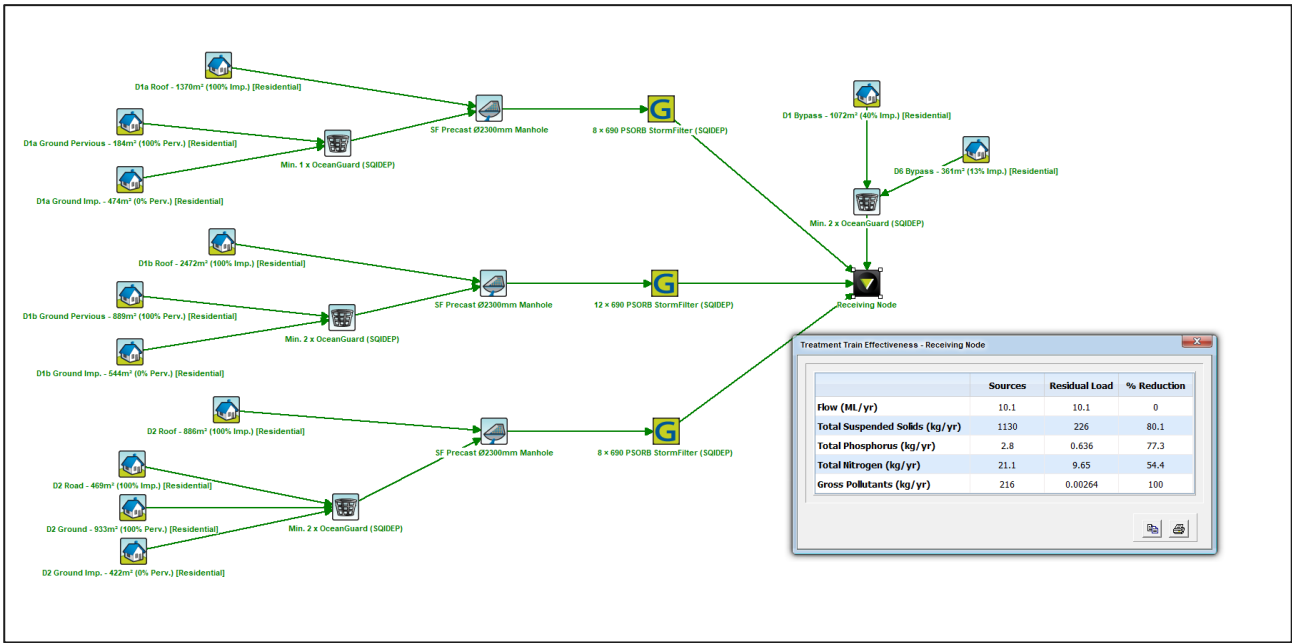


Figure 6-3 MUSIC Model Layout for 54 George Alexander Way

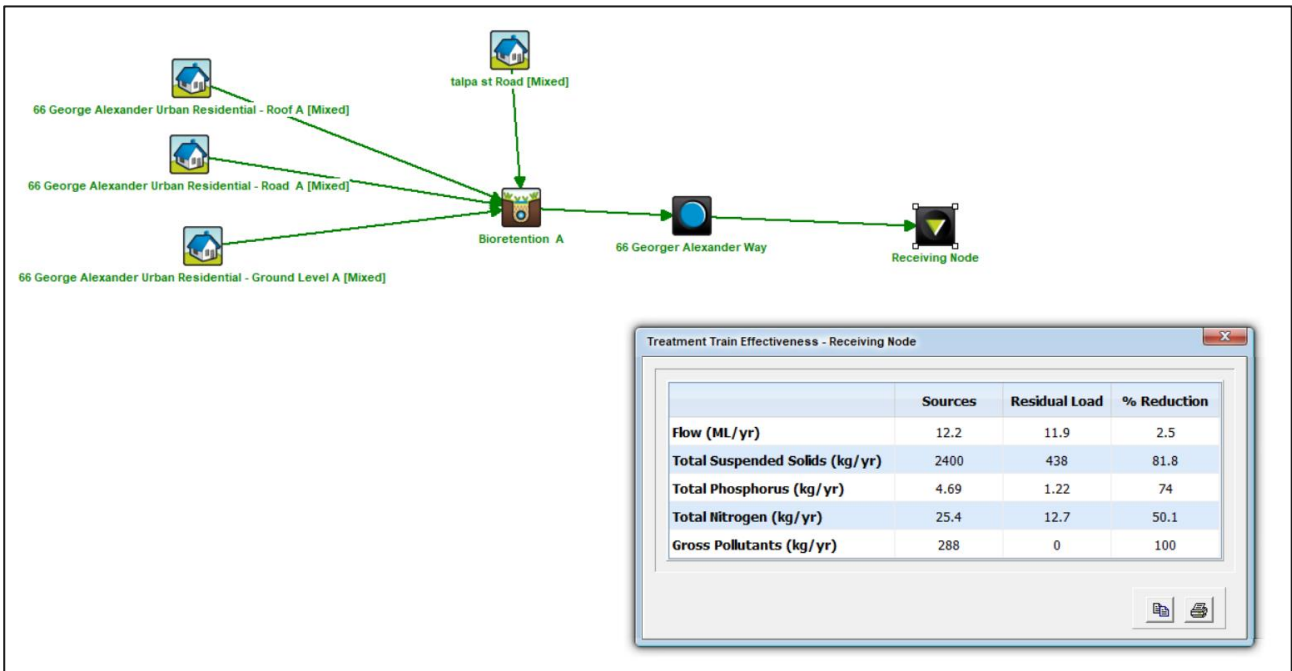


Figure 6-4 MUSIC Model Layout for 66 George Alexander Way

## 7 STORMWATER QUALITY (CONSTRUCTION)

### 7.1 Water Quality Objectives

**Table 7-1 Construction Phase Quality Objectives (SPP and CoGC LDG)**

| Pollutant                             | Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Drainage Control                      | <p>Design life and design storm of temporary drainage works:</p> <ul style="list-style-type: none"> <li>Disturbed area open for &lt;12 months—1 in 2 ARI.</li> <li>Disturbed area open for 12-24 months—1 in 5 ARI.</li> <li>Disturbed area open for &gt; 24 months—1 in 10 ARI.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Erosion Control                       | <ul style="list-style-type: none"> <li>Minimise exposure of disturbed soils at any time.</li> <li>Avoid or minimise large construction activities in the wet season.</li> <li>Divert water run-off from undisturbed areas around disturbed areas.</li> <li>Use erosion risk ratings to determine appropriate erosion control measures.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Sediment Control                      | <p>Use soil loss rates to determine appropriate sediment control measures</p> <p>Design storm for sediment control basins should be based on retaining the maximum sediment quantity for the maximum volume of water run-off</p> <p>Site discharge during sediment basin dewatering should not exceed 50 mg/L TSS and pH between 6.5–8.5</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Stormwater Drainage / Flow Management | <p>Hydraulics and hydrology—Take all reasonable and practicable measures to minimise significant changes to the natural waterway hydraulics and hydrology from:</p> <ul style="list-style-type: none"> <li>peak flow for the one-year and 100-year ARI event (respectively for aquatic ecosystems and flood protection).</li> <li>run-off frequency and volumes entering receiving waters.</li> <li>Uncontrolled release of contaminated stormwater.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Water Quality Outcomes                | <p>Stormwater flows from undisturbed and disturbed areas—manage to help protect environmental values</p> <p>Coarse sediment—coarse sediment is retained on site</p> <p>Fine sediment—Site discharge during sediment basin dewatering has a TSS concentration less than 50 mg/L</p> <p>Turbidity—Site discharge during sediment basin dewatering has a turbidity (NTU) less than 10% above receiving waters turbidity— measured immediately upstream of the site</p> <p>Nutrients (N &amp; P)—Nitrogen and phosphorus are managed through sediment control.</p> <p>pH—Site discharge during sediment basin dewatering has a pH range 6.5–8.5</p> <p>Litter and other waste—Prevent litter/waste entering the site, the stormwater system or watercourses that discharge from the site. Also minimise or sufficiently contain on-site litter and waste production and regularly clear waste bins</p> <p>Hydrocarbons and other contaminants—Hydrocarbons and other contaminants are prevented from entering the stormwater system or internal watercourses that discharge from the site.</p> <p>Wash down water—Wash down water is prevented from entering the stormwater system or internal watercourses that discharge from the site</p> <p>Cations and anions—Cations and anions including aluminium, iron and Sulfate are managed as required under an approved acid Sulfate soil management plan</p> |

Table 7-1 provides the construction phase stormwater quality objectives outline by the State Planning Policy. Additional relevant acts, policies and information that may be useful for construction phase planning include:

- Environmental Protection Act (1994).
- Environmental Protection (Water) Policy (2009).
- Queensland Development Code, Sediment and Erosion Control (2010).
- Best Practice Erosion and Sediment Control for Building and Construction Sites Guidelines (2008).

## 7.2 Erosion and Sediment Control Plan Purpose

During the construction phase it shall be the Principal Contractor's responsibility to ensure the objectives of Table 7-1 are achieved.

The following section of this report provides a suggested framework for an Erosion and Sediment Control Plan. This includes recommended actions and responses for specific activities; monitoring and reporting; and construction of specifically designed site-specific sediment basins.

## 7.3 Specific Activities

### 7.3.1 Erosion and Sediment Control of Disturbed Land

During the construction phase it shall be the Principal Contractor's responsibility to ensure the following:

- Diversion of any clean water runoff that may interfere with land disturbance by the use of earth bunds, or other control devices deemed appropriate by a suitable supervisor.
- Reduction of sediment migration from disturbed land parcels by implementing silt fences, sediment basins or other control devices as deemed appropriate by a suitable supervisor.
- Where cut to fill operations produce a spoil it is recommended that the excess material be placed upstream of the excavation location to ensure any sediment runoff is directed back into the trench. Earth bunds or sediment fences may be required to control direction of sediment flow should the spoil be placed on the downstream side of the excavation site.
- Control measures such as a gully pit sediment barrier (see Arcadis drawings attached) shall be installed around inlet pits where required reducing the potential for sediment discharge into the surrounding stormwater system.
- Any sediment deposited from construction vehicles will be swept up and removed.
- Erosion and sediment control devices may only be removed once disturbed lands which they are protecting are rehabilitated and capable of resisting further erosion.

### 7.3.2 Spoil and Stockpile Management

It shall be the Principal Contractor's responsibility to oversee the following controls during the construction phase unless otherwise specified:

- The placement of spoil and stockpile material shall be kept at a maximum distance from stormwater inlets, gutters and stormwater pipes to reduce unnecessary sediment migration into nearby infrastructure.
- Spoil and stockpile material shall be placed in a way that reduces the likelihood of sedimentation, erosion and slippage. Advice from an appropriate project manager/representative shall be sought in this instance.
- Spoil or stockpile material that is deemed a contaminant shall be placed on a designated zone of either fill material, plastic or concrete with the installation of appropriate containment devices. Advice from an appropriate project manager/representative shall be sought in this instance as the resulting control will be highly dependent on the severity of contamination.
- It shall be the Project Manager's responsibility to foresee and develop appropriate control measures to prevent the impacts of spoil and stockpile material prior to construction activities. Monitoring and reporting shall also be required during the implementation of any given device associated with spoil and stockpile management.

### 7.3.3 Erosion Control

It shall be the Principal Contractor's responsibility to oversee the following controls during the construction phase:

- Traffic of any type shall be kept away from areas of rehabilitation to promote stabilisation of the zone.
- Where wind and water are acknowledged as potential erosion sources temporary protection shall be installed. Such measures only apply to zones of spoil, stockpile and land disturbance which are unlikely to receive works within a period of 6-8 weeks. Further advice from an appropriate project manager/representative shall be sought in this instance as the resulting control will be highly dependent on the disturbance type and erosion source.
- Once viable, final landscaping shall be undertaken on applicable zones to increase stability.

### 7.3.4 Personnel Training

It shall be the Principal Contractor's responsibility to oversee the following training protocols during the construction phase:

- Environmental management and incident reporting is to be included on all site induction courses.
- All personnel are to receive adequate training in; workplace health and safety issues, environmental management, best practice erosion and sediment control practices, incident reporting procedures and where applicable site inspection and maintenance procedures.

### 7.3.5 Miscellaneous

It is the Principal Contractor's responsibility to ensure erosion and sediment controls are operated and maintained in an effective operational condition. These structures are not allowed to accumulate sediment volume in excess of 70% sediment storage design capacity as per Section 6 of the Urban Stormwater Quality Planning Guidelines 2010.

- Sediment removed from control measures must be disposed of in a manner approved by the local Council that does not cause pollution and forms part of the Contractor's obligation.
- Any chemicals, fuel or oil stored on site shall be stored under cover in a bounded area or placed sufficiently above ground level to prevent contamination of surface water.
- A waste concrete receptor (disposal area) must be established if significant concreting is to occur on site. The site must be surrounded by perimeter bunds and be clearly signed.
- A general waste collection area shall be established which is to include appropriate pollutant runoff controls, dependent on the nature of the waste.

## 7.4 Project Personnel Responsibilities

A description of the key personnel involved with implementing the Erosion and Sediment Control Plan are listed in Table 7-2. It is recommended that all parties involved attend a pre-construction conference to discuss and clarify all issues associated with sediment and erosion control as well as this plan.

**Table 7-2 Project Personnel Responsibilities**

| Project Role              | Responsibilities                                                                                                                                                                                                                                                                                           |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Superintendent            | <ul style="list-style-type: none"> <li>• Authorisation of this plan; and</li> <li>• Review and monitoring of this plan.</li> </ul>                                                                                                                                                                         |
| Contractor / Site Manager | <ul style="list-style-type: none"> <li>• Implementation of this plan;</li> <li>• Monitoring of this plan;</li> <li>• Supervising any activities or requirements required by this plan; and</li> <li>• Ensuring all personnel are aware of the contractual agreements associated with this plan.</li> </ul> |
| All Personnel             | <ul style="list-style-type: none"> <li>• Ensuring they are aware of the contractual agreements associated with this plan; and</li> <li>• Informing appropriate personnel of any issues that may arise with respect to the desired sediment and erosion control measures.</li> </ul>                        |

## 7.5 Monitoring and Responsibility

### 7.5.1 All Personnel

It is the obligation of all personnel to report any failures in the erosion and sediment control works utilised during the projects life cycle. Any identified errors within the sediment and erosion control system shall be reported in writing to a relevant project manager. A formal inquiry shall be undertaken in accordance with the reported issue as well as the relevant party procedures (i.e. Principal Contractor).

### 7.5.2 Contractor/Contractor's Foreman

It shall be the responsibility of the Contractor and Contractor's Foreman to monitor and report on the erosion and sediment control measures utilised in the construction phase. Inspections are to be undertaken:

- On a daily basis during earthworks, land disturbance, spoil or stockpile activities and rain events.
- Weekly during site inactivity.
- Within 24 hours prior to expected rainfall and 18 hours prior to intense rainfall events.

The following shall be inspected or reported on:

- Erosion and sediment control devices are in the correct location and are working as defined by this plan.
- Drainage systems both internal and external to the site are operating effectively or to pre-construction efficiencies.
- Spilled material is removed if it can potentially mobilise via stormwater runoff or wind.
- Stabilisation of disturbed land parcels has been undertaken in an effective manner.
- Excess sediment has been removed from erosion and sediment measures appropriately if the device is operation ineffectively or requires decommissioning.
- It is understood that repairs, maintenance or reinstallation may be required if any control measures are operating inadequately, or if infrastructure is damaged due to inefficient operation of the outlined measures.

### 7.5.3 Environmental Representative

It shall be the responsibility of the environment representative to periodically inspect and report on the effectiveness of the erosion and sediment controls during the construction phase of the project. Technical advice shall be given to personnel outlying any uncertainty with regards to the; applicability, installation, operation, maintenance, removal or rehabilitation of any sediment and erosion control.

## 7.6 Construction Phase Sediment Control Devices

As the site has been assessed as a single catchment, it is appropriate to approach the assessment of construction phase sediment devices in a similar manner.

In accordance with the Best Practice Erosion and Sediment Control Manual (IECA 2009) the construction phase catchment has been classified to determine the level of sediment and erosion control techniques required. The site is identified as per Table 4.4.6 (IECA 2009) to be closest to the Southport locality and therefore attracts an average monthly rainfall depth of 56mm to 205mm.

As the extent of soil disturbance is widespread, Type 1 techniques will be used in accordance with Table 4.5.3. This will require control techniques such as a vehicle shakedown at the site entry, sediment fences, sediment basins and check dams. Preliminary explanations of the measures can be found in the engineering drawings in Appendix B.

## 8 ASSET MAINTENANCE

All the stormwater quantity and quality controls detailed in this document are contained within the development site and will remain an asset of the development's property owner, Body Corporate or similar internal authority.

## 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 primary objectives of this report are achieved as follows:

### **Lawful Point of Discharge (LPD)**

- Stormwater will be discharged to the 3 existing lawful points of discharge, being Talpa Street to the north of the site, the lot to the south of the site (Lot 95 on RP187418) and the low point on the northern boundary within the site and its downstream drainage corridor.

### **Stormwater Quantity**

- The site proposes to mitigate the increase in peak run off, where expected to occur at lawful Points of Discharge through the use of a combination of a stormwater quality tank, a detention basin area and reductions in catchment areas.

### **Stormwater Quality**

- A stormwater quality assessment is provided which demonstrates that a specially tailored treatment system will be required in order to meet the pollutant removal targets of City of Gold Coast during the operational phase of the proposed development. The proposed treatment system features specifically designed Ocean Protect tanks.

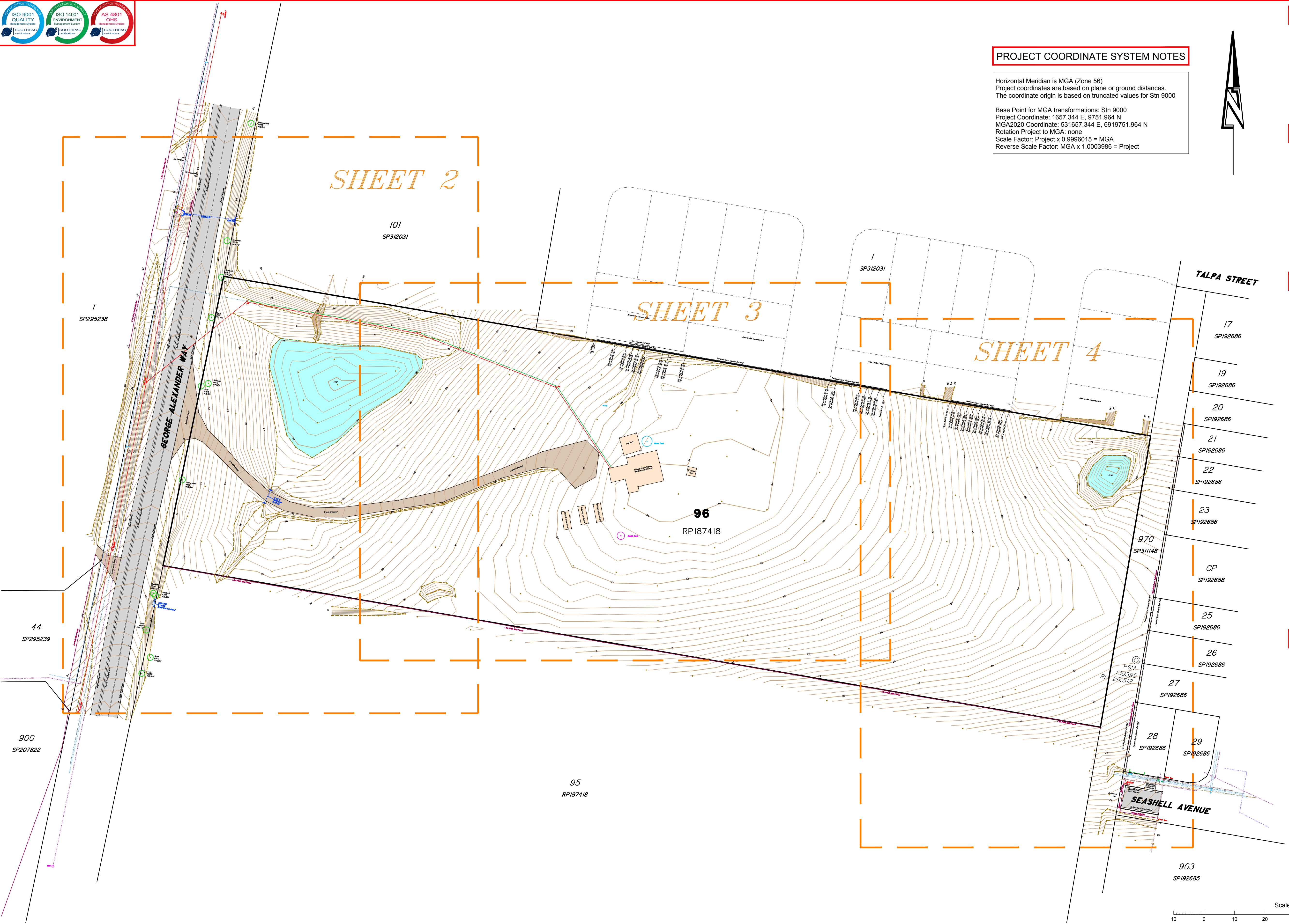
### **Erosion and Sediment Control**

- Erosion and sediment control measures during construction shall be undertaken in accordance with the SPP and Council requirements.

APPENDIX A

Survey

---



PROJECT COORDINATE SYSTEM NOTES

Horizontal Meridian is MGA (Zone 56)  
Project coordinates are based on plane or ground distances.  
The coordinate origin is based on truncated values for Stn 9000

Base Point for MGA transformations: Stn 9000  
Project Coordinate: 1657.344 E, 9751.964 N  
MGA2020 Coordinate: 531657.344 E, 6919751.964 N  
Rotation Project to MGA: none  
Scale Factor: Project x 0.9996015 = MGA  
Reverse Scale Factor: MGA x 1.0003986 = Project

LEGEND

Quality levels are shown on linetypes along with service type eg.   
-E(A)- First Letter is the Service (Elec) and the second is Quality Level (A)

|                        | by Survey | by Records |
|------------------------|-----------|------------|
| U/G ELECTRICITY        | -E(A)-    | -E(D)-     |
| O/H ELECTRICITY        | -E-       | -E-        |
| O/H TELECOMMUNICATIONS | -T-       | -T-        |
| U/G TELECOMMUNICATIONS | -T(A)-    | -T(B)-     |
| U/G DRAINAGE           | -D(A)-    | -D(B)-     |
| SEWERAGE               | -S(A)-    | -S(B)-     |
| WATER                  | -W(A)-    | -W(B)-     |
| GAS                    | -G(A)-    | -G(B)-     |
| FENCE                  | -F-       | -F-        |

SYMBOLS

|                            |            |         |                                                  |
|----------------------------|------------|---------|--------------------------------------------------|
| Sewer Manhole              | SMH        | MH      | Manhole                                          |
| Gully Trap                 | GT         | SL      | Surface Level                                    |
| Stormwater Manhole         | SWMH       | IL      | Invert Level                                     |
| Fire Hydrant               | FH         | BM      | Bench Mark                                       |
| Valve                      | V          | Ø       | Diameter                                         |
| Water Meter                | WM         | RCP     | Reinforced Concrete Pipe                         |
| Electricity Box / Pillar   | EB         | GI      | Galvanised Iron                                  |
| Electric Light Pole        | ELP        |         |                                                  |
| Power Pole                 | PP         | Ø, H, S | Trunk diameter, Height, Spread (canopy diameter) |
| Electricity Manhole        | Elect MH   |         |                                                  |
| Electricity Pit            | Elect PH   |         |                                                  |
| Traffic Signal Pit         | Traffic PH |         |                                                  |
| Traffic Light              | Light      |         |                                                  |
| Telecommunications Manhole | Tel MH     |         |                                                  |
| Telecommunications Pit     | Tel PH     |         |                                                  |
| Tree / Shrub               |            |         |                                                  |

ABBREVIATIONS

NOTES

This Plan has been prepared from a combination of field survey and existing records for the purpose of showing the physical features of the land to assist in designing future development, and should not be used for any other purpose.

See IS313805 for survey of external boundaries of Lot 96 on RP187418. All other boundaries shown hereon were not verified or marked at the time of survey, but were determined by existing title dimensions and occupation (where available), not be field measurement. As such, these dimensions could be out of date and incorrect by modern standards. This plan should not be used for building to boundary, or to prescribed set-backs, without further boundary survey.

Services shown hereon were located where possible by field survey. If not able to be so located, known services have been shown from the records of the relevant authorities or service providers where available and have been noted accordingly on this plan. All services shown from records only will need verification prior to, or during work on site.

Prior to any demolition, excavation or construction on site, the relevant authority should be contacted for:

- \* Verification of all services plotted from records only, and
- \* Possible location of any services altered since this survey was completed or any new services installed either on or adjacent to the site.

**Before starting any demolition, excavation or construction on the site, the relevant person should make an independent and updated enquiry of "dial before you dig" and any relevant service providers to ascertain the existence of further services (if any) and the accurate location of those not able to have been surveyed at the time of preparing this plan.**

\* No responsibility can be accepted by Saunders Havill Group Pty Ltd, for any damage caused to any underground service or any loss or injury so suffered if enquiry and verification have not been completed in accordance with this note.

\*\* This note is an integral part of this plan/data. Reproduction of this plan or any part of it without this note being included in full will render the information shown on such reproduction invalid and not suitable for use.

QUALITY LEVELS

This plan shows Quality classifications of sub surface utility data as per AS5488-2013. The following classifications apply.

Quality Level D - (least accurate level and if used on its own has a high risk of damage) QL-D information is generally obtained from existing records provided by utilities as a result of a Dial Before You Dig enquiry being lodged. In many cases the asset depicted on the plan is in a schematic format only and intended only to indicate its presence.

Quality Level C - (low accuracy and a high risk of damage) Is described as a surface feature correlation or an interpretation of the approximate location and attributes of a subsurface utility asset using a combination of existing records and site survey of visible evidence - for example you can see the pit lids shown on the plan but the actual position of underground connection between pits is still assumed.

Quality Level B - (significant risk reduction) Provides relative subsurface feature locations in three dimensions. The minimum requirement for QL-B is relative spatial position, this can be achieved via an electromagnetic frequency locating device. An electronic location provided by a DBYD Certified Locator to QL-B standard would have a maximum horizontal tolerance of plus or minus 300mm and a maximum vertical tolerance of plus or minus 500mm.

Quality Level A - (meets location accuracy standards for minimum risk when excavating) Is the highest Quality Level accuracy and consists of positive identification of the attribute and location of a subsurface utility at a point to an absolute spatial position in three dimensions. It is the only quality level that defines a subsurface utility as 'Validated'.

| No. | Drawn | Date       | Description    | Checked |
|-----|-------|------------|----------------|---------|
| A   | MD    | 31/10/2022 | Original Issue | JC      |
|     |       |            |                |         |
|     |       |            |                |         |
|     |       |            |                |         |
|     |       |            |                |         |

Plan of

DETAIL PLAN

Sheet 1 of 4

Project

54 George Alexander Way, Coomera

Client

Coomera GA Pty Ltd ATF The Coomera GA Unit Trust

Surveyed

BC

Date

Oct 2022

Level Datum: AHD der.

Origin of Levels: PM139395

RL of Origin: 26.512

Contour Interval: 0.2m

Lot Description

Lot 96 on RP187418

Locality: Coomera

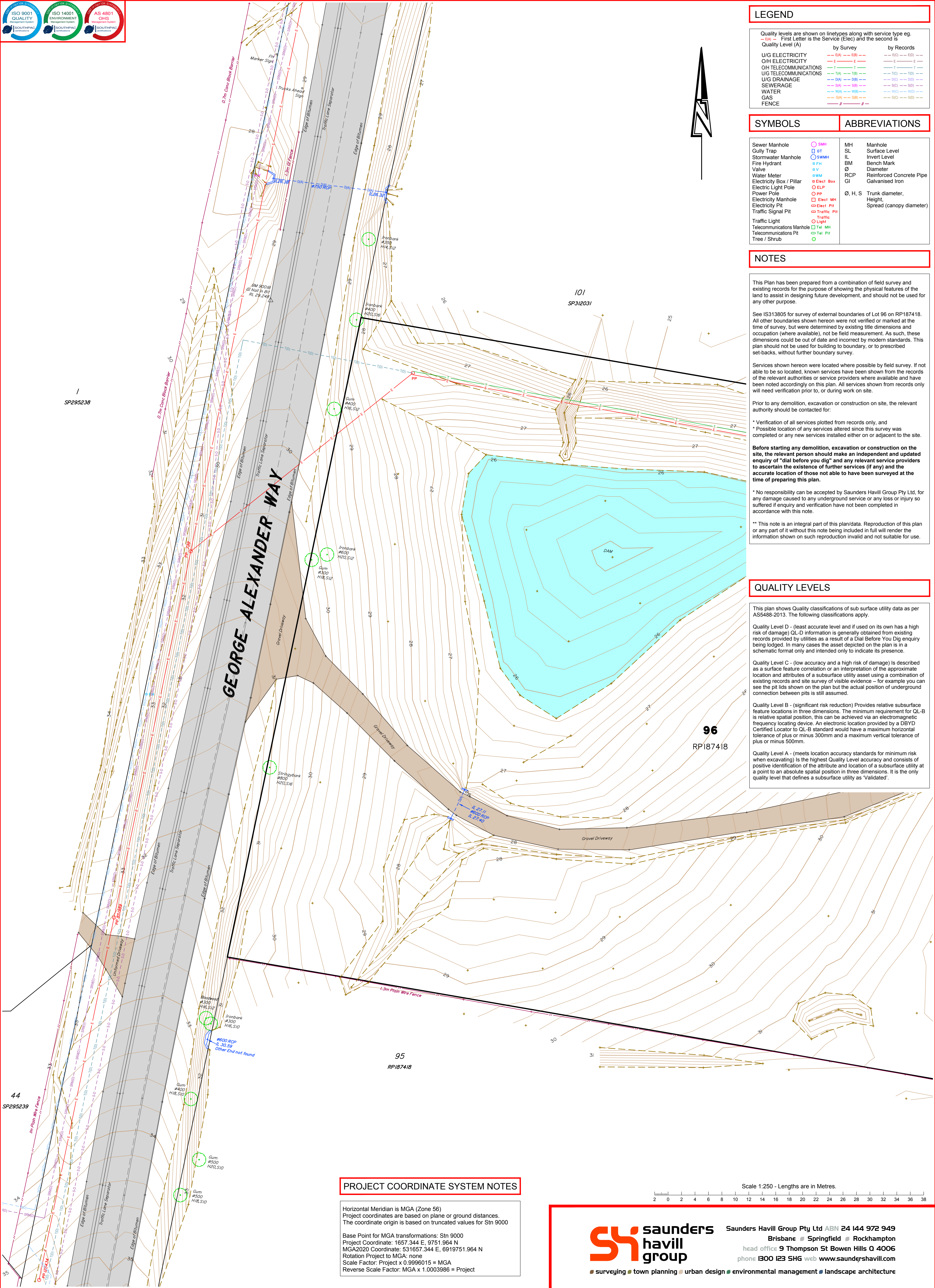
Local Government: Gold Coast City

■ surveying

Scale @A1 1: 600

@A3 1: 1200

Dwg No. 11241 S 03 DT A



LEGEND

| Quality levels are shown on linetypes along with service type eg.<br>— E — First Letter is the Service (Elec) and the second is<br>Quality Level (A) |       |       | by Survey | by Records |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-----------|------------|
| U/G ELECTRICITY                                                                                                                                      | — E — | — E — | — E —     | — E —      |
| O/H ELECTRICITY                                                                                                                                      | — E — | — E — | — E —     | — E —      |
| O/H TELECOMMUNICATIONS                                                                                                                               | — T — | — T — | — T —     | — T —      |
| U/G TELECOMMUNICATIONS                                                                                                                               | — T — | — T — | — T —     | — T —      |
| U/G DRAINAGE                                                                                                                                         | — D — | — D — | — D —     | — D —      |
| SEWERAGE                                                                                                                                             | — S — | — S — | — S —     | — S —      |
| WATER                                                                                                                                                | — W — | — W — | — W —     | — W —      |
| GAS                                                                                                                                                  | — G — | — G — | — G —     | — G —      |
| FENCE                                                                                                                                                | — F — | — F — | — F —     | — F —      |

SYMBOLS

|                            |             |         |                                                        |
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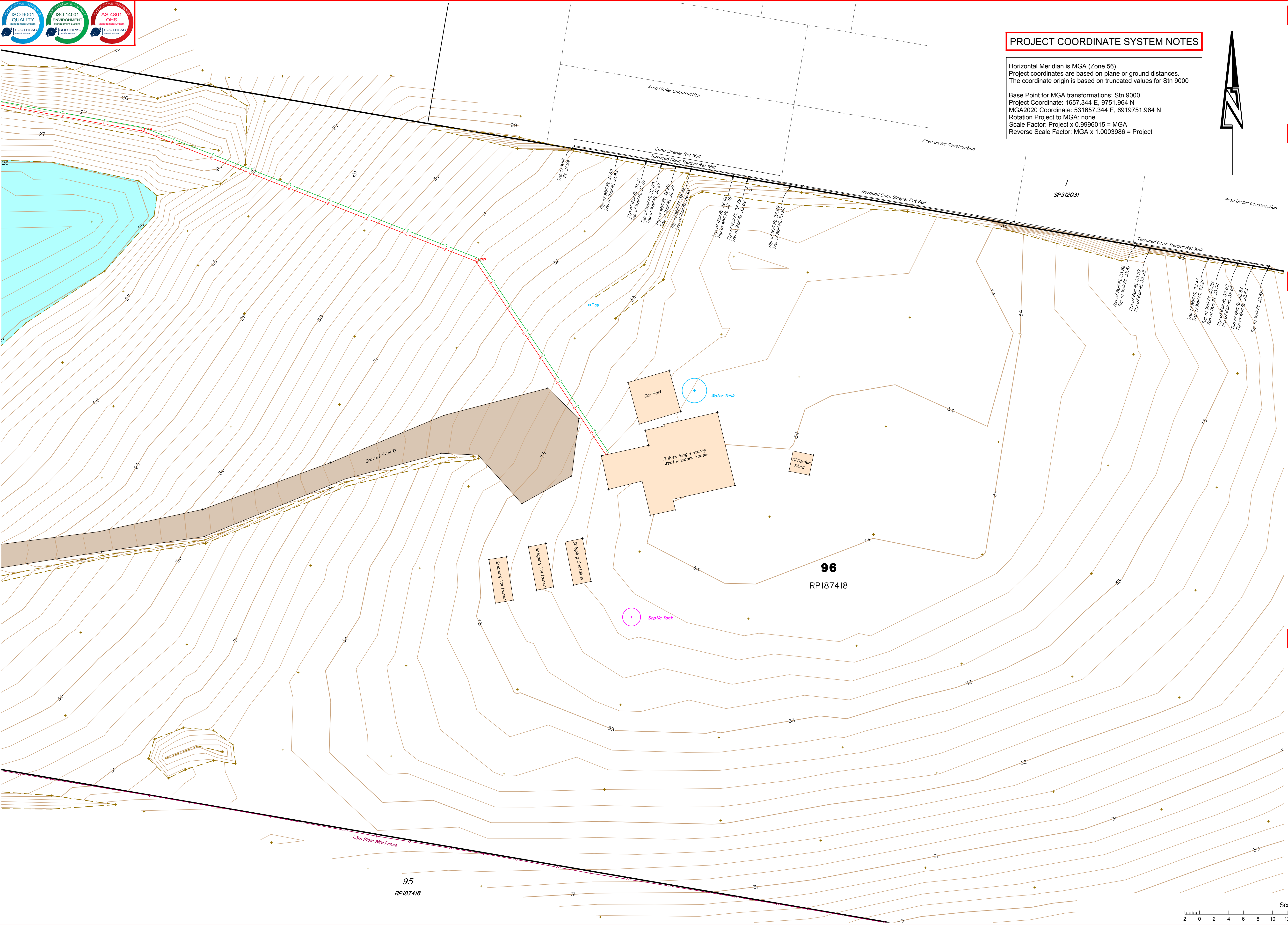
Base Point for MGA transformations: Stn 9000  
Project Coordinate: 1657.344 E, 9751.964 N  
MGA2020 Coordinate: 531657.344 E, 6919751.964 N  
Rotation Project to MGA: none  
Scale Factor: Project x 0.9996015 = MGA  
Reverse Scale Factor: MGA x 1.0003986 = Project

Scale 1:250 - Lengths are in Metres.

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phone 1300 123 SHG web www.saundershavill.com

■ surveying ■ town planning ■ urban design ■ environmental management ■ landscape architecture

|                                                         |     |          |            |                                   |         |         |
|---------------------------------------------------------|-----|----------|------------|-----------------------------------|---------|---------|
| Issues                                                  | No. | Drawn    | Date       | Description                       | Checked | Plan of |
|                                                         | A   | MD       | 31/10/2022 | Original Issue                    | JC      |         |
|                                                         |     |          |            |                                   |         |         |
|                                                         |     |          |            |                                   |         |         |
|                                                         |     |          |            |                                   |         |         |
|                                                         |     |          |            |                                   |         |         |
|                                                         |     |          |            |                                   |         |         |
|                                                         |     |          |            |                                   |         |         |
|                                                         |     |          |            |                                   |         |         |
|                                                         |     |          |            |                                   |         |         |
| DETAIL PLAN                                             |     |          |            |                                   |         |         |
| Sheet 2 of 4                                            |     |          |            |                                   |         |         |
| Project 54 George Alexander Way, Coomera                |     |          |            |                                   |         |         |
| Client Coomera GA Pty Ltd ATF The Coomera GA Unit Trust |     |          |            |                                   |         |         |
| Surveyed                                                |     | Date     |            | Lot Description                   |         |         |
| BC                                                      |     | Oct 2022 |            |                                   |         |         |
| Level Datum: AHD der.                                   |     |          |            | Lot 96 on RP187418                |         |         |
| Origin of Levels: PM139395                              |     |          |            | Scale @A1 1: 250                  |         |         |
| RL of Origin: 26.512                                    |     |          |            | @A3 1: 500                        |         |         |
| Contour Interval: 0.2m                                  |     |          |            | Locality: Coomera                 |         |         |
|                                                         |     |          |            | Local Government: Gold Coast City |         |         |
|                                                         |     |          |            | Dwg No. 11241 S 03 DT A           |         |         |
|                                                         |     |          |            | surveying                         |         |         |



### PROJECT COORDINATE SYSTEM NOTES

Horizontal Meridian is MGA (Zone 56)  
Project coordinates are based on plane or ground distances.  
The coordinate origin is based on truncated values for Stn 9000  
Base Point for MGA transformations: Stn 9000  
Project Coordinate: 1657.344 E, 9751.964 N  
MGA2020 Coordinate: 531657.344 E, 6919751.964 N  
Rotation Project to MGA: none  
Scale Factor: Project x 0.9996015 = MGA  
Reverse Scale Factor: MGA x 1.0003986 = Project

### LEGEND

Quality levels are shown on linetypes along with service type eg. -E(A)- First Letter is the Service (Elec) and the second is Quality Level (A)

|                        | by Survey         | by Records        |
|------------------------|-------------------|-------------------|
| U/G ELECTRICITY        | ---E(A)---E(B)--- | ---E(C)---E(D)--- |
| O/H ELECTRICITY        | ---E---           | ---E---           |
| O/H TELECOMMUNICATIONS | ---T---           | ---T---           |
| U/G TELECOMMUNICATIONS | ---TA---TB---     | ---TC---TD---     |
| U/G DRAINAGE           | ---DA---DB---     | ---DC---DD---     |
| SEWERAGE               | ---SA---SB---     | ---SC---SD---     |
| WATER                  | ---WA---WB---     | ---WC---WD---     |
| GAS                    | ---GA---GB---     | ---GC---GD---     |
| FENCE                  | ---F---           | ---F---           |

### SYMBOLS

|                            |              |         |                                                  |
|----------------------------|--------------|---------|--------------------------------------------------|
| Sewer Manhole              | ○ SMH        | MH      | Manhole                                          |
| Gully Trap                 | ○ G          | SL      | Surface Level                                    |
| Stormwater Manhole         | ○ SWMH       | IL      | Invert Level                                     |
| Fire Hydrant               | ■ FH         | BM      | Bench Mark                                       |
| Valve                      | ■ V          | Ø       | Diameter                                         |
| Water Meter                | ■ WM         | RCP     | Reinforced Concrete Pipe                         |
| Electricity Box / Pillar   | ■ Elect Box  | GI      | Galvanised Iron                                  |
| Electric Light Pole        | ○ ELP        |         |                                                  |
| Power Pole                 | ○ PP         | Ø, H, S | Trunk diameter, Height, Spread (canopy diameter) |
| Electricity Manhole        | ■ Elect MH   |         |                                                  |
| Electricity Pit            | ■ Elect PH   |         |                                                  |
| Traffic Signal Pit         | ■ Traffic PH |         |                                                  |
| Traffic Light              | ○ Light      |         |                                                  |
| Telecommunications Manhole | ■ Tel MH     |         |                                                  |
| Telecommunications Pit     | ■ Tel PH     |         |                                                  |
| Tree / Shrub               | ○            |         |                                                  |

### ABBREVIATIONS

### NOTES

This Plan has been prepared from a combination of field survey and existing records for the purpose of showing the physical features of the land to assist in designing future development, and should not be used for any other purpose.

See IS313805 for survey of external boundaries of Lot 96 on RP187418. All other boundaries shown hereon were not verified or marked at the time of survey, but were determined by existing title dimensions and occupation (where available), not by field measurement. As such, these dimensions could be out of date and incorrect by modern standards. This plan should not be used for building to boundary, or to prescribed set-backs, without further boundary survey.

Services shown hereon were located where possible by field survey. If not able to be so located, known services have been shown from the records of the relevant authorities or service providers where available and have been noted accordingly on this plan. All services shown from records only will need verification prior to, or during work on site.

Prior to any demolition, excavation or construction on site, the relevant authority should be contacted for:

- \* Verification of all services plotted from records only, and
- \* Possible location of any services altered since this survey was completed or any new services installed either on or adjacent to the site.

Before starting any demolition, excavation or construction on the site, the relevant person should make an independent and updated enquiry of "dial before you dig" and any relevant service providers to ascertain the existence of further services (if any) and the accurate location of those not able to have been surveyed at the time of preparing this plan.

\* No responsibility can be accepted by Saunders Havill Group Pty Ltd, for any damage caused to any underground service or any loss or injury so suffered if enquiry and verification have not been completed in accordance with this note.

\*\* This note is an integral part of this plan/data. Reproduction of this plan or any part of it without this note being included in full will render the information shown on such reproduction invalid and not suitable for use.

### QUALITY LEVELS

This plan shows Quality classifications of sub surface utility data as per AS488-2013. The following classifications apply.

Quality Level D - (least accurate level and if used on its own has a high risk of damage) QL-D information is generally obtained from existing records provided by utilities as a result of a Dial Before You Dig enquiry being lodged. In many cases the asset depicted on the plan is in a schematic format only and intended only to indicate its presence.

Quality Level C - (low accuracy and a high risk of damage) is described as a surface feature correlation or an interpretation of the approximate location and attributes of a subsurface utility asset using a combination of existing records and site survey of visible evidence - for example you can see the pit lids shown on the plan but the actual position of underground connection between pits is still assumed.

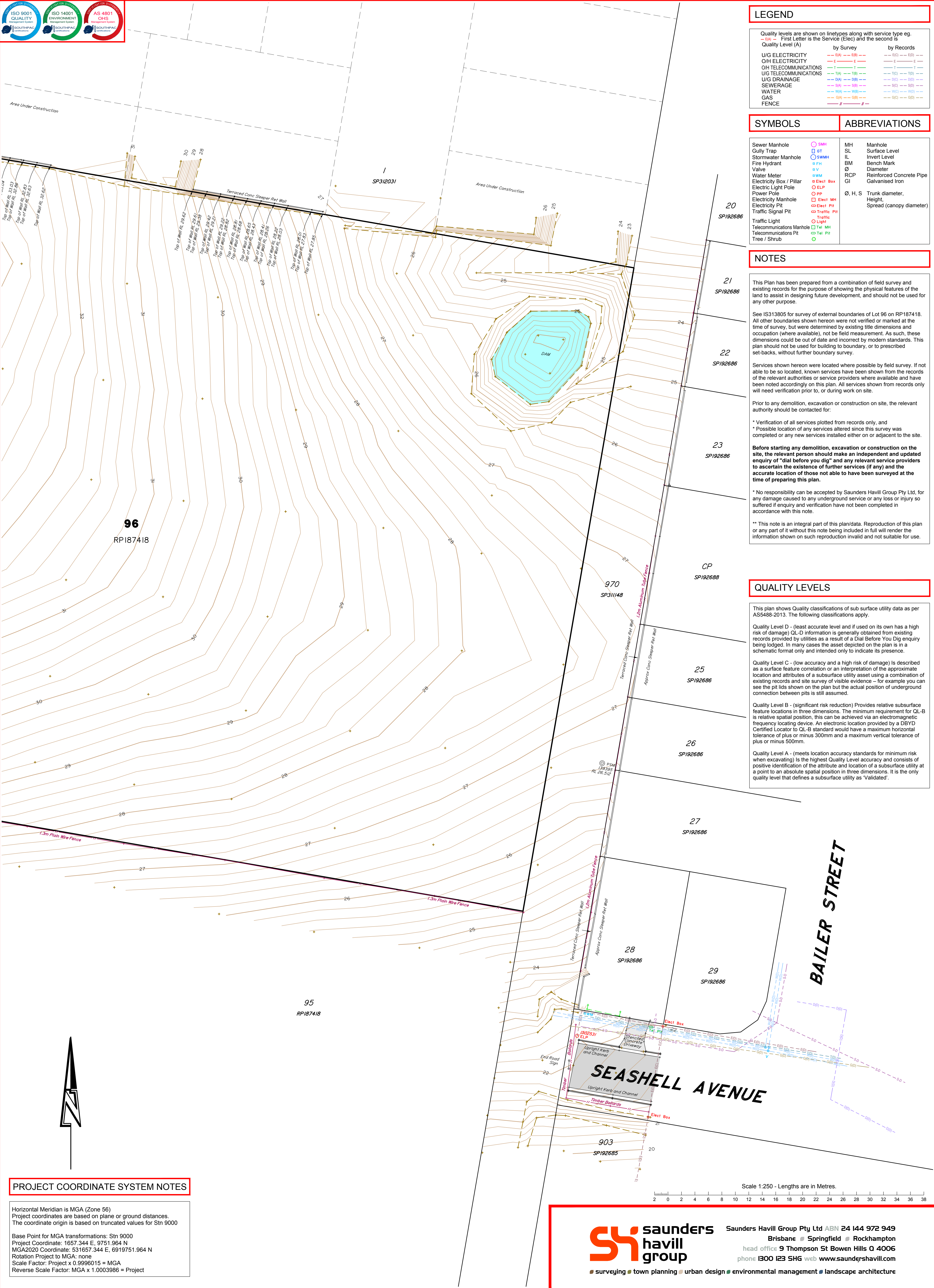
Quality Level B - (significant risk reduction) Provides relative subsurface feature locations in three dimensions. The minimum requirement for QL-B is relative spatial position, this can be achieved via an electromagnetic frequency locating device. An electronic location provided by a DBYD Certified Locator to QL-B standard would have a maximum horizontal tolerance of plus or minus 300mm and a maximum vertical tolerance of plus or minus 500mm.

Quality Level A - (meets location accuracy standards for minimum risk when excavating) Is the highest Quality Level accuracy and consists of positive identification of the attribute and location of a subsurface utility at a point to an absolute spatial position in three dimensions. It is the only quality level that defines a subsurface utility as 'Validated'.

| No. | Drawn | Date       | Description    | Checked |
|-----|-------|------------|----------------|---------|
| A   | MD    | 31/10/2022 | Original Issue | JC      |
|     |       |            |                |         |
|     |       |            |                |         |
|     |       |            |                |         |
|     |       |            |                |         |
|     |       |            |                |         |
|     |       |            |                |         |
|     |       |            |                |         |
|     |       |            |                |         |

|         |                                                  |
|---------|--------------------------------------------------|
| Plan of | <b>DETAIL PLAN</b><br>Sheet 3 of 4               |
| Project | 54 George Alexander Way, Coomera                 |
| Client  | Coomera GA Pty Ltd ATF The Coomera GA Unit Trust |

|                                                    |                  |                                                        |
|----------------------------------------------------|------------------|--------------------------------------------------------|
| Surveyed<br>BC                                     | Date<br>Oct 2022 | Lot Description<br>Lot 96 on RP187418                  |
| Level Datum: AHD der.                              |                  | Locality: Coomera<br>Local Government: Gold Coast City |
| Origin of Levels: PM139395<br>RL of Origin: 26.512 |                  |                                                        |
| Contour Interval: 0.2m                             |                  |                                                        |



LEGEND

| Quality levels are shown on linetypes along with service type eg.<br>- 1A - First Letter is the Service (Elec) and the second is Quality Level (A) |                   |                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|
|                                                                                                                                                    | by Survey         | by Records        |
| U/G ELECTRICITY                                                                                                                                    | --- 1A --- 1B --- | --- 1A --- 1B --- |
| O/H ELECTRICITY                                                                                                                                    | --- 1A --- 1B --- | --- 1A --- 1B --- |
| O/H TELECOMMUNICATIONS                                                                                                                             | --- 1A --- 1B --- | --- 1A --- 1B --- |
| U/G TELECOMMUNICATIONS                                                                                                                             | --- 1A --- 1B --- | --- 1A --- 1B --- |
| U/G DRAINAGE                                                                                                                                       | --- 1A --- 1B --- | --- 1A --- 1B --- |
| SEWERAGE                                                                                                                                           | --- 1A --- 1B --- | --- 1A --- 1B --- |
| WATER                                                                                                                                              | --- 1A --- 1B --- | --- 1A --- 1B --- |
| GAS                                                                                                                                                | --- 1A --- 1B --- | --- 1A --- 1B --- |
| FENCE                                                                                                                                              | --- 1A --- 1B --- | --- 1A --- 1B --- |

SYMBOLS

|                            |              |         |                                                  |
|----------------------------|--------------|---------|--------------------------------------------------|
| Sewer Manhole              | ○ SMH        | MH      | Manhole                                          |
| Gully Trap                 | □ GT         | SL      | Surface Level                                    |
| Stormwater Manhole         | ○ SWMH       | IL      | Invert Level                                     |
| Fire Hydrant               | ■ FH         | BM      | Bench Mark                                       |
| Valve                      | ■ V          | Ø       | Diameter                                         |
| Water Meter                | ■ WM         | RCP     | Reinforced Concrete Pipe                         |
| Electricity Box / Pillar   | ■ Elect Box  | GI      | Galvanised Iron                                  |
| Electric Light Pole        | ○ ELP        | Ø, H, S | Trunk diameter, Height, Spread (canopy diameter) |
| Power Pole                 | ○ PP         |         |                                                  |
| Electricity Manhole        | □ Elect MH   |         |                                                  |
| Electricity Pit            | □ Elect PH   |         |                                                  |
| Traffic Signal Pit         | □ Traffic PH |         |                                                  |
| Traffic Light              | ○ Light      |         |                                                  |
| Telecommunications Manhole | □ Tel MH     |         |                                                  |
| Telecommunications Pit     | □ Tel PH     |         |                                                  |
| Tree / Shrub               | ○ Tree       |         |                                                  |

NOTES

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QUALITY LEVELS

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Quality Level D - (least accurate level and if used on its own has a high risk of damage) QL-D information is generally obtained from existing records provided by utilities as a result of a Dial Before You Dig enquiry being lodged. In many cases the asset depicted on the plan is in a schematic format only and intended only to indicate its presence.

Quality Level C - (low accuracy and a high risk of damage) Is described as a surface feature correlation or an interpretation of the approximate location and attributes of a subsurface utility asset using a combination of existing records and site survey of visible evidence - for example you can see the pit lids shown on the plan but the actual position of underground connection between pits is still assumed.

Quality Level B - (significant risk reduction) Provides relative subsurface feature locations in three dimensions. The minimum requirement for QL-B is relative spatial position, this can be achieved via an electromagnetic frequency locating device. An electronic location provided by a DBYD Certified Locator to QL-B standard would have a maximum horizontal tolerance of plus or minus 300mm and a maximum vertical tolerance of plus or minus 500mm.

Quality Level A - (meets location accuracy standards for minimum risk when excavating) Is the highest Quality Level accuracy and consists of positive identification of the attribute and location of a subsurface utility at a point to an absolute spatial position in three dimensions. It is the only quality level that defines a subsurface utility as 'Validated'.

PROJECT COORDINATE SYSTEM NOTES

Horizontal Meridian is MGA (Zone 56)  
Project coordinates are based on plane or ground distances.  
The coordinate origin is based on truncated values for Stn 9000

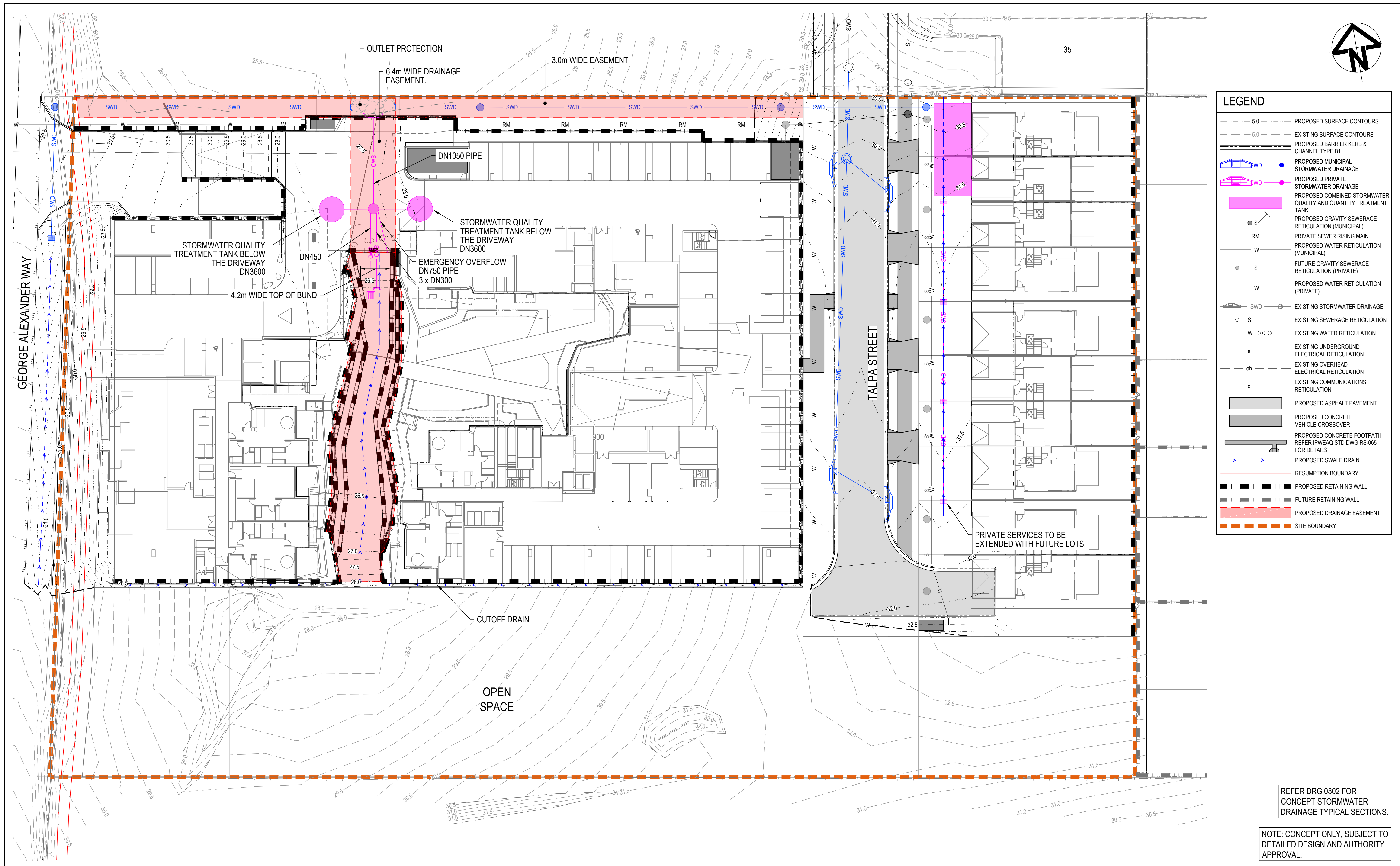
Base Point for MGA transformations: Stn 9000  
Project Coordinate: 1657.344 E, 9751.964 N  
MGA2020 Coordinate: 531657.344 E, 6919751.964 N  
Rotation Project to MGA: none  
Scale Factor: Project x 0.9996015 = MGA  
Reverse Scale Factor: MGA x 1.0003986 = Project

|                                                         |     |       |            |                |         |         |                            |          |                                   |           |
|---------------------------------------------------------|-----|-------|------------|----------------|---------|---------|----------------------------|----------|-----------------------------------|-----------|
| Issues                                                  | No. | Drawn | Date       | Description    | Checked | Plan of | Surveyed                   | Date     | Lot Description                   | surveying |
|                                                         | A   | MD    | 31/10/2022 | Original Issue | JC      |         | BC                         | Oct 2022 |                                   |           |
|                                                         |     |       |            |                |         |         |                            |          |                                   |           |
|                                                         |     |       |            |                |         |         |                            |          |                                   |           |
|                                                         |     |       |            |                |         |         |                            |          |                                   |           |
|                                                         |     |       |            |                |         |         |                            |          |                                   |           |
|                                                         |     |       |            |                |         |         |                            |          |                                   |           |
| DETAIL PLAN                                             |     |       |            |                |         |         | Level Datum: AHD der.      |          | Scale @A1 1: 250                  |           |
| Sheet 4 of 4                                            |     |       |            |                |         |         | Origin of Levels: PM139395 |          | @A3 1: 500                        |           |
|                                                         |     |       |            |                |         |         | RL of Origin: 26.512       |          |                                   |           |
| Project 54 George Alexander Way, Coomera                |     |       |            |                |         |         | Contour Interval: 0.2m     |          | Locality: Coomera                 |           |
| Client Coomera GA Pty Ltd ATF The Coomera GA Unit Trust |     |       |            |                |         |         |                            |          | Local Government: Gold Coast City |           |
|                                                         |     |       |            |                |         |         |                            |          | Dwg No. 11241 S 03 DT A           |           |

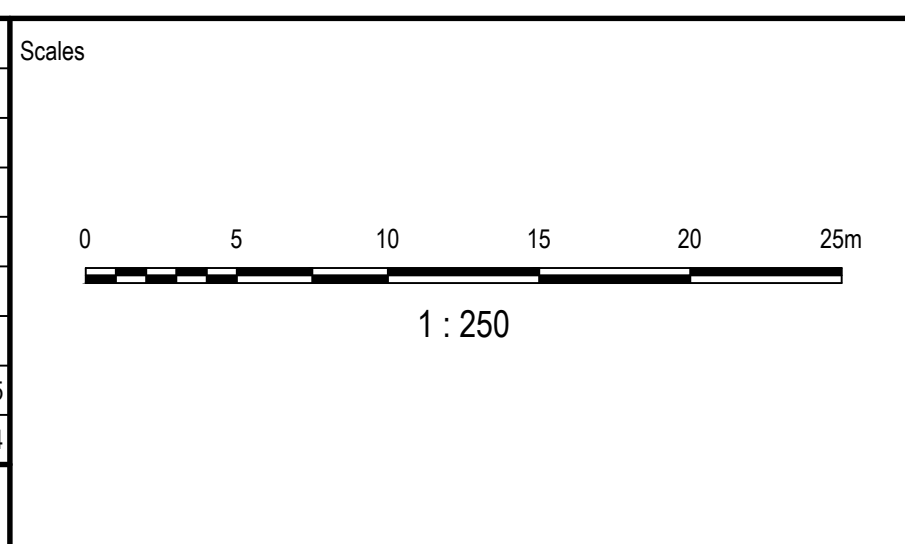
## APPENDIX B

### Engineering Drawings

---



|       |                               |    |    |    |            |
|-------|-------------------------------|----|----|----|------------|
| 01    | CHANGE IN ARCHITECTURAL PLANS | DK | AS | RM | 28.04.2025 |
| 01    | ORIGINAL ISSUE                | DK | AS | RM | 08.08.2024 |
| Issue | Description                   | DR | CH | VE | Date       |



Client

Coomera GA Pty Ltd  
ATF The Coomera  
GA Unit Trust  
Pty Ltd

|                           |                                                                        |               |               |
|---------------------------|------------------------------------------------------------------------|---------------|---------------|
| Status                    | PRELIMINARY<br>NOT TO BE USED FOR CONSTRUCTION<br>© Copyright reserved |               |               |
| Original Issue Signatures |                                                                        |               |               |
| Drawn                     | D. KEARNEY                                                             | Original Size | A1            |
| Designed                  | T. DINGLE                                                              | Height Datum  | AHD           |
| Project Manager           | A. SHEPHERD                                                            | Grid          | MGA (ZONE 56) |
| Verified                  | R. MULLIGAN                                                            |               |               |

|         |                                               |  |
|---------|-----------------------------------------------|--|
| Project | 54 GEORGE ALEXANDER WAY,<br>COOMERA           |  |
| Title   | CONCEPT<br>STORMWATER DRAINAGE<br>LAYOUT PLAN |  |

Arcadis Australia Pacific Pty Limited  
Level 7, Seabank Building, 12-14 Marine Parade  
SOUTHPORT QLD 4215  
ABN 76 104 485 289  
Tel No: +61 7 5503 4800  
www.arcadis.com/au

Project Number

30157884

Issue

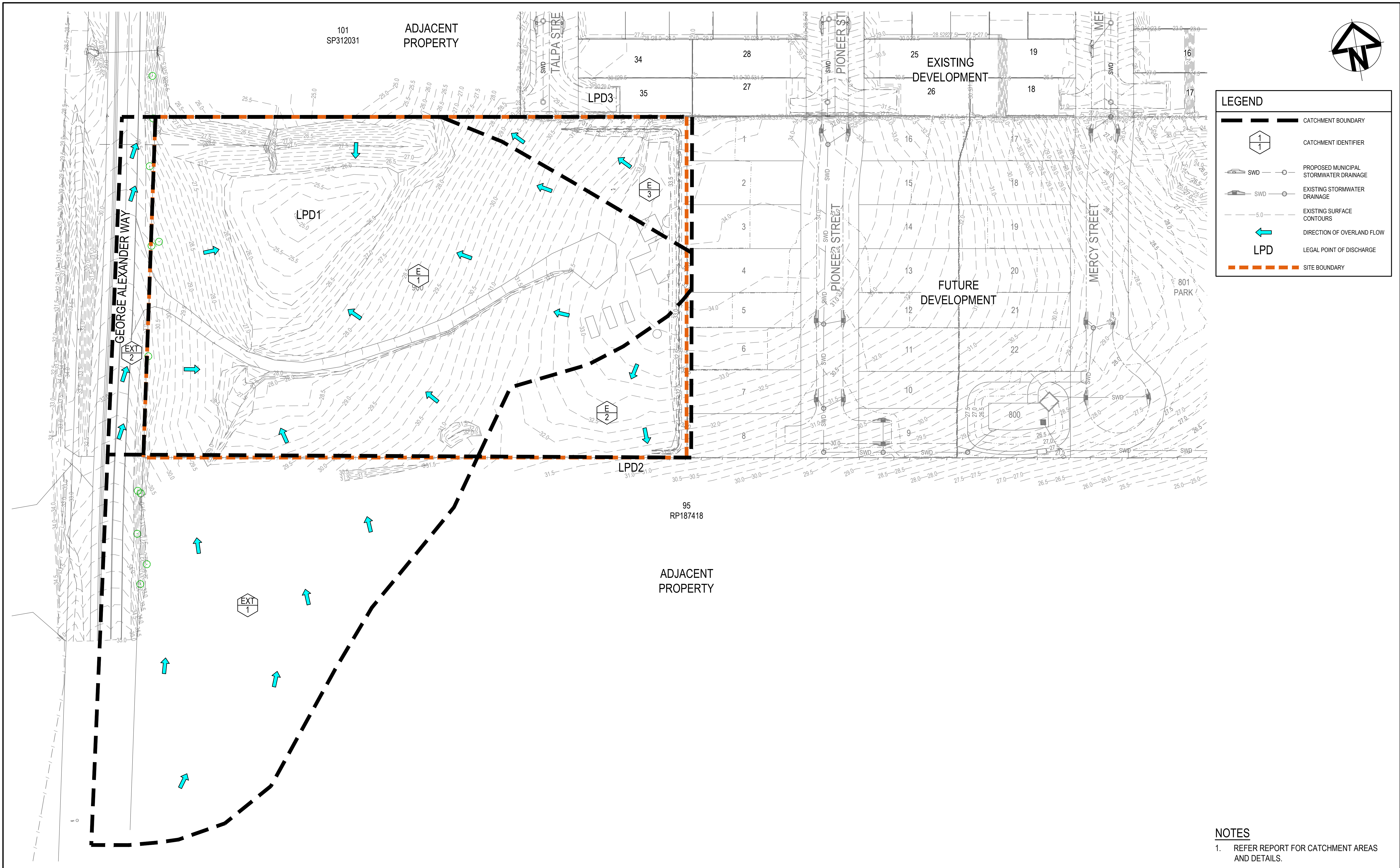
01

Drawing No.

GAW-AAP-DA-00-DRG-CV-0301

REFER DRG 0302 FOR  
CONCEPT STORMWATER  
DRAINAGE TYPICAL SECTIONS.

NOTE: CONCEPT ONLY, SUBJECT TO  
DETAILED DESIGN AND AUTHORITY  
APPROVAL.

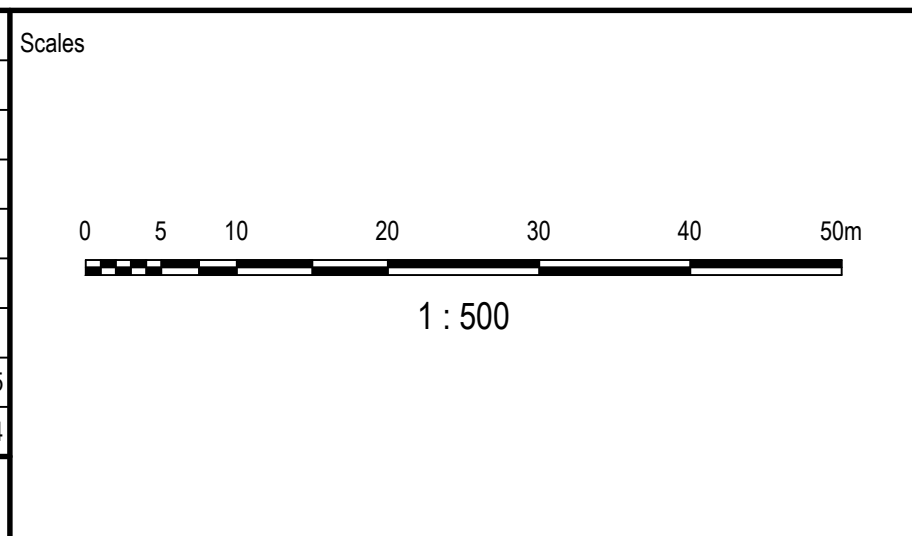


**LEGEND**

- CATCHMENT BOUNDARY
- CATCHMENT IDENTIFIER
- PROPOSED MUNICIPAL STORMWATER DRAINAGE
- EXISTING STORMWATER DRAINAGE
- EXISTING SURFACE CONTOURS
- DIRECTION OF OVERLAND FLOW
- LEGAL POINT OF DISCHARGE
- SITE BOUNDARY

- NOTES**
- REFER REPORT FOR CATCHMENT AREAS AND DETAILS.

|       |                               |    |    |    |            |
|-------|-------------------------------|----|----|----|------------|
|       |                               |    |    |    |            |
|       |                               |    |    |    |            |
|       |                               |    |    |    |            |
|       |                               |    |    |    |            |
| 02    | CHANGE IN ARCHITECTURAL PLANS | DK | AS | RM | 28.04.2025 |
| 01    | ORIGINAL ISSUE                | DK | AS | RM | 08.08.2024 |
| Issue | Description                   | DR | CH | VE | Date       |



Client

Coomera GA Pty Ltd  
ATF The Coomera  
GA Unit Trust  
Pty Ltd

|                                                |             |               |               |
|------------------------------------------------|-------------|---------------|---------------|
| Status                                         |             |               |               |
| PRELIMINARY<br>NOT TO BE USED FOR CONSTRUCTION |             |               |               |
| © Copyright reserved                           |             |               |               |
| Original Issue Signatures                      |             |               |               |
| Drawn                                          | D. KEARNEY  | Original Size | A1            |
| Designed                                       | T. DINGLE   | Height Datum  | AHD           |
| Project Manager                                | A. SHEPHERD | Grid          | MGA (ZONE 56) |
| Verified                                       | R. MULLIGAN |               |               |

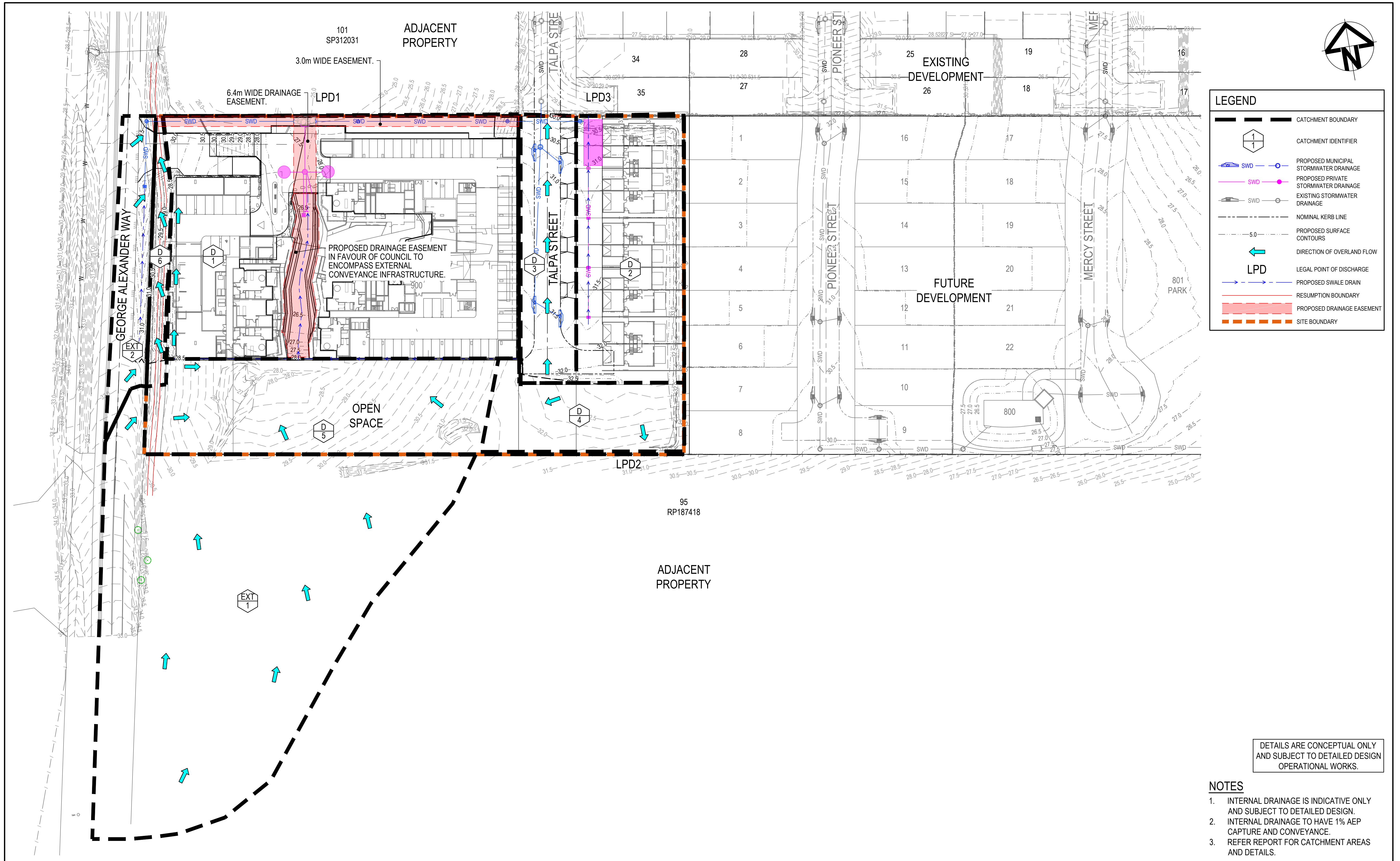
|         |  |                                                   |
|---------|--|---------------------------------------------------|
| Project |  | 54 GEORGE ALEXANDER WAY,<br>COOMERA               |
| Title   |  | STORMWATER<br>CATCHMENT PLAN -<br>PRE DEVELOPMENT |

ARCADIS

Arcadis Australia Pacific Pty Limited  
Level 7, Seabank Building, 12-14 Marine Parade  
SOUTHPORT QLD 4215  
ABN 76 104 485 289  
Tel No: +61 7 5503 4800  
www.arcadis.com/au

|                |          |
|----------------|----------|
| Project Number | 30157884 |
| Issue          | 02       |

GAW-AAP-DA-00-DRG-CV-0311



**LEGEND**

- CATCHMENT BOUNDARY
- CATCHMENT IDENTIFIER
- PROPOSED MUNICIPAL STORMWATER DRAINAGE
- PROPOSED PRIVATE STORMWATER DRAINAGE
- EXISTING STORMWATER DRAINAGE
- NOMINAL KERB LINE
- PROPOSED SURFACE CONTOURS
- DIRECTION OF OVERLAND FLOW
- LEGAL POINT OF DISCHARGE
- PROPOSED SWALE DRAIN
- RESUMPTION BOUNDARY
- PROPOSED DRAINAGE EASEMENT
- SITE BOUNDARY

DETAILS ARE CONCEPTUAL ONLY  
AND SUBJECT TO DETAILED DESIGN  
OPERATIONAL WORKS.

- NOTES**
- INTERNAL DRAINAGE IS INDICATIVE ONLY AND SUBJECT TO DETAILED DESIGN.
  - INTERNAL DRAINAGE TO HAVE 1% AEP CAPTURE AND CONVEYANCE.
  - REFER REPORT FOR CATCHMENT AREAS AND DETAILS.

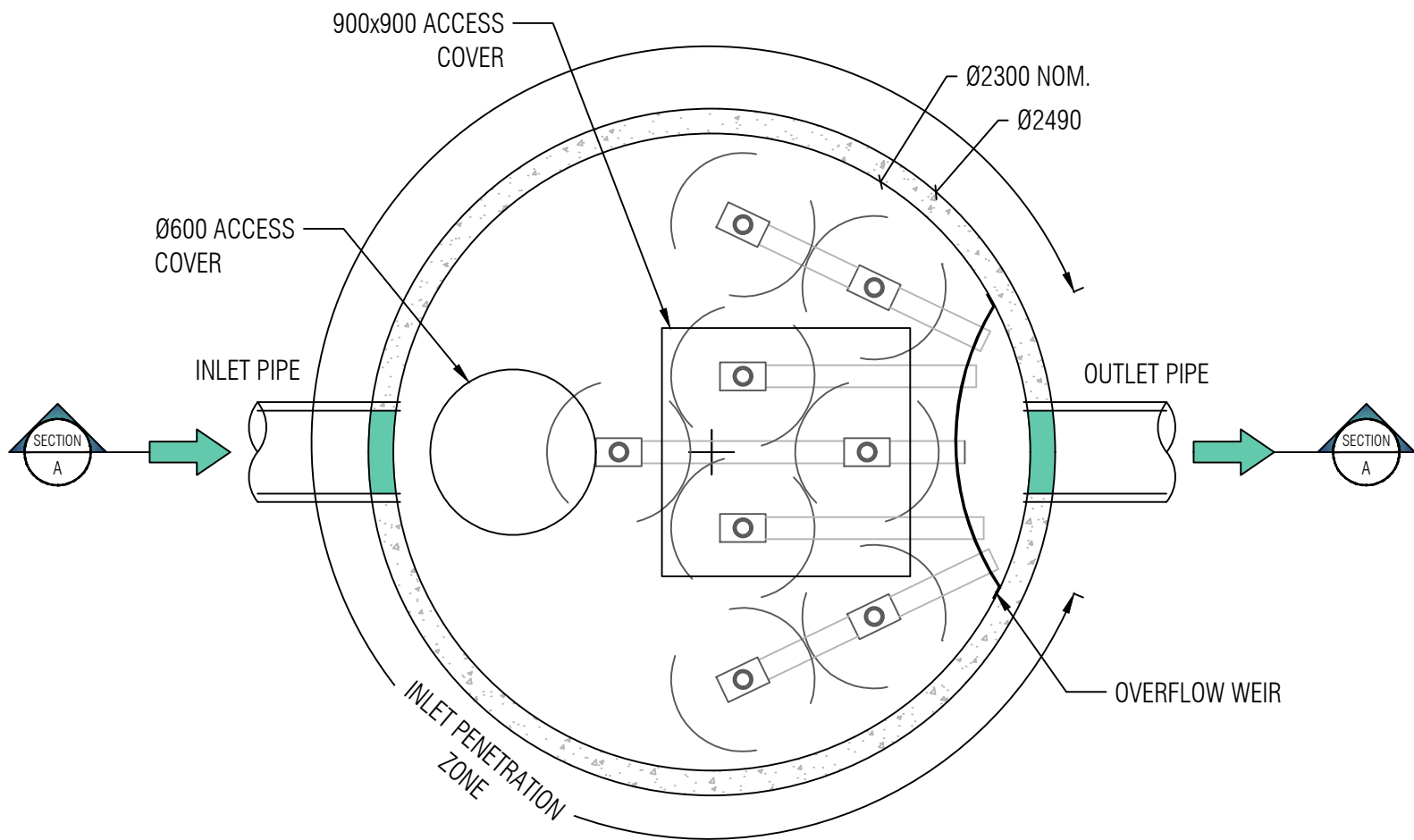
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## APPENDIX C

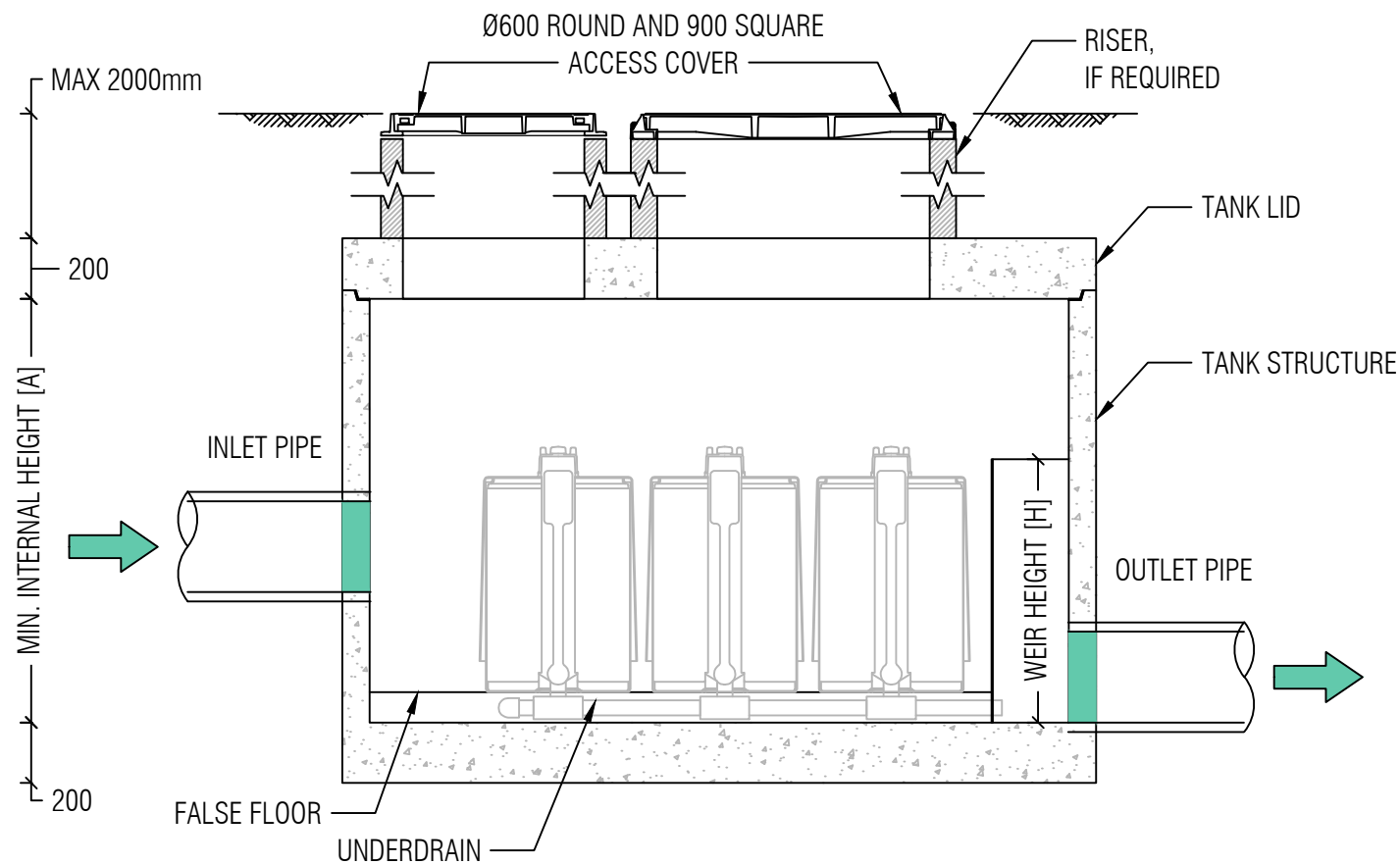
### Ocean Protect Stormwater Quality System

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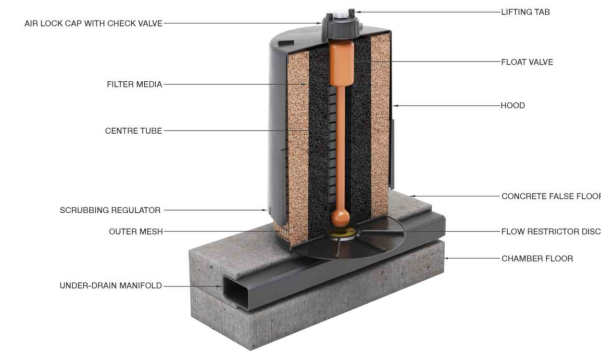
INLET INVERT LEVEL  
MINIMUM 100mm ABOVE  
OUTLET INVERT LEVEL

## PLAN LAYOUT



## SECTION A

## STORMFILTER DESIGN PARAMETERS



- 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.

|                                                             |          |
|-------------------------------------------------------------|----------|
| NUMBER OF CARTRIDGES                                        | UP TO 12 |
| HYDRAULIC CAPACITY (L/S)                                    | 90       |
| MAX. COMPONENT WEIGHT (kg)<br><small>*MASS VARIABLE</small> | 7000     |
| TANK LID WEIGHT (kg)                                        | 1900     |

|                                                    |      |      |      |
|----------------------------------------------------|------|------|------|
| CARTRIDGE NAME / SIPHON HEIGHT (mm)                | 690  | 460  | 310  |
| CARTRIDGE PHYSICAL HEIGHT (mm)                     | 840  | 600  | 600  |
| TYPICAL WEIR HEIGHT [H] (mm)                       | 920  | 690  | 540  |
| MINIMUM INTERNAL HEIGHT [A] (mm)                   | 1100 | 850  | 850  |
| CARTRIDGE FLOW RATE FOR NPSORB MEDIA (L/s)         | 1.60 | 1.10 | 0.70 |
| CARTRIDGE FLOW RATE FOR PSORB (MCC) MEDIA (L/s)    | 0.90 | 0.46 | 0.39 |
| CARTRIDGE FLOW RATE FOR PSORB (SQIDEP) MEDIA (L/s) | 1.26 | 0.86 | 0.60 |
| CARTRIDGE FLOW RATE FOR ZPG MEDIA (L/s)            | 1.60 | 1.10 | 0.70 |

### GENERAL NOTES/ STRUCTURAL DESIGN CRITERIA

- PRECAST STRUCTURE SUPPLIED WITH PENETRATIONS TO SUIT OUTER DIAMETER OF NOMINATED PIPE SIZE / MATERIAL.
- PRECAST STRUCTURE SHALL MEET W80 WHEEL LOAD RATING ASSUMING A MAXIMUM EARTH COVER OF 2.0m AND A GROUND WATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. CERTIFYING ENGINEER TO CONFIRM ACTUAL GROUNDWATER ELEVATION. PRECAST STRUCTURE SHALL BE IN ACCORDANCE WITH AS3600.
- PRECAST STRUCTURE SHALL BE PLACED ON A STABLE GROUND WITH A MINIMUM SOIL BEARING CAPACITY OF 125kPa UNDER NORMAL SERVICE CONDITION.
- IF THE PEAK FLOW RATE, AS DETERMINED BY THE SITE CERTIFYING ENGINEER, EXCEEDS THE PEAK HYDRAULIC CAPACITY OF THE SYSTEM, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.
- ALL WATER QUALITY TREATMENT DEVICES REQUIRE PERIODIC MAINTENANCE. REFER TO THE OPERATION AND MAINTENANCE MANUAL FOR GUIDELINES AND ACCESS REQUIREMENTS.
- SITE-SPECIFIC PRODUCTION DRAWING WILL BE PROVIDED UPON PLACEMENT OF ORDER.
- DRAWING NOT TO SCALE.

### INSTALLATION NOTES

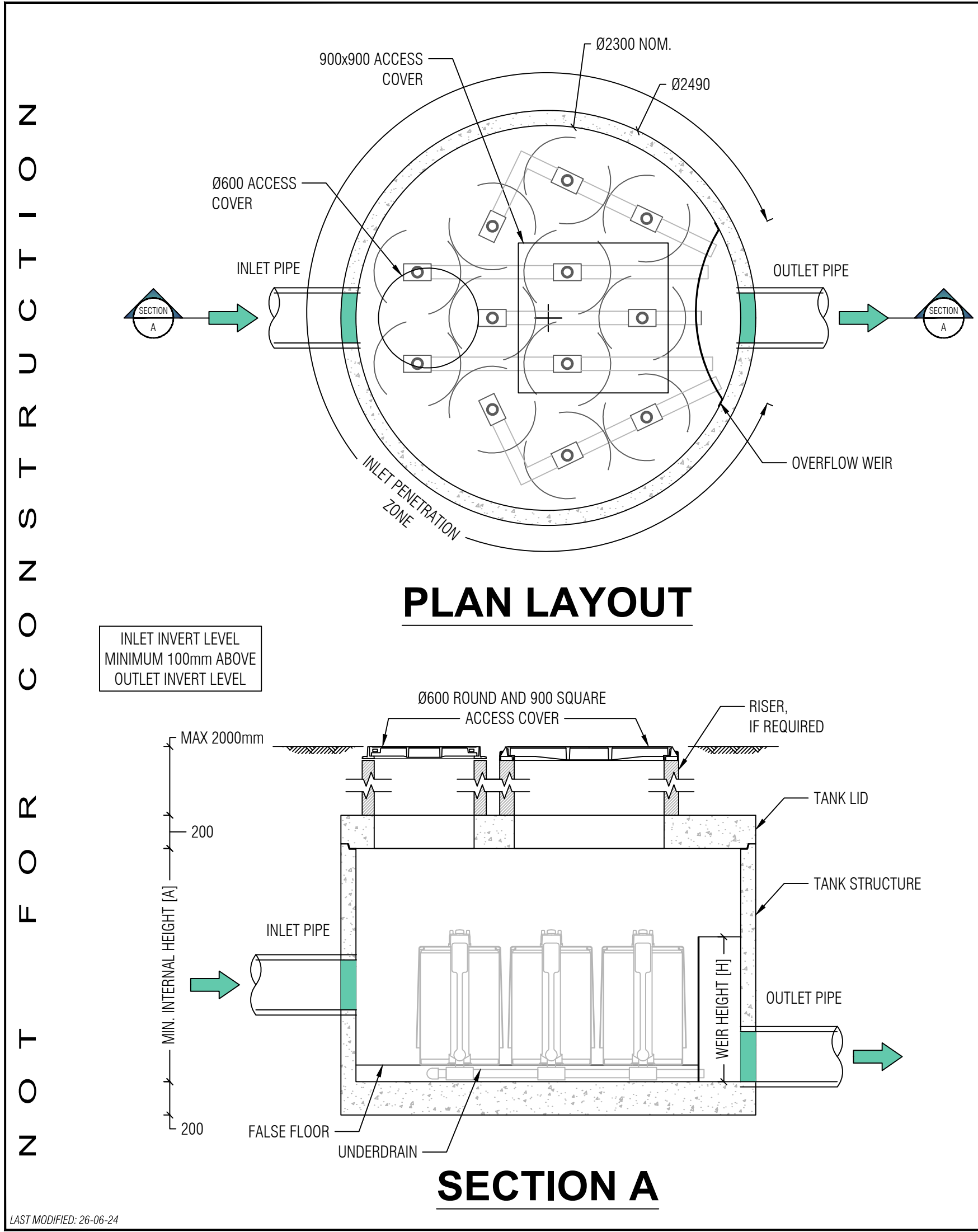
- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY CERTIFYING ENGINEER.
- CONTRACTOR TO PROVIDE ALL EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING DETAIL PROVIDED SEPARATELY).
- CONTRACTOR TO APPLY SEALANT TO ALL JOINTS AND TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPES.



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OCEAN PROTECT  
8 CARTRIDGE STORMFILTER SYSTEM  
DN2300 MANHOLE  
SPECIFICATION DRAWING



STORMFILTER DESIGN PARAMETERS

- 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.

|                                                             |          |  |  |
|-------------------------------------------------------------|----------|--|--|
| NUMBER OF CARTRIDGES                                        | UP TO 12 |  |  |
| HYDRAULIC CAPACITY (L/S)                                    | 90       |  |  |
| MAX. COMPONENT WEIGHT (kg)<br><small>*MASS VARIABLE</small> | 7000     |  |  |
| TANK LID WEIGHT (kg)                                        | 1900     |  |  |

|                                                    |      |      |      |
|----------------------------------------------------|------|------|------|
| CARTRIDGE NAME / SIPHON HEIGHT (mm)                | 690  | 460  | 310  |
| CARTRIDGE PHYSICAL HEIGHT (mm)                     | 840  | 600  | 600  |
| TYPICAL WEIR HEIGHT [H] (mm)                       | 920  | 690  | 540  |
| MINIMUM INTERNAL HEIGHT [A] (mm)                   | 1100 | 850  | 850  |
| CARTRIDGE FLOW RATE FOR NPSORB MEDIA (L/s)         | 1.60 | 1.10 | 0.70 |
| CARTRIDGE FLOW RATE FOR PSORB (MCC) MEDIA (L/s)    | 0.90 | 0.46 | 0.39 |
| CARTRIDGE FLOW RATE FOR PSORB (SQIDEP) MEDIA (L/s) | 1.26 | 0.86 | 0.60 |
| CARTRIDGE FLOW RATE FOR ZPG MEDIA (L/s)            | 1.60 | 1.10 | 0.70 |

GENERAL NOTES/ STRUCTURAL DESIGN CRITERIA

- PRECAST STRUCTURE SUPPLIED WITH PENETRATIONS TO SUIT OUTER DIAMETER OF NOMINATED PIPE SIZE / MATERIAL.
- PRECAST STRUCTURE SHALL MEET W80 WHEEL LOAD RATING ASSUMING A MAXIMUM EARTH COVER OF 2.0m AND A GROUND WATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. CERTIFYING ENGINEER TO CONFIRM ACTUAL GROUNDWATER ELEVATION. PRECAST STRUCTURE SHALL BE IN ACCORDANCE WITH AS3600.
- PRECAST STRUCTURE SHALL BE PLACED ON A STABLE GROUND WITH A MINIMUM SOIL BEARING CAPACITY OF 125kPa UNDER NORMAL SERVICE CONDITION.
- IF THE PEAK FLOW RATE, AS DETERMINED BY THE SITE CERTIFYING ENGINEER, EXCEEDS THE PEAK HYDRAULIC CAPACITY OF THE SYSTEM, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.
- ALL WATER QUALITY TREATMENT DEVICES REQUIRE PERIODIC MAINTENANCE. REFER TO THE OPERATION AND MAINTENANCE MANUAL FOR GUIDELINES AND ACCESS REQUIREMENTS.
- SITE-SPECIFIC PRODUCTION DRAWING WILL BE PROVIDED UPON PLACEMENT OF ORDER.
- DRAWING NOT TO SCALE.

INSTALLATION NOTES

- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY CERTIFYING ENGINEER.
- CONTRACTOR TO PROVIDE ALL EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING DETAIL PROVIDED SEPARATELY).
- CONTRACTOR TO APPLY SEALANT TO ALL JOINTS AND TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPES.

OCEAN  
PROTECT

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OCEAN PROTECT  
12 CARTRIDGE STORMFILTER SYSTEM  
DN2300 MANHOLE  
SPECIFICATION DRAWING



## Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP)

# VERIFICATION CERTIFICATE

### Applicant Information

|                          |                                                                                |
|--------------------------|--------------------------------------------------------------------------------|
| <b>Applicant Name</b>    | <b>Ocean Protect Pty Ltd</b>                                                   |
| <b>Applicant Address</b> | PO Box 75,<br>Casula Mall NSW 2170                                             |
| <b>Website</b>           | <a href="http://www.oceanprotect.com.au">www.oceanprotect.com.au</a>           |
| <b>Contact Email</b>     | <a href="mailto:michaelw@oceanprotect.com.au">michaelw@oceanprotect.com.au</a> |

### Verified Technology

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product Title</b>      | <b>OceanGuard</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>SQIDEP Pathway</b>     | <b>Body of Evidence Pathway</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Reviewed Documents</b> | <p>The following documents form the basis of this independent evaluation:</p> <ul style="list-style-type: none"> <li>• Dalrymple B, Wicks M. (2021). A review of the application of OceanGuard® in Australia. Prepared on behalf of Ocean Protect.</li> <li>• Letter from Ocean Protect (3 March 2019) describing the equivalence of OceanGuard® technology to EnviroPod® technology.</li> <li>• Peer review report by Damian McCann of OceanGuard® (16 June 2021)</li> <li>• Goonetilleke A (2011), Kuranda Stormwater Treatment System Field Evaluation.</li> <li>• Butler K, Ockleston G, Foster M (2002), Auckland City's field and laboratory testing of stormwater catchpit filters.</li> <li>• Renew Solutions, 2023, Hydraulic testing of OceanGuard Technology.</li> <li>• Dalrymple B, Wicks M, Jones W, Allingham B (2021), "Gully pit inserts" shown to reduce pollutants in stormwater, Australian Water Association Water e-Journal, Vol 6, No.1.</li> <li>• White M, Pezzaniti D (2002), Evaluation of Gully Pit Inlet Litter Control Systems – Final Report. Prepared for Brisbane City Council.</li> <li>• Wicks M, Vigar N, Hannah M (2011), Nutrients and solids removal by an engineered treatment train – Field evaluation of a gully pit insert and cartridge media filter. Published in Water Journal of the Australian Water Association, September 2011.</li> <li>• Vigar N, Wicks M (2010), Kuranda Stormwater Treatment System Field Evaluation – StormFilter EnviroPod® (SFEP) Treatment Train with ZPGTM Media.</li> <li>• Michael Wicks, Brad Dalrymple, OceanGuard SQIDEP Compliance (undated) (spreadsheet data with more details regarding monitoring of OceanGuard at Western Sydney, NSW – includes spreadsheets of water quality results, event flows and sample aliquots).</li> <li>• Various supporting files from monitoring of OceanGuard at Western Sydney University including individual storm reports, chain of custody documentation, maintenance reports, statutory declarations, and photos.</li> </ul> |

## Technology Information

|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                     |               |                              |               |                            |               |                         |              |
|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------|------------------------------|---------------|----------------------------|---------------|-------------------------|--------------|
| <b>Applicant's<br/>Verified<br/>Performance<br/>Claims (ER)</b> | <table> <tr> <td><b>Total Suspended Solids (TSS)</b></td><td><b>51.6 %</b></td></tr> <tr> <td><b>Total Phosphorus (TP)</b></td><td><b>64.7 %</b></td></tr> <tr> <td><b>Total Nitrogen (TN)</b></td><td><b>24.9 %</b></td></tr> <tr> <td><b>Gross Pollutants</b></td><td><b>100 %</b></td></tr> </table>                                                                                                                                                                                                                                                                          | <b>Total Suspended Solids (TSS)</b> | <b>51.6 %</b> | <b>Total Phosphorus (TP)</b> | <b>64.7 %</b> | <b>Total Nitrogen (TN)</b> | <b>24.9 %</b> | <b>Gross Pollutants</b> | <b>100 %</b> |
| <b>Total Suspended Solids (TSS)</b>                             | <b>51.6 %</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                     |               |                              |               |                            |               |                         |              |
| <b>Total Phosphorus (TP)</b>                                    | <b>64.7 %</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                     |               |                              |               |                            |               |                         |              |
| <b>Total Nitrogen (TN)</b>                                      | <b>24.9 %</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                     |               |                              |               |                            |               |                         |              |
| <b>Gross Pollutants</b>                                         | <b>100 %</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                     |               |                              |               |                            |               |                         |              |
| <b>Test Stormwater<br/>Runoff</b>                               | <p>The presented runoff pollutant test results complied with the SQIDEP typical stormwater pollutant concentrations for urban environments. The device has therefore been tested within the pollutant loading ranges specified by SQIDEP v1.3 for typical urban environments (urban roads, residential, industrial, commercial). The TN component of one event was removed from the performance claim as it was considered an outlier, and not representative of TN loading and treatment. The gross pollutant performance claim is based on independent laboratory testing.</p> |                                     |               |                              |               |                            |               |                         |              |
| <b>Test Catchment</b>                                           | <p>Commercial</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |               |                              |               |                            |               |                         |              |
| <b>Maintenance<br/>Performed<br/>during<br/>monitoring</b>      | <ul style="list-style-type: none"> <li>The OceanGuard at the site was maintained in accordance with typical/ standard maintenance procedures for these assets during the study period. In summary, the system was maintained approximately every four (4) months, with maintenance undertaken on 14 February 2020, 4 June 2020, 27 November 2020 and 25 March 2021 – noting the monitoring of the OceanGuard at the site was undertaken between March 2020 and June 2021.</li> </ul>                                                                                             |                                     |               |                              |               |                            |               |                         |              |

## Verified method to model in MUSIC

Modelling a OceanGuard in MUSIC is as follows:



Use a Generic node with the following properties:

| High flow bypass/ treatment flow rate (TFR) | Pollutant removal up to TFR                                                |
|---------------------------------------------|----------------------------------------------------------------------------|
| 20 L/ s per OceanGuard                      | 51.6% for TSS<br>64.7% for TP<br>24.9% for TN<br>100% for gross pollutants |

Input properties should reflect those given below:

| Pollutant                    | Influent | Effluent | Reduction |
|------------------------------|----------|----------|-----------|
| Total suspended solids (TSS) | 1000     | 484      | 51.6%     |
| Total Phosphorus (TP)        | 10       | 3.53     | 64.7%     |
| Total Nitrogen               | 100      | 75.1     | 24.9%     |
| Gross Pollutants             | 1000     | 0        | 100%      |

## Conditions/Notes

The limitations of the acceptance of these claims include:

- The results lie within acceptable inflow limits for this type of catchment and based on the analysis are found to be representative. The device has been tested within the pollutant loading ranges specified by SQIDEP v1.3. As with the majority of treatment devices, where the influent water is more polluted there would likely be a greater percentage of pollutants removed and a higher residual load in effluent water – and, where the influent water is cleaner (i.e. below limits of detection), there would likely be a lower percentage of pollutants removed and a lower residual pollutant load in effluent water.
- The OP OceanGuard filter bag is the only treatment mechanism applied by the device. The field results evaluated for the OP OceanGuard were for a device with a 200-micron filter bag. The OP OceanGuard filter bag can be supplied with multiple pore sizes from 200 micron or larger. This verification certificate is specific to filter bag with pore size of 200 microns.
- Design and installation should be performed in accordance with the manufacturer's guidelines. Results are reliant on the maintenance of the device being consistent with the manufacturer's guidelines.
- Regular inspection and maintenance should be performed in accordance with the manufacturer's operation and maintenance manuals.

#### Independent Reviewers

| Evaluator Signature                                         |                                                                                    |
|-------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>Dr Baden Myers</b><br>Director<br>Baden Myers Consulting |  |
|                                                             |                                                                                    |

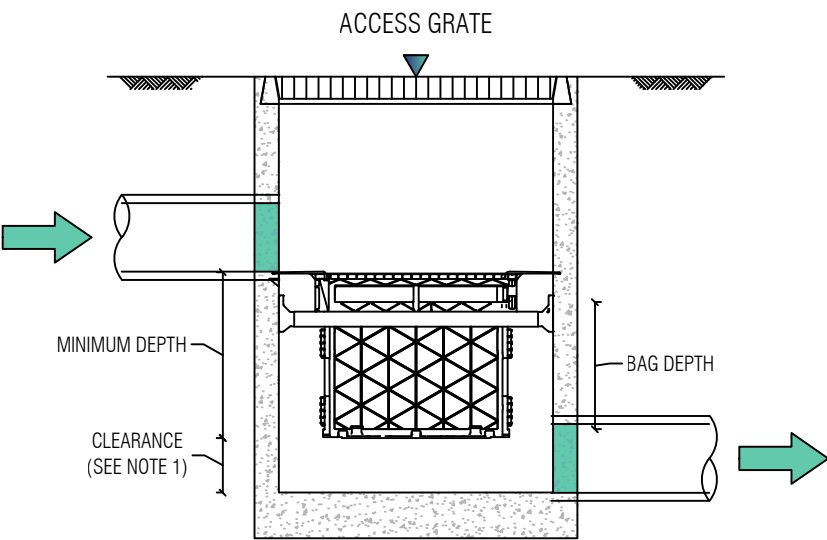
#### Issue of Verification Certificate

|                                                                |                  |
|----------------------------------------------------------------|------------------|
| Acceptance by SQIDEP Governance Panel                          | 13 November 2023 |
| Acceptance by Stormwater Australia Board of Directors          | 1 December 2023  |
| Verification Issued                                            | 1 December 2023  |
| Stormwater Australia Verification Certificate Number Reference | SA-2023/08-VC    |

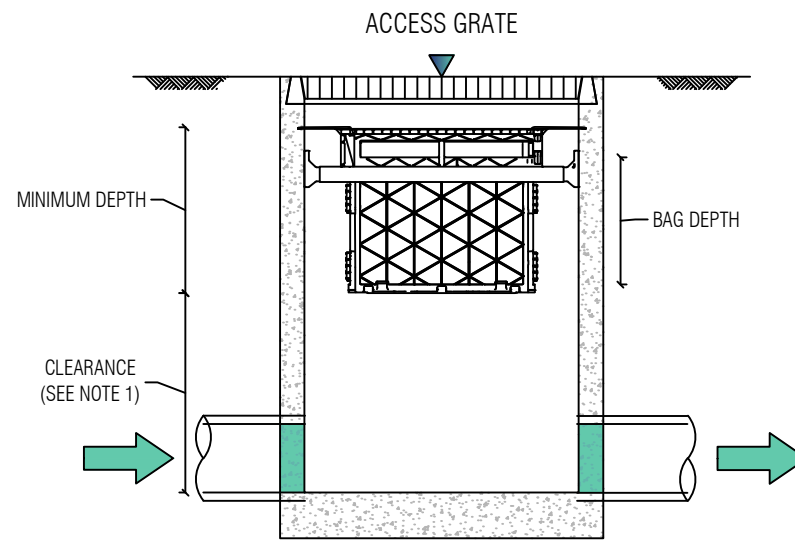
#### Verified under SQIDEP Version

##### 1.3 Body of Evidence Pathway

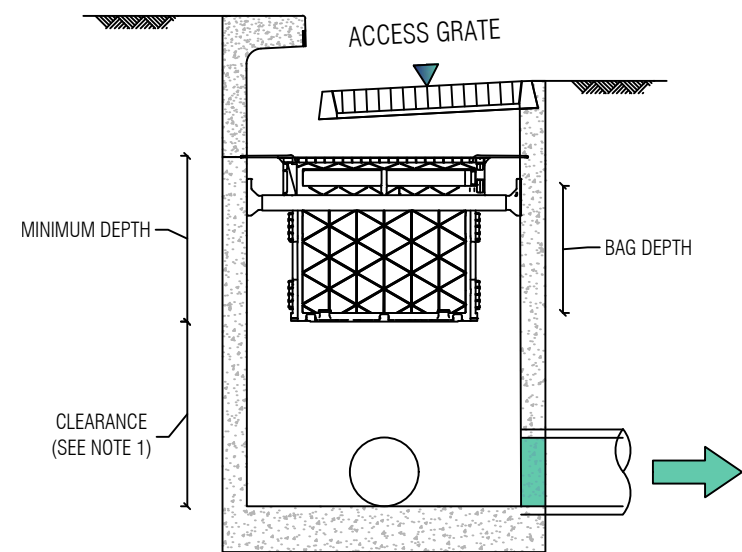




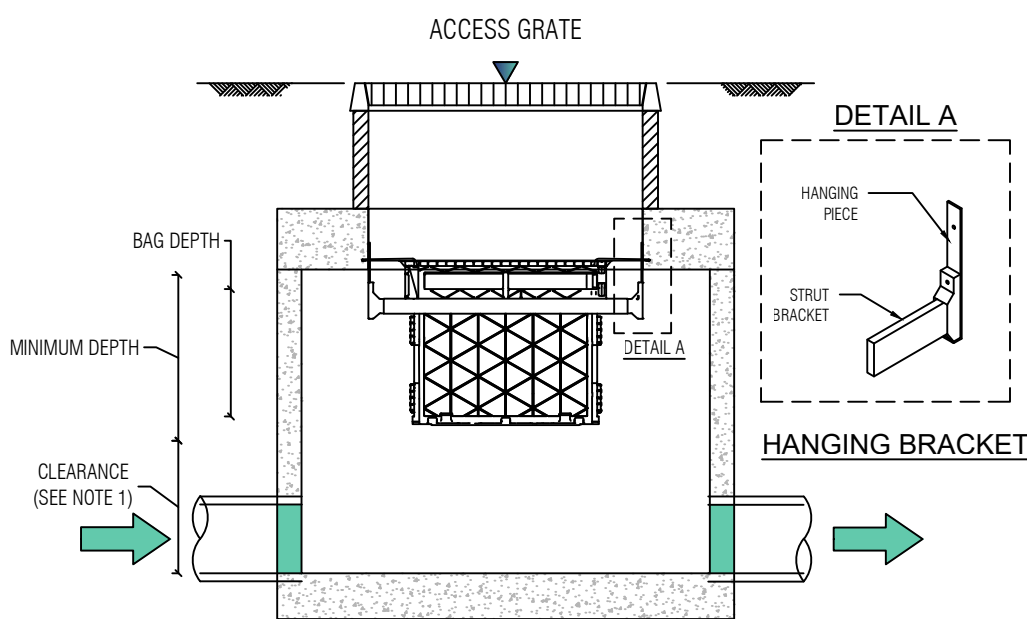
PIPE FLOW CONFIGURATION



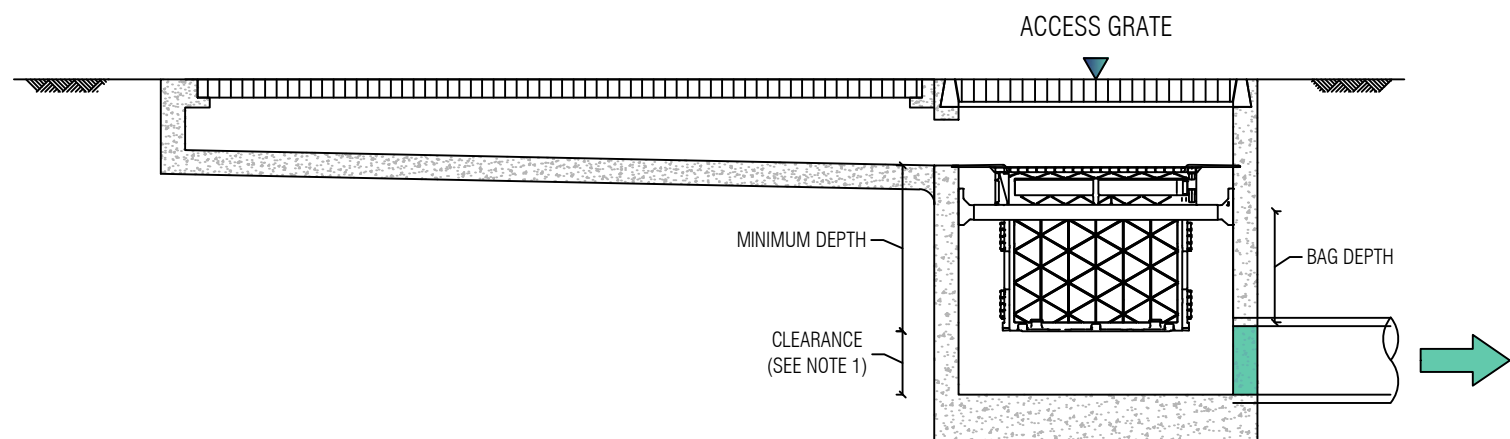
SURFACE FLOW CONFIGURATION



SURFACE FLOW CONFIGURATION



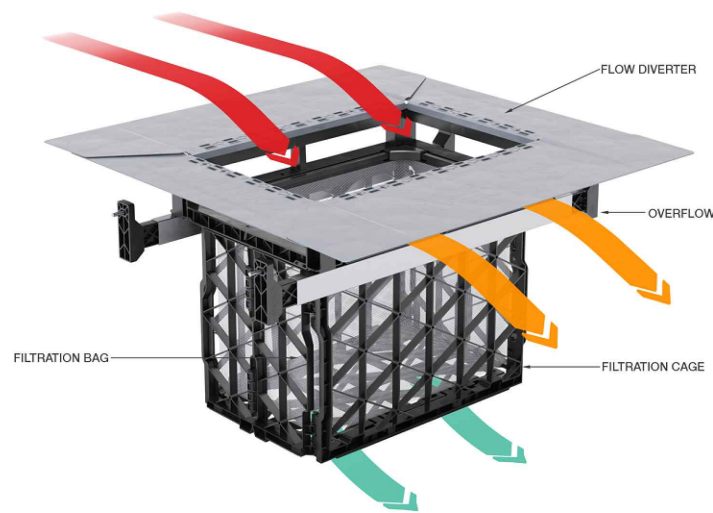
SURFACE FLOW CONFIGURATION



GRATED STRIP DRAIN CONFIGURATION

OCEANGUARD

| PRODUCT ID | MAX. PIT DIMENSIONS (mm × mm) | MINIMUM DEPTH (mm) | BAG DEPTH (mm) |
|------------|-------------------------------|--------------------|----------------|
| OG4        | 450 × 450                     | 350                | 200            |
| OG6-S      | 600 × 600                     | 350                | 200            |
| OG6-D      | 600 × 600                     | 475                | 300            |
| OG9-S      | 600 × 900                     | 400                | 300            |
| OG9-S      | 900 × 900                     | 400                | 300            |
| OG9-D      | 900 × 900                     | 600                | 500            |
| OG12-S     | 1200 × 1200                   | 420                | 300            |
| OG12-D     | 1200 × 1200                   | 600                | 500            |



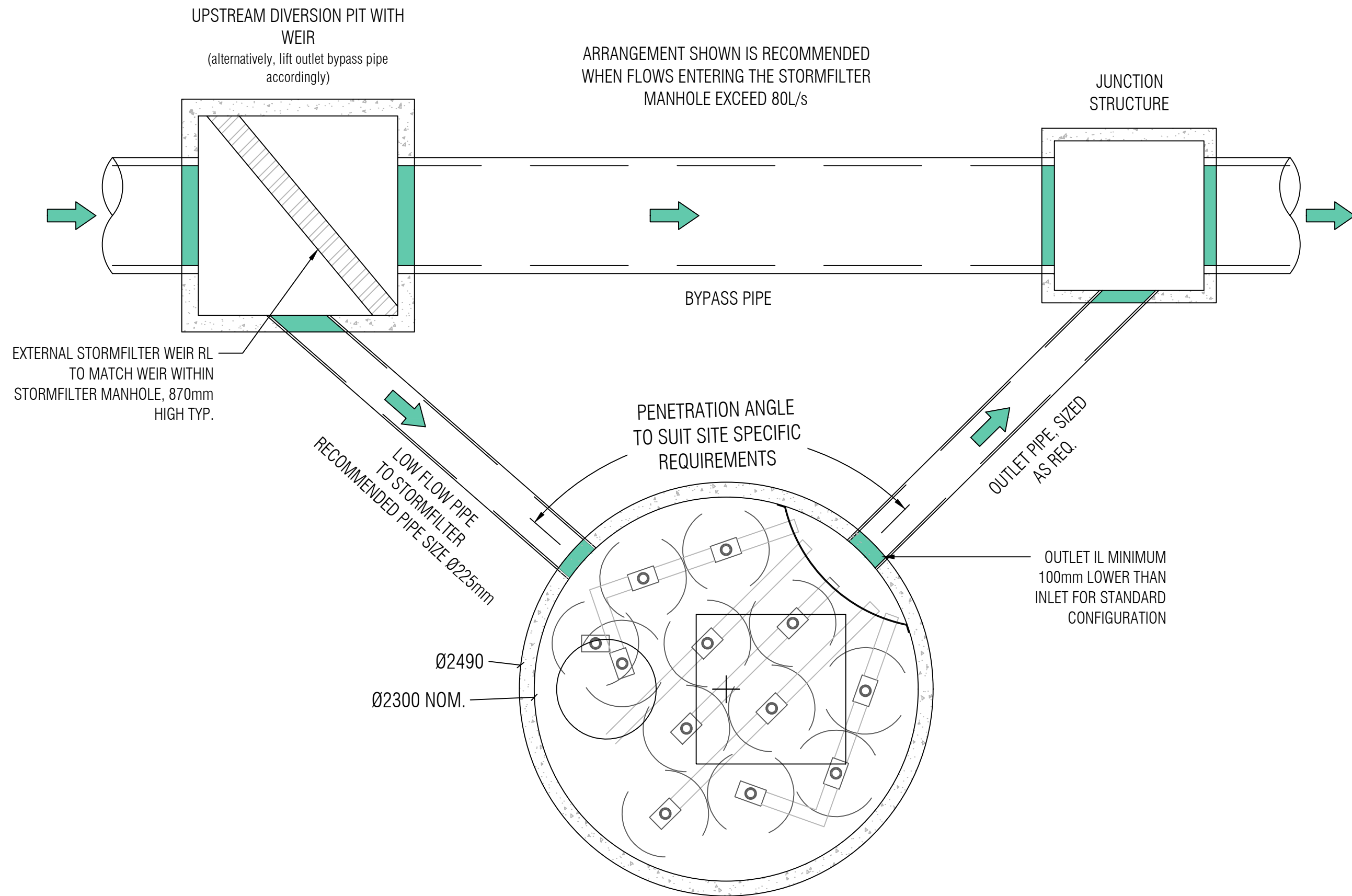
GENERAL NOTES

- CLEARANCE FOR ANY PIT WITHOUT AN INLET PIPE (ONLY USED FOR SURFACE FLOW) CAN BE AS LOW AS 50mm. FOR OTHER PITS, THE RECOMMENDED CLEARANCE SHOULD BE GREATER OR EQUAL TO THE PIPE OBVERT SO AS NOT TO INHIBIT HYDRAULIC CAPACITY.
- OCEAN PROTECT PROVIDES TWO FILTRATION BAG TYPES:
  - 200 MICRON BAGS FOR HIGHER WATER QUALITY FILTERING
  - COARSE BAG FOR TARGETING GROSS POLLUTANTS.
- DRAWINGS NOT TO SCALE.



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OCEAN PROTECT  
OCEANGUARD  
TYPICAL ARRANGEMENTS  
SPECIFICATION DRAWING



## PLAN LAYOUT

NOT FOR CONSTRUCTION



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OCEAN PROTECT  
TYPICAL DN2300 OFFLINE LAYOUT  
HIGH FLOW BYPASS  
WITH PRECAST MANHOLE STORMFILTER SYSTEM

DATE: 13-03-2025

DRAWN: N.R.

CHECKED: J.G.

DRAWING

1

A



## Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP)

# VERIFICATION CERTIFICATE

### Applicant Information

|                          |                                                                          |
|--------------------------|--------------------------------------------------------------------------|
| <b>Applicant Name</b>    | <b>Ocean Protect Pty Ltd</b>                                             |
| <b>Applicant Address</b> | PO Box 75<br>Casula Mall NSW 2170                                        |
| <b>Website</b>           | <a href="http://www.oceanprotect.com.au">www.oceanprotect.com.au</a>     |
| <b>Contact Email</b>     | <a href="mailto:bradd@oceanprotect.com.au">bradd@oceanprotect.com.au</a> |

### Verified Technology

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product Title</b>      | <b>StormFilter PSorb</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>SQIDEP Pathway</b>     | <b>Body of Evidence Pathway</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Reviewed Documents</b> | <p>The following documents form the basis of this independent evaluation:</p> <ul style="list-style-type: none"> <li>Contech Construction Products Inc (2009), The Int'l Corporate Center Stormwater Treatment System Field Evaluation: The Stormwater Management StormFilter® (StormFilter) with PhosphoSorb and Sintered Perlite Media at specific flow rate of 0.67 gal/min/ft².</li> <li>Dalrymple B, Wicks M. (2021). A review of the application of StormFilter® in Australia. Prepared on behalf of Ocean Protect.</li> <li>Goonetilleke A (2011), Kuranda Stormwater Treatment System Field Evaluation.</li> <li>Laboratory reports for all monitoring events at site.</li> <li>Letter from John Pedrick, Contech Engineered Solutions, Stormwater Management StormFilter PhosphoSorb, 5/18/2015.</li> <li>Letter from Gretchen Tellessen, Contech Engineered Solitons, Review of catchment conditions at StormFilter monitoring site, Lolo Pass Road, Zig Zag, Oregon, 4/8/23.</li> <li>Ocean Protect (2019). StormFilter® Operations &amp; Maintenance Manual.</li> <li>Ocean Protect (2020). StormFilter® Technical Design Guide.</li> <li>Peer review report by Damian McCann of StormFilter® (16 June 2021)</li> <li>Photos of StormFilter® Psorb technology installations.</li> <li>Plan and section drawings for the StormFilter PSorb technology monitoring installation at the study site.</li> <li>Rahman A (2020). Peer Review: StormFilter® as a stormwater improvement device under typical Australian conditions, Prepared for Ocean Protect, 2 March 2020.</li> <li>Renew Solutions (2021), StormFilter Flow Test.</li> <li>Urban Green (2015), The Stormwater Management StormFilter® PhosphoSorb® at a Specific Flow Rate of 1.67 gpm/ft². GULD Technical Evaluation Report for Basic &amp; Phosphorus Treatment, Prepared for Contech Engineered Solutions.</li> <li>Statutory declarations from Ocean Protect personnel.</li> <li>Wicks M, Lenhart J, Pedrick J (2014). Solid and nutrient pollutant removal by an engineered stormwater filtration media – Field evaluation of a radial cartridge media filter, Published in Water Journal, September 2014.</li> <li>Wicks M, Vigar N, Hannah M (2011), Nutrients and solids removal by an engineered treatment train – Field evaluation of a gully pit insert and cartridge media filter.</li> </ul> |

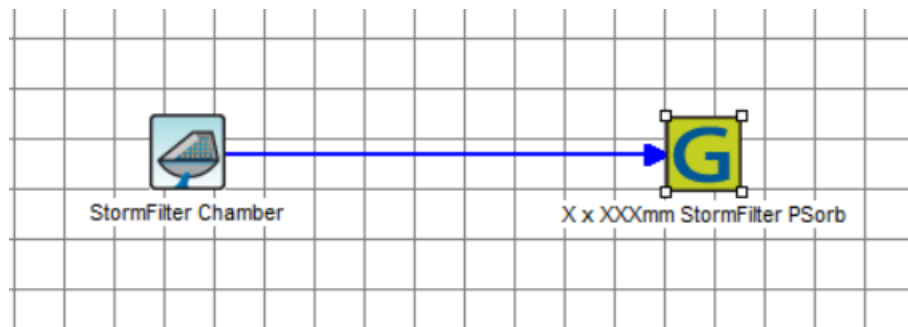
|  |                                                                                 |
|--|---------------------------------------------------------------------------------|
|  | Published in Water Journal of the Australian Water Association, September 2011. |
|--|---------------------------------------------------------------------------------|

## Technology Information

|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Applicant's<br/>Verified<br/>Performance<br/>Claims (ER)</b> | <b>Total Suspended Solids (TSS)</b> <b>88.6 %</b><br><b>Total Phosphorus (TP)</b> <b>77.1 %</b><br><b>Total Nitrogen (TN)</b> <b>61.9 %</b><br><b>Gross Pollutants</b> <b>100 %</b>                                                                                                                                                                                                                                                                                                                                  |
| <b>Test Stormwater<br/>Runoff</b>                               | The presented runoff pollutant test results complied with the SQIDEP typical stormwater pollutant concentrations for urban environments. The device has therefore been tested within the pollutant loading ranges specified by SQIDEP v1.3 for typical urban environments (Urban Roads, Residential, Industrial, Commercial).                                                                                                                                                                                        |
| <b>Test Catchment</b>                                           | Residential                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Maintenance<br/>Performed<br/>during<br/>monitoring</b>      | <ul style="list-style-type: none"> <li>During the performance monitoring period, maintenance of the system was performed three (3) times – on 27 March 2012, 28 March 2013, and 17 January 2014. Each of the maintenance events involved the removal of sediment within the system, removal of the used cartridge, and the installation of a new cartridge.</li> <li>The StormFilter system at the site has been maintained in accordance with typical/ standard maintenance procedures for these assets.</li> </ul> |

Verified method  
to model in  
MUSIC

Modelling a StormFilter PSorb technology in MUSIC is as follows:



**Table 1 – Summary of StormFilter® PSorb cartridge dimensions**

| Parameter                            | Cartridge name/ siphon height |      |      |
|--------------------------------------|-------------------------------|------|------|
|                                      | 690                           | 460  | 310  |
| Physical height (mm)                 | 840                           | 600  | 600  |
| Typical weir height from outlet (mm) | 920                           | 690  | 540  |
| Treatment flow rate (L/s)*           | 1.26                          | 0.86 | 0.60 |

\*: Treatment flow rate based on StormFilter® PSorb technology applied at study site.

Use the detention basin node to hydraulically represent the detention tank (or 'vault'/ storage) 'housing' the StormFilter® cartridge system(s), with the properties given in Table 2.

**Table 2 – Recommended values for MUSIC Detention Node component for StormFilter® PSorb technology modelling**

| Parameter                     | Value for given cartridge name/<br>siphon height                                                                         |      |      | Comments                                                                                                                                 |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------|------|------|------------------------------------------------------------------------------------------------------------------------------------------|
|                               | 690                                                                                                                      | 460  | 310  |                                                                                                                                          |
| Inlet properties              |                                                                                                                          |      |      |                                                                                                                                          |
| Low flow by-pass (m³/s)       | 0                                                                                                                        |      |      | No bypass of flows below treatment flow rate occurs.                                                                                     |
| High flow by-pass (m³/s)      | 100                                                                                                                      |      |      | Default (very high value), noting bypass occurs in the Generic node and any overflow occurs via the overflow weir in the detention node. |
| Storage properties            |                                                                                                                          |      |      |                                                                                                                                          |
| Surface area (m²)             | Varies. Adjust to be equal to value of surface area of chamber housing StormFilter® cartridges minus area of cartridges. |      |      |                                                                                                                                          |
| Extended detention depth (m)  | 0.77                                                                                                                     | 0.54 | 0.39 | Standard 80mm head above top of cartridge media.                                                                                         |
| Permanent pool volume (m³)    | 0                                                                                                                        |      |      | No permanent ponding of water occurs in appropriately functioning StormFilter® technologies.                                             |
| Initial volume (m³)           | 0                                                                                                                        |      |      |                                                                                                                                          |
| Evaporative Loss as % of PET  | 0                                                                                                                        |      |      | StormFilter® cartridges are almost exclusively underground. Any evaporative loss is likely to be minimal.                                |
| Outlet properties             |                                                                                                                          |      |      |                                                                                                                                          |
| Equivalent pipe diameter (mm) | Varies.                                                                                                                  |      |      | Depends on cartridge height, number, and chamber dimensions. Best to liaise with Ocean Protect.                                          |
| Overflow weir width (m)       | Varies. Adjust to be equal to width of weir structure within system.                                                     |      |      |                                                                                                                                          |
| Notional detention time (hrs) | Varies.                                                                                                                  |      |      |                                                                                                                                          |
| Advanced properties           |                                                                                                                          |      |      |                                                                                                                                          |
| k (m/year)                    | Set to 1 or zero.                                                                                                        |      |      | Ensures no additional treatment is modelled where none exists.                                                                           |

Use the generic node with the properties given below in Tables 3 and 4.

**Table 3 – Recommended treatment flow rate & pollutant removal for StormFilter® PSorb technology**

| High flow bypass/ treatment flow rate (TFR)             | Pollutant removal up to TFR                                                |
|---------------------------------------------------------|----------------------------------------------------------------------------|
| Treatment flow rate multiplied by number of cartridges* | 88.6% for TSS<br>77.1% for TP<br>61.9% for TN<br>100% for gross pollutants |

\*: Treatment flow rates for available configurations given in Table 1.

**Table 4 – Recommended generic node transfer function properties for StormFilter® PSorb technology**

| Pollutant                    | Influent | Effluent | Reduction |
|------------------------------|----------|----------|-----------|
| Total suspended solids (TSS) | 1000     | 114      | 88.6%     |
| Total Phosphorus (TP)        | 10       | 2.29     | 77.1%     |
| Total Nitrogen               | 100      | 38.1     | 61.9%     |
| Gross Pollutants             | 1000     | 0        | 100%      |

#### Conditions/Notes

The limitations of the acceptance of these claims include:

- The results lie within acceptable inflow limits for this type of catchment and based on the analysis are found to be representative. The device has been tested within the pollutant loading ranges specified by SQIDEP v1.3. As with the majority of treatment devices, where the influent water is more polluted there would likely be a greater percentage of pollutants removed and a higher residual load in effluent water – and, where the influent water is cleaner (i.e. below limits of detection), there would likely be a lower percentage of pollutants removed and a lower residual pollutant load in effluent water.
- Design and installation should be performed in accordance with the Manufacturer's guidelines. Results are reliant on the maintenance of the device being consistent with the manufacturer's guidelines.
- Regular inspection and maintenance should be performed in accordance with the Manufacturer's Operation and Maintenance Manuals.

#### Independent Reviewers

| Evaluator Signature                                          |                                                                                    |
|--------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>Dr Baden Myers</b><br>Director<br>Baden Myer's Consulting |  |
|                                                              |                                                                                    |

#### Issue of Verification Certificate

|                                                                |                  |
|----------------------------------------------------------------|------------------|
| Acceptance by SQIDEP Governance Panel                          | 22 December 2023 |
| Acceptance by Stormwater Australia Board of Directors          | 22 December 2023 |
| Verification Issued                                            | 22 December 2023 |
| Stormwater Australia Verification Certificate Number Reference | SA-2023/09-VC    |

#### Verified under SQIDEP Version

##### 1.3 Body of Evidence Pathway

