CONCEPTUAL STORMWATER MANAGEMENT PLAN

Proposed Residential Development

7-9 Surf Parade, Broadbeach

Lot CP on BUP2545 & Lot CP on BUP3459

For Hirsch & Faigen

03 April 2025

Document No: OSK6957-0002

DOCUMENT CONTROL SHEET

Title:	Conceptual Stormwater Management Plan
Document No:	OSK6957-0002
Original Date of Issue:	3 April 2025
Project Manager:	Trent Purdon
Author:	Ben Grant
Client:	Hirsch & Faigen
Client Contact:	Patrick Hefferan - Urbis
Client Reference:	7-9 Surf Parade, Broadbeach
Synopsis:	This *Conceptual Stormwater Management Plan* describes the existing site characteristics, and corresponding stormwater quantity and quality management controls to be implemented during the construction and operational phase of the development.

Reviewed by RPEQ	Reg. No.	Signed	Date
Trent Purdon	12190		03 April 2025

Revision/Checking History			
Revision No	**Date**	**Checked By**	**Issued By**
A	03 April 2025	Thomas Watt	Ben Grant

Distribution		
Recipient	**No of Copies**	**Method**
Patrick Hefferan - Urbis	1	PDF

The information contained within this report is provided in good faith in the belief that no information, opinions or recommendations made are misleading. All comments and opinions given in this report are based on information supplied by the client, their agent and third parties.

CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 Background

OSKA Civil Consultants has been commissioned by Hirsch & Faigen to prepare a Conceptual Stormwater Management Plan (CSWMP) to support a Development Application for the proposed residential development situated at 7-9 Surf Parade, Broadbeach.

The subject site is described as Lot CP on BUP2545 & Lot CP on BUP3459 and has a total site area of 0.1014ha.

1.2 Scope

This CSWMP details the conceptual planning, layout and design of the stormwater management infrastructure for both the construction and operational phases of this development.

This CSWMP aims to:

- Establish the required performance criteria for the proposed stormwater quantity and quality improvement systems;
- Provide a conceptual design of stormwater infrastructure including stormwater quality improvement devices and stormwater quantity management controls;
- Demonstrate the modelled post-development stormwater quality discharging from the site does not adversely impact on the water quality and ecological values of downstream watercourses;
- Demonstrate stormwater runoff is conveyed through the site to a Lawful Point of Discharge (LPOD) in accordance with the Queensland Urban Drainage Manual (QUDM); and
- Provide reporting and monitoring mechanisms whereby the performance of this system can be measured enabling identification of corrective actions/alterations required to ensure the above mentioned objectives are maintained.

This CSWMP has been prepared in accordance with the IEAust Australian Runoff Quality: Guide to Water Sensitive Urban Design, Queensland State Planning Policy 2017, IPWEA Queensland Urban Drainage Manual (QUDM) Fourth Edition (2017), Water By Design MUSIC Modelling Guidelines V1 – 2010, and City of Gold Coast (CoGC), SC6.12 City Plan Policy – Land Development Guidelines.

2.0 SITE DESCRIPTION

2.1 Location

The subject site is located at 7-9 Surf Parade, Broadbeach. The site fronts Surf Parade to the west and has existing residential properties to the north, south and east. The site covers a total combined area of 0.1014ha, with details as summarised in Table 1 and as located in Figure 1.

Table 1: Site Description

Client	Lot and Property Description	Street Address
Hirsch & Faigen	*Lot CP on BUP2545 & Lot CP on BUP3459*	*7-9 Surf Parade, Broadbeach*

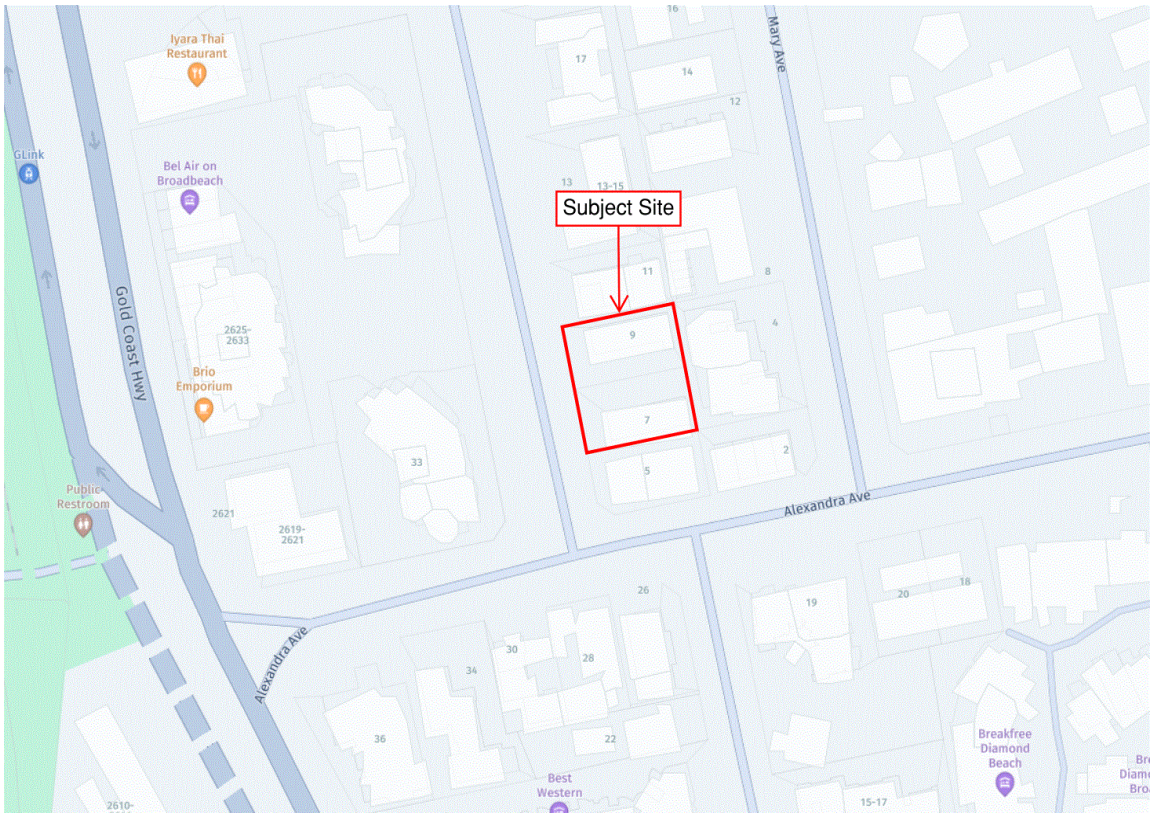


Figure 1: Locality Plan (Source: Nearmap)

2.2 Site Topography

The existing site is relatively flat with no general grade/slope across the site and spot heights range from approximately RL 5.28m AHD to 5.52m AHD. Based on the provided survey and aerial information, any stormwater runoff from the site is anticipated to ultimately drain to the kerb and channel of Surf Parade.

For further information, the site survey has been provided by Bennett & Bennett, Verification Plot (Ref: 241959_S001_VER Rev A) included as Appendix A.

2.3 Vegetation and Land Use

The subject site currently consists of two, two-storey residential dwellings along the northern and southern boundaries and a carpark in the middle of the site. There are small landscaped/grassed areas to the front and rear of the subject site and access to the site is gained from the west via Surf Parade.

An aerial photograph taken on the 22 December 2024 of the subject site is included in Figure 2.

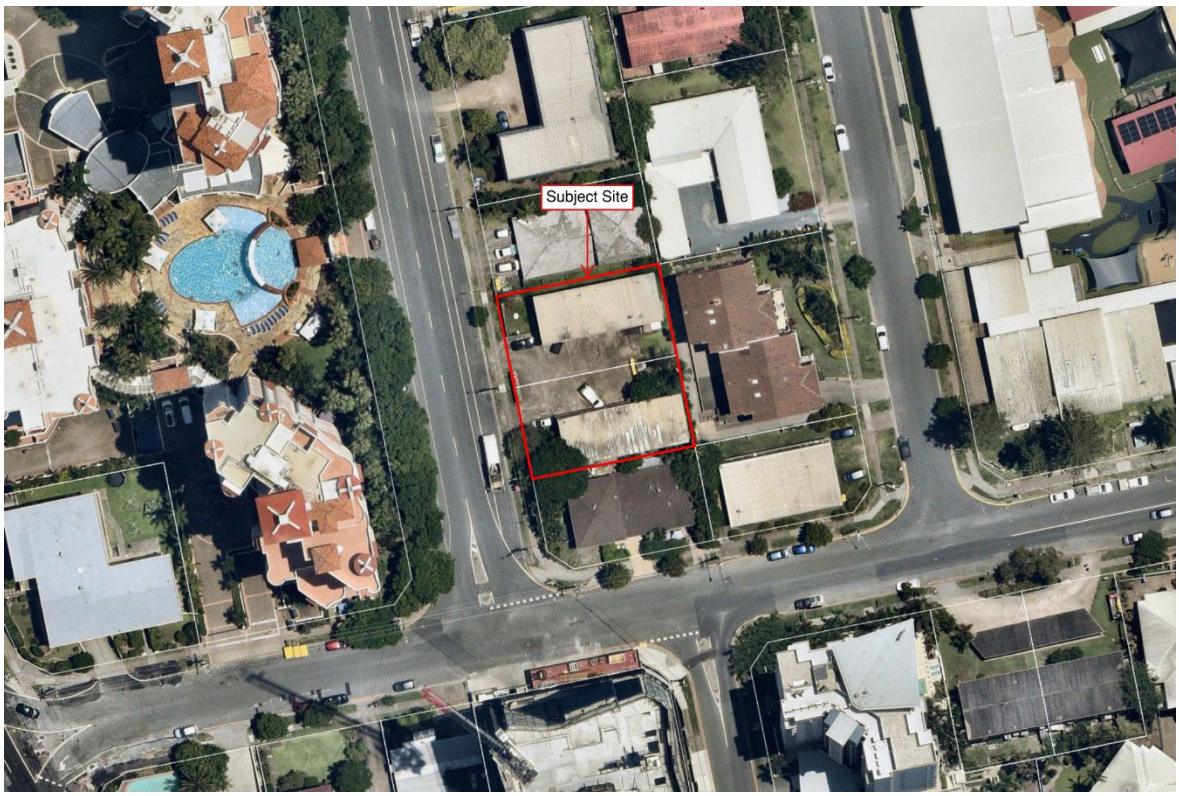


Figure 2: Aerial Image of the Site (Source: Nearmap – Image taken 22 December 2024)

2.4 Proposed Development

The proposed development for the site consists of a 31-storey residential building with three (3) levels of basement car parking, one level of ground floor carparking and two (2) levels of above ground carparking. Driveway access to the site will be gained via Surf Parade to the west which will provide access to the basement and above ground carparks.

Refer to Appendix B for further proposed architectural details prepared by Rothelowman, Level 01 - Ground Floor Plan (Ref: TP01.04).

2.5 Proposed Conceptual Drainage

It is proposed that the site's captured stormwater be diverted to a stormwater quantity and quality tank. The Stormwater Quality Improvement Devices (SQID) will treat the majority of the site's stormwater runoff with, at minimum, the Q3-month flow rate being treated by the SQID's.

The stormwater connection to the Lawful Point of Discharge (LPOD) is conceptual at this stage. The captured flows within the tank are to be piped to a proposed manhole within Surf Parade.

2.6 Rainfall Data

Rainfall intensity data has been obtained from the Australian Bureau of Meteorology's 2016 Design IFD Rainfall System. The data has been extracted for the nearest grid cell at Latitude 28.0375 (S) and Longitude 153.4375 (E). The IFD data and average rainfall intensities used in this report are in accordance with the procedures outlined in Geosciences Australia, Australian Rainfall and Runoff 2019.

3.0 DATA

Data which has been sourced or provided, in order to prepare this report for the site, was gathered from the following sources:

- Detailed site survey provided by Bennett & Bennett, Verification Plot (Ref: 241959_S001_VER Rev A) included as Appendix A;
- Proposed site layout provided by Rothelowman, Level 01 - Ground Floor Plan (Ref: TP01.04) included as Appendix B;
- LIDAR data for the subject site sourced from Australian Government Elevation and Depth Foundation Spatial Data (ELVIS), Date Source: 2014, DEM Data;
- Rainfall and Meteorological 2016 IFD Data by the Australian Bureau of Meteorology;
- Information Extracted from CoGC City Plan Interactive Mapping – Version 11;
- Aerial Imagery by Nearmap (Accessed on 19 March 2025); and
- MUSIC data sourced from Rainfall Station 40584, Hinze Dam.

4.0 SITE HYDROLOGY

4.1 Background

The following sections define the method and parameters utilised within the hydrologics of the site, in order to establish a simulation of the anticipated flow regime and peak discharge at the Lawful Point of Discharge (LPOD). A Rational Method calculation has been provided for comparison of the pre and post-development peak flow rates.

The Rational Method (Section 4.3 of the Queensland Urban Drainage Manual - QUDM 2017) is a suitable estimation technique, given its flexibility in its data requirements and is able to produce satisfactory estimates of peak site discharges based on the following data input:

Specific intensity frequency duration (IFD) data;

- length/type of flow path;
- contributing catchment areas; and
- coefficient of discharge.

4.2 Pre-Development

4.2.1 Catchment Definition and Lawful Point of Discharge

The pre-development site has been analysed as a singular internal catchment and has a contributing area of 1,014m^2. Stormwater captured on the roof of the southern dwelling is conveyed via downpipes and discharged to the kerb and channel of Surf Parade via kerb adaptor. Any stormwater on remaining roof, ground and road surfaces is anticipated to ultimately drain to the kerb and channel of Surf Parade.

The existing Lawful Point of Discharge (LPOD) for the subject site (for analysis in accordance with QUDM), is the kerb and channel of Surf Parade.

The catchment area and LPOD for the subject site are shown on OSKA Consulting Group, Pre-Development Catchment Plan (Ref: OSK6957/P001/A) included as Appendix C.

4.2.2 Coefficient of Runoff

The pre-development coefficient of runoff (C year) was determined based on the fraction impervious method specified in QUDM. The pre-development catchment, based on the provided survey information, has 849m^2 of impervious surfaces, which equates to a fraction impervious (fi) of 0.84. Using a one hour, ten-year rainfall intensity ($^1I_{10}$) of 70.6 mm/hr, a C_{10} value of 0.87 has been adopted for the pre-development catchment.

The following pre-development coefficients of runoff (as shown in Table 2) have been adopted in accordance with QUDM Table 4.5.2, which apply the frequency factors for the standard Annual Exceedance Probability (AEP) design storms of 39%, 18%, 10%, 5%, 2% and 1% (corresponding to the 2, 5, 10, 20, 50 and 100-year Average Recurrence Interval (ARI) storms).

Table 2: Pre-Development Coefficient of Runoff

Catchment	C_2	C_5	C_{10}	C_{20}	C_{50}	C_{100}
Pre	0.74	0.82	0.87	0.91	1.00	1.00

4.2.3 Time of Concentration

The Time Of Concentration (TOC) for the pre-development catchment has been calculated in accordance with QUDM Table 4.6.3 – Recommended roof drainage system travel times.

In accordance with Table 4.6.3 of QUDM, the pre-development catchment will have a time of concentration that will incorporate five (5) minutes of the roof to downpipes time plus one (1) minute of pipe flow. This equates to a total travel time of six (6) minutes.

4.2.4 Design Flow Rates

Pre-development peak flow rates have been estimated for the adopted storms using design rainfall intensities from the Bureau of Meteorology IFD Data. The Rational Method ($Q = 2.78 \times 10^{-3}$ CIA) has been used to estimate the subject site's design peak flow rates. The pre-development peak flows for the subject site are presented in Table 3.

Table 3: Pre-Development Peak Flow Estimation – Rational Method

Pre-Development							
Annual Exceedance Probability	**AEP**	39%	18%	10%	5%	2%	1%
Coefficient of Runoff	**C**	0.74	0.82	0.87	0.91	1.00	1.00
Area of Catchment (ha)	**A**	0.101	0.101	0.101	0.101	0.101	0.101
Average Rainfall Intensity (mm/h)	**I**	144	180	209	240	282	314
Peak Flow Rate (m^3/s)	**Q**	**0.030**	**0.042**	**0.051**	**0.062**	**0.079**	**0.088**

4.3 Post-Development

4.3.1 Catchment Definition and Lawful Point of Discharge

The post-development scenario has been analysed as described in the pre-development scenario with a single internal catchment and has a total contributing area of 1,014m^2.

Stormwater collected from the roof, road and ground areas shall be conveyed via an internal network of pits and pipes, sized to capture up to the 1% AEP event, and conveyed to the proposed stormwater tank. The captured flows within the tank are piped to a proposed manhole within Surf Parade (the site's LPOD).

The internal building drainage design to facilitate this stormwater strategy is to be coordinated with the building hydraulic engineer at the detailed design phase.

The post-development catchment area and LPOD are detailed on OSKA Consulting Group, Post-Development Catchment Plan (Ref: OSK6957/P002/A) & Music Catchment Plan (Ref: OSK6957/P003/A) included as Appendix D.

4.3.2 Coefficient of Runoff

The post-development coefficients of runoff (C year) were determined using the fraction impervious method as specified in QUDM.

Based on the supplied architectural plans, the post-development catchment has approximately 1,003m^2 of impervious surfaces which equates to a fraction impervious (fi) of 0.99. Using a one-hour, ten-year rainfall intensity ($^1I_{10}$) of 70.6 mm/hr, a C_{10} value of 0.90 has been adopted for the post-development catchment. This C_{10} value is in accordance with the CoGC City Plan *Table 4.4: Runoff Coefficient vs development category* for a high density residential development.

The following post-development Coefficients of Runoff (as shown in *Table 4*) have been adopted in accordance with QUDM Table 4.5.2, which apply the frequency factors for the standard Annual Exceedance Probability (AEP) design storms of 39%, 18%, 10%, 5%, 2% and 1% (corresponding to the 2, 5, 10, 20, 50 and 100-year ARI storms).

Table 4: Post-Development Coefficient of Runoff

Catchment	C_2	C_5	C_{10}	C_{20}	C_{50}	C_{100}
Post	0.77	0.86	0.90	0.95	1.00	1.00

4.3.3 Time of Concentration

The Time of Concentration for the post-developed catchment has been calculated in accordance with QUDM Table 4.6.3 – Recommended roof drainage system travel times.

In accordance with Table 4.6.3 of QUDM, the post-development catchment will have a time of concentration that will incorporate five (5) minutes of the roof to downpipes time plus one (1) minute of pipe flow. This equates to a total travel time of six (6) minutes.

4.3.4 Design Flow Rates

Post-development peak flow rates have been calculated for the adopted storms using design rainfall intensities from the Bureau of Meteorology 2016 IFD Data. The Rational Method ($Q = 2.78 \times 10^{-3}$ CIA) has been used to estimate the required design peak flow rates for the subject site. The post-development peak flows for the subject site are presented in Table 5.

Table 5: Post-Development Peak Flow Estimation – Rational Method

Post-Development							
Annual Exceedance Probability	**AEP**	39%	18%	10%	5%	2%	1%
Coefficient of Runoff	**C**	0.77	0.86	0.90	0.95	1.00	1.00
Area of Catchment (ha)	**A**	0.101	0.101	0.101	0.101	0.101	0.101
Average Rainfall Intensity (mm/h)	**I**	144	180	209	240	282	314
Peak Flow Rate (m^3/s)	**Q**	**0.031**	**0.043**	**0.053**	**0.064**	**0.079**	**0.088**

4.3.5 Change in Flow Rates

The difference in peak flow rates calculated from the total pre and post-developed site as estimated via The Rational Method, is detailed in Table 6.

Table 6: Change in Peak Flow Rates Estimation – Rational Method

LPOD							
Annual Exceedance Probability	**AEP**	39%	18%	10%	5%	2%	1%
Pre-Developed Peak Flow Rate (m^3/s)	**Q**	0.030	0.042	0.051	0.062	0.079	0.088
Post-Developed Peak Flow Rate (m^3/s)	**Q**	0.031	0.043	0.053	0.064	0.079	0.088
Change in Peak Flow Rate (m^3/s)	**Q**	**+0.001**	**+0.001**	**+0.002**	**+0.002**	**-**	**-**

The Rational Method assessment has demonstrated that an increase in peak flow rates discharging from the subject site is anticipated due to the proposed development. Therefore, On-Site Detention (OSD) will be required to mitigate flows to the pre-development rates.

4.3.6 External Catchments

The subject site and the surrounding area were examined to determine if any localised external catchments will contribute to the subject site. The site is deemed to not contain any influencing localised external catchments.

5.0 STORMWATER QUANTITY ASSESSMENT

5.1 Background

The proposed development will increase peak flow rates from the subject site due to increased impervious areas and a reduction in the surface roughness of the site. Accordingly, the following section provides preliminary details of a proposed On-Site Detention (OSD) system to demonstrate no increase in nuisance flows or adverse impacts as a result of potential increased post-development runoff, on neighbouring properties and/or authorities stormwater infrastructure.

5.2 Objective

In accordance with CoGC's requirements and typical industry-standard practices, the following objective has been set for post-development stormwater discharge from the site:

- No net increase in peak flows from the subject site, for all events up to the 1% AEP design storm event, during the post-developed scenario.

This objective shall be demonstrated via a suitable hydrologic and hydraulic modelling package, by detaining site runoff from the subject site within proposed above ground detention tanks.

5.3 Hydraulic Model

An estimation of the required detention volume to mitigate any increase in total site discharge rates has been undertaken using the DRAINS software programme.

A DRAINS model has been adopted at the preliminary planning stage to ensure that the below ground detention tanks volume is estimated with a higher degree of confidence. As finished site levels and internal pipe levels are still preliminary, this initial calculation is an estimate, however, it has the required level of accuracy to progress the design with confidence.
The model was developed by simulating the pre, post and mitigated catchment layouts and comparing the peak flow rates generated from each scenario.

The mitigated catchment consists of the 1% AEP runoff generated from the roof (829m^2), road (34m^2) and ground areas (151m^2) being conveyed to the proposed below ground detention tank. This catchment arrangement provides enough mitigation to demonstrate no increase in the peak flow rates exiting the site when compared to the pre-development scenario. The adopted sub-catchment areas for the site, time of concentration and fraction imperviousness, for the pre and post-development have been tabulated in Table 7.

Note that roof gutters are to be designed to convey the major event (up to the 1% AEP) into the detention tank.

The pre and post-development catchment area and LPOD are detailed on OSKA Consulting Group, Pre-Development Catchment Plan (Ref: OSK6957/P001/A) and on OSKA Consulting Group, Post-Development Catchment Plan (Ref: OSK6957/P002/A) & Music Catchment Plan (Ref: OSK6957/P003/A) included respectively as *Appendix C and D*.

Table 7: Adopted Sub-catchment Parameters

Pre-Development Sub-Catchments			
DRAINS Sub-Catchment ID	***Total Area (ha)***	***Time of Concentration (mins)***	***Fi (%)***
Pre	0.1014	6	83.73
Post-Development Sub-Catchments			
DRAINS Sub-Catchment ID	***Total Area (ha)***	***Time of Concentration (mins)***	***Fi***
Post	0.1014	6	98.92

The TOC values calculated in the Rational Method calculations in Section 4 for the pre and post-development scenarios were adopted. The 39%, 18%, 10%, 5%, 2% and 1% AEP design storm events were analysed for all standard durations ranging from 5 minutes to 120 minutes. The critical duration for the combined peak site discharge was determined to be the 5 minute storms for the pre-development and post-development.

The peak discharge rates for the site calculated by the DRAINS model are shown in Table 8.

Table 8: Anticipated Peak Site Discharge Rate – Extracted from DRAINS Model (m^3/s)

	Peak Flow Rate Discharge (m^3/s)					
Design AEP Events	**39%**	**18%**	**10%**	**5%**	**2%**	**1%**
Pre-development	0.028	0.039	0.046	0.055	0.068	0.077
Post-development (unmitigated)	0.029	0.040	0.047	0.057	0.070	0.078

The DRAINS assessment results shown in Table 8 supports the Rational Method in Section 4 in confirming that an increase in peak flow rates discharging from the site is anticipated. Therefore, On-Site Detention is required to mitigate flows to pre-development conditions.

5.4 Detention Volume

The following detention storage parameters were adopted to achieve the target pre-development flow rates, via mitigation of the post-development flow rates. Note that the following parameters provide details for the detention component of the tank only, with the water quality components being detailed in Section 6 of this report.

Table 9: Adopted Detention Tank Parameters

Minimum Detention Area:	2.00m^2
Detention Tank Internal Height:	1.20m
Low Flow (at invert of tank)	Ø190mm Orifice
High Flow Weir (at 1.075m above tank invert)	1.60m Long
Consolidated Outlet Pipe	Ø375mm @ 1% grade
1% AEP (Q100) Water Level:	1.09m
Required Detention Volume:	2.40m^3

The 5-minute design storm was determined as the critical storm duration for determining the required volume within the detention tank. A comparison of the pre-development and mitigated flow rates based on the above arrangement is shown in Table 10.

Table 10: Comparison of Pre-Development and Mitigated Flow Rates – Extracted from DRAINS

Annual Exceedance Probability	39%	18%	10%	5%	2%	1%
Pre-Development Peak Flow Rate (m^3/sec)	0.028	0.039	0.046	0.055	0.068	0.077
Mitigated Peak Flow Rate (m^3/sec)	0.028	0.038	0.046	0.055	0.067	0.076

The hydrograph for the critical duration of the Mitigated 1% AEP storm event compared against the pre and post-development is shown in Figure 3.

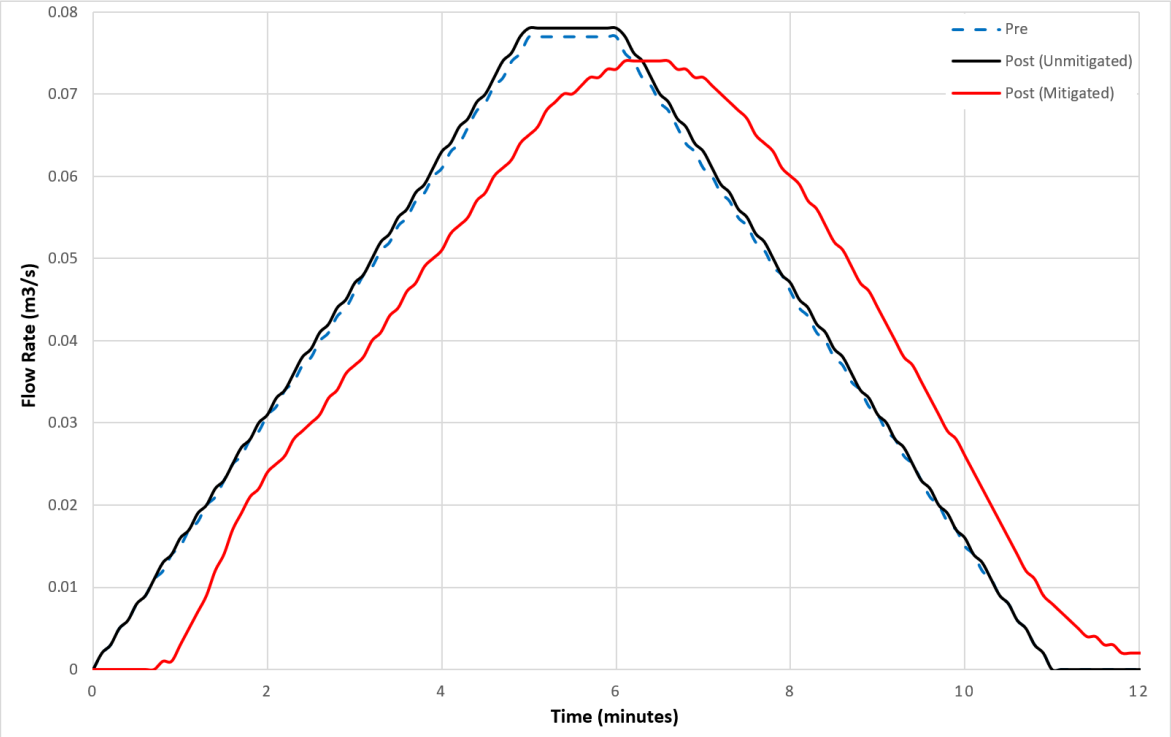


Figure 3: Pre, Post and Mitigated Flow Rates for the 1% AEP Design Storm Event

As demonstrated in the results displayed in *Table 10 and Figure 3*, the detention arrangement can be seen to effectively mitigate the post-development flows in the adopted critical design storm AEP events.

The hydraulic analysis using the DRAINS model has determined that a minimum total of 2.00m^3 of storage is required for runoff attenuation and is to be provided in the form of a below ground detention tank. Note that this volume is for the detention component of the tank only, with the water quality requirements specified in Section 6 of this report. The below ground detention tank is to be fitted with an outlet configuration (low and high flow outlets) as detailed in Table 9 to satisfy the mitigation requirements. Refer to the OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957/P004/A) & Conceptual Stormwater Management Details (Ref: OSK6957/P005/A) in *Appendix E* for details of the tank's arrangement and indicative location. The final location onsite and construction levels will be determined at the detailed design stage.

A copy of DRAINS model used in this report can be made available to Council upon request.

6.0 STORMWATER QUALITY ASSESSMENT

6.1 Background

The development of the land has the potential to increase the pollutant loads within stormwater runoff and downstream watercourses. During the construction phase of the development, disturbances to the existing ground have the potential to significantly increase sediment loads entering downstream drainage systems and watercourses. The operational phase of the development will potentially increase the amount of sediments and nutrients washing from the site.

The following sections describe the construction and operational phase controls and water quality modelling of the proposed treatment train in compliance with Council guidelines.

6.2 Construction Phase

A high risk of stormwater pollution will occur from the site during the construction phase due to erosion and sediment transportation off-site to the receiving environment. The majority of this risk results from construction activities disturbing the site and exposing areas of soil to the direct erosive influence of the environment.

The following section outlines the procedures necessary to minimise erosion and control sediment during construction in accordance with the International Erosion Control Association (IECA) Best Practice ESC Document.

6.2.1 Key Pollutants

The key pollutants have been identified for the Construction Phase of this development.

Table 11: Key Pollutants, Construction Phase

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, material offcuts.
Sediment	Exposed soils and stockpiles during earthworks and building works.
Hydrocarbons	Fuel and oil spills, leaks from construction equipment and temporary car park areas.
Toxic Materials	Cement slurry, asphalt primer, solvents, cleaning agents, and wash waters (e.g., from tile works).
Acids or Alkaline substances	Acid sulphate soils, cement slurry and wash waters.

6.2.2 Sediment and Erosion Controls

Sediment and Erosion Control devices (S&EC) employed on the site shall be designed and constructed in accordance with the International Erosion Control Association (IECA) Best Practice ESC Document as shown on OSKA Consulting Group, Sediment and Erosion Control Plan (Ref: OSK6957/P006/A) & Sediment and Erosion Control Details (Ref: OSK6957/P007/A) included as Appendix F.

Pre-Construction

- Stabilised site access/exit onto Surf Parade to the west;
- Sediment fences to be located around the perimeter of the site;
- Sediment trap to be installed if required;
- Dust fencing to be installed if required; and
- Educate site personnel to the requirements of Erosion and Sediment Control Plan.

Initial Construction

- Maintain construction access/exit, sediment fencing, dust fences and all other existing controls as required;
- Construct diversion drains to convey disturbed site run-off to the temporary sediment traps; and
- Confine construction activities to stages to minimise areas of disturbance at any given time.

Second Stage Construction

- Maintain construction access/exit, sediment fencing, dust fences, diversion drain and all other existing controls as required;
- Progressively revegetate finished areas where applicable;
- Divert runoff from undisturbed areas around disturbed areas; and
- Drainage structure protection around field inlets and gully pits.

During construction, all areas of exposed soils allowing dust generation are to be suitably treated. Treatments will include covering the soil and watering. Road accesses are to be regularly cleaned to prevent the transmission of soil on vehicle wheels and eliminate any build-up of typical road dirt and tyre dust from delivery vehicles.

Adequate waste disposal facilities are to be provided and maintained on the site to cater for all waste materials such as litter, hydrocarbons, toxic materials, acids or alkaline substances.

6.2.3 Water Quality Monitoring and Inspections

To ensure that the water quality objectives are being met during the construction phase of the development, water quality monitoring shall be conducted. Water quality monitoring shall use a calibrated probe or sampling and testing at a NATA registered laboratory.

Location: Monitoring Stations shown on OSKA Consulting Group, *Sediment and Erosion Control Plan* (Ref: OSK6957/P006/A).

Parameters: Site discharge criteria.

Frequency: Following at least 10 mm of rainfall in a 24-hour period.

The contractor shall be responsible for the inspection and maintenance of all sediment and erosion control devices. Additional controls and review of existing controls shall be undertaken in response to the results of the above-mentioned monitoring program.

6.2.4 Reporting

An inspection report shall be written by a suitably qualified and experienced scientist/engineer following each water quality monitoring episode. The report shall include at least the following information:

- Name, address and real property description for the development site;
- Council file reference number (if known);
- Monitoring locations;
- Performance criteria;
- Results for each monitoring location, identifying any breaches of performance criteria;
- Recommended corrective actions to be taken and additional sediment and erosion controls, if required; and
- Inspection reports shall be provided to the contractor for their action and compilation in an on-site register.

If the above-mentioned performance criteria are exceeded and results from the downstream monitoring stations show significant deterioration from upstream results (if applicable), the contractor shall implement all recommendation of the inspection report within one (1) working day of receipt of the report.

6.3 Operational Phase

The following sections provide details of the Stormwater Quality Improvement Devices (SQID's) proposed for the operational phase of the development. OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957/P004/A) & Conceptual Stormwater Management Details (Ref: OSK6957/P005/A) in Appendix E illustrates the size and location of the proposed SQID's.

6.3.1 Stormwater Quality Objectives

To protect the water quality of the downstream watercourses, the following Water Quality Objectives (WQO's) have been applied to stormwater runoff from the site in accordance with CoGC SC6.12.4.5.4.2 Stormwater quality objectives (operational phase) and the criteria of the CoGC Healthy Waters Code as addressed in OSKA Consulting Group, Response to Healthy Waters Code (Ref: OSK6957-0004) included as Appendix G.

Best Management Practices (BMP) are required to be demonstrated for all Development Applications within the City of Gold Coast and are recommended to be implemented by the developer. Where practicable, methods such as first flush devices, and discharging stormwater to landscaped/grassed areas prior to discharge to the LPOD, are to be incorporated into the site's stormwater strategy, where the opportunity is available.

The following load reduction targets must be achieved when assessing the post-development treatment train (comparison of unmitigated developed case versus developed mitigated case).

- 80% reduction in Total Suspended Sediment (TSS).
- 60% reduction in Total Phosphorus (TP).
- 45% reduction in Total Nitrogen (TN).
- 90% reduction in litter (sized 5 mm or greater).

6.3.2 Post-Development MUSIC Modelling

To assess the potential quantities of pollutants anticipated to be discharged from the site, the water quality modelling package 'Model for Urban Stormwater Improvement Conceptualisation' (MUSIC) V6.3 by eWATER has been applied. MUSIC Modelling Parameters and delineated data have been sourced from Water by Design, MUSIC Modelling Guidelines, and where possible, via online MUSIC Link data.

Rainfall data has been sourced from Rainfall Station 40584, (Hinze Dam) using a date range from 1976 to 1985 and a 6 Minute Time Step, in accordance with CoGC requirements.

6.3.3 Stormwater Quality Improvement Devices

An underground propriety Stormwater Quality Improvement Device (SQID) will be utilised to treat stormwater runoff from the site as it is deemed more suitable for the proposed site use. An Ocean Protect system comprising of 5 x StormFilters within a 3.00m^2 filter chamber has been adopted as the SQID's modelled, to be incorporated into the operational phase development layout.

The proposed SQID has been provided for modelling purposes only and is subject to Council approval. Accordingly, similar alternative devices may be adopted with Council review and approval.

The adopted MUSIC catchment areas for the subject site are as follows:-

Table 12: Adopted MUSIC Catchment Areas

Catchment	Area (m^2)	% Impervious
Roof (Residential)	829	100
Road (Residential)	34	100
Ground (Residential)	151	93
TOTAL Site	**1,014**	

Stormwater runoff from the roof areas will be directly conveyed via downpipes to the proposed pit and pipe network by a building hydraulics designer to the proposed underground stormwater tank. Runoff generated from the ground and road areas will be conveyed directly into the underground tank fitted with 5 x Ocean Protect StormFilters.

An illustration of the MUSIC model of the adopted operational treatment train for the post-development site has been provided in Figure 3.

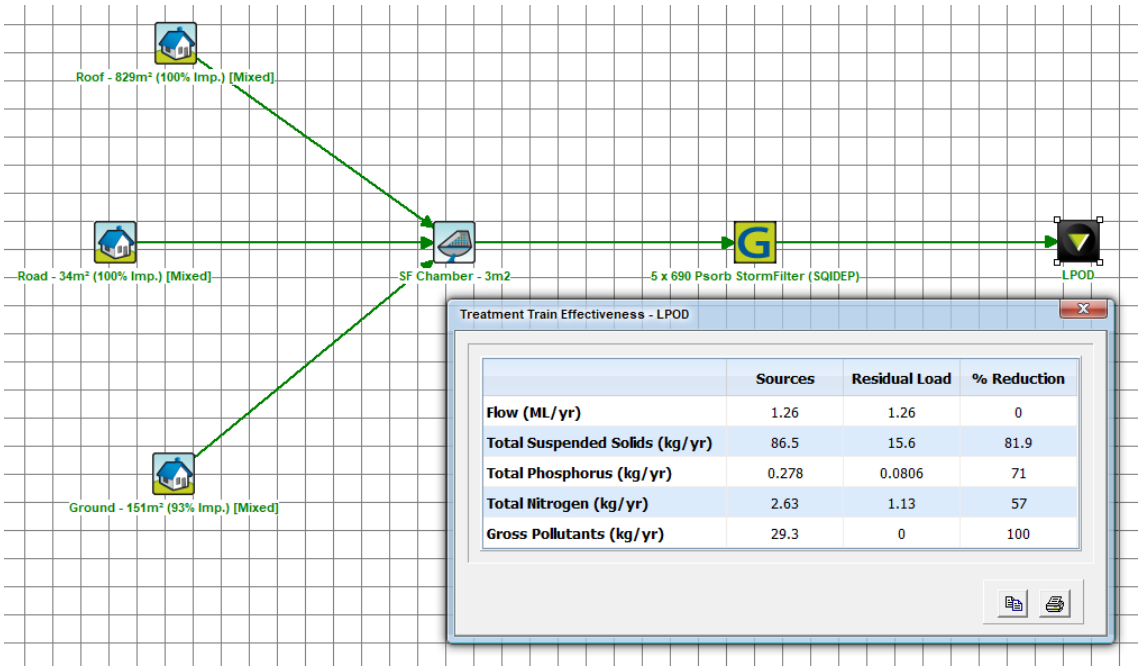


Figure 4: Operational Phase Treatment Train (Source: Ocean Protect MUSIC model)

6.3.4 Design Parameters of the Stormwater Quality Improvement System

Detailed design of the stormwater treatment train shall be in accordance with the Water Sensitive Urban Design (WSUD), Technical Design Guidelines for South East Queensland – Version 1 (June 2006).

StormFilter (Psorb) Cartridges

The Ocean Protect StormFilter (Psorb) Cartridges are designed to operate in a similar fashion as a traditional bioretention basin. That is, stormwater runoff is directed to a ponding zone where it traps nutrients while draining through filter cartridges. The Ocean Protect StormFilter (Psorb) Cartridge system is customized for specific sites depending on the pollutant loads produced. Its efficiency allows a smaller required treatment area.

For details of the proposed SQID's refer to *Appendix H* which details *Ocean Protect, Operations and Maintenance Manual.*

6.3.5 Post-Development Modelling Results - Mitigated

The modelled Stormwater Quality Improvement Devices (SQID) have demonstrated a reduction in the amount of sediments and nutrients discharging from the proposed residential development. Table 13 illustrates the effectiveness of the SQID's in the treatment train for the development.

Table 13: Treatment Train Effectiveness at Receiving Node

Parameter	Post	Post Mitigated	Reduction	Water Quality Objectives
Flow (ML/yr)	1.26	1.26	**0**	-
TSS (kg/yr)	86.5	15.6	**81.9 %**	80 %
TP (kg/yr)	0.278	0.0806	**71.0 %**	60 %
TN (kg/yr)	2.63	1.13	**57.0 %**	45 %
Gross Pollutants (kg/yr)	29.3	0	**100 %**	90 %

The results demonstrate that the proposed SQID's meet the intended Water Quality Objectives for Gross Pollutants, Suspended Solids, Phosphorous and Nitrogen levels, in accordance with the City of Gold Coast Requirements.

7.0 OPERATIONAL PHASE MAINTENANCE REQUIREMENTS

The proposed stormwater management devices will require maintenance and monitoring to ensure that they function as designed. The following section provides an outline of the necessary maintenance tasks for the proposed devices.

7.1 StormFilter (Psorb) Cartridges

To ensure the optimal and ongoing performance of the StormFilter, the system requires systematic inspection, cleaning and maintenance. This maintenance regime falls into two categories – ongoing minor inspection and maintenance, and major cleaning and maintenance. The maintenance frequency is largely determined by the conditions of each site, and the amount of sedimentation in the stormwater runoff that flows through the system. Unexpected events such as chemical spills, erosion or extreme storm activity require immediate inspection of the system, together with removal of debris or contaminated sediment, and where appropriate, replacement of the media cartridges. A maintenance contract with Ocean Protect will include annual servicing of the StormFilter (Psorb) Cartridges.

Detailed inspection and maintenance instructions for the StormFilter and OceanGuard are detailed in Ocean Protect, Operations and Maintenance Manual found in Appendix H.

8.0 ASSET HANDOVER

The proposed stormwater quality devices shall be dedicated to the owner/body corporate following the time of practical completion for the proposed development. An Asset Handover Checklist is provided as Table 14 as a guideline for the necessary steps to be taken prior to the end of the maintenance period.

Table 14: Asset Handover Checklist

Asset Location:		
Construction By:		
Maintenance Period:		
Treatment:	**Y**	**N**
Actual treatment performance equivalent to design:		
Maintenance:		
Maintenance Plans Provided:		
Inspection and maintenance undertaken as per maintenance plan:		
Inspection and maintenance forms provided:		
Asset inspected for defects:		
Asset Information:		
Design assessment checklist provided:		
As constructed plans provided:		
Copies of all permits provided:		
Digital files provided:		

9.0 CONCLUSIONS

OSKA Civil Consultants has been commissioned by Hirsch & Faigen to prepare a Conceptual Stormwater Management Plan (CSWMP) to support a Development Application (DA) to the City of Gold Coast (CoGC) for the proposed residential building situated at 7-9 Surf Parade, Broadbeach. This CSWMP intends to provide an optimised stormwater management system that would be compatible and readily integrated into the proposed site use.

This CSWMP details the conceptual planning, layout and design of the stormwater management infrastructure for both the construction and operational phases of this development and satisfies the requirements of the City of Gold Coast's Land Development Guidelines.

A hydrological analysis demonstrated that the anticipated post-development peak flow rates discharging from the site are higher than the pre-development flow rates. A hydraulic model was built using the DRAINS software program, to estimate the required detention volume and arrangement. The report and stormwater management plan define the preliminary size and layout of the proposed combined underground stormwater quality/detention tank. The captured flows from the tank are to be piped to a proposed manhole within Surf Parade. A minimum total tank volume of 2.00m^3 was modelled demonstrating adequate mitigation of post-developed flows resulting in no additional or actionable nuisance to downstream properties or infrastructure.

OSKA Civil Consultants has adopted a Water Sensitive Urban Design (WSUD) approach in accordance with the State Planning Policy, to manage the stormwater runoff from the proposed development by treating stormwater runoff within an adopted Ocean Protect system consisting of a minimum of 5 x Ocean Protect StormFilters housed within a 3.00m^2 section of the stormwater tank. The SQID's utilised within the MUSIC model have been adopted to demonstrate a potential treatment system, pending Council approval.

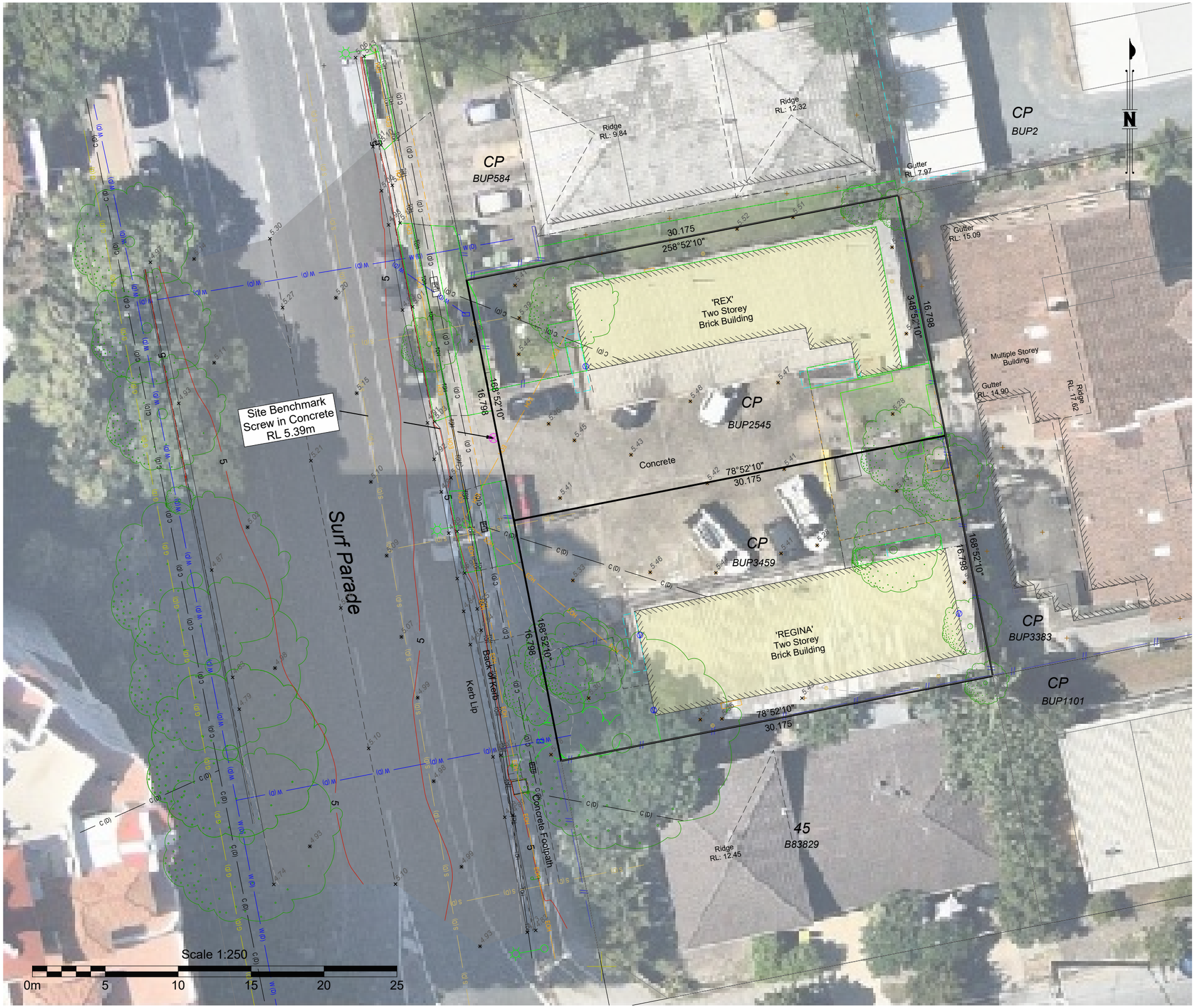
A monitoring and maintenance plan for the proposed infrastructure has been included. A concept sediment and erosion control plan is provided for the construction phase of the development and shall be implemented by the contractor and developer.

This stormwater quality strategy has defined the preliminary requirements and layout of the proposed development to demonstrate compliance with the State Planning Policy 2017 and the CoGC Planning Scheme Stormwater Quality Management requirements.

APPENDIX

A

Bennett & Bennett, Verification Plot (Ref: 241959_S001_VER Rev A)



BENNETT + BENNETT
PO Box 5021, GCMC QLD 9726
Ph: (07) 5631 8000
mail@bennettandbennett.com.au

Surveying, Town Planning, Spatial Services & Titling
GOLD COAST | BRISBANE | SUNSHINE COAST | NORTHERN RIVERS

www.bennettandbennett.com.au

LEGEND:

Road
- Kerb Back
- Kerb Invert
- Edge of Bitumen
- Edge of Gravel
- Road Crown
- Traffic Park Meter
- Traffic Light
- Traffic Pit
- Traffic Sign
- Traffic Post Box

Structures
- Building Line
- Roof Ridgeline
- Fence Line
- Gate
- Hand Rail
- Cattle Grid
- Bollard

Sewer
- Sewer Line
- Valve
- Inspection Opening
- Manhole

Electrical
- Electricity Line
- Overhead Line
- Pits/Manholes
- Pole
- Street Light
- Light In-Ground

Water
- Water Line
- Meter
- Valve
- Fire Hydrant
- Tap
- Sprinkler

Fuel
- Fuel Line
- Fitting

Terrain
- Driveway
- Footpath
- Slab Edge
- Retaining Wall Base
- Retaining Wall Top
- Change of Grade
- Top of Bank
- Toe of Bank
- Waterline
- Garden Edge
- Creek Toe of Bank
- Creek Top of Bank
- Creek Invert
- Creek Waterline
- Tree
- Tree Canopy
- Control Point/PSM

Drainage
- Drainage line
- Open Drain
- Manhole
- Field Inlet
- Downpipe

Communications
- Communication Line
- Overhead Line
- Pits/Manholes
- Pillar

Gas
- Gas Line
- Valve
- Marker

General
- Pothole

Subsurface Utility - QL
- * QL-A (H±50mm,V±50mm)
- * QL-B (H±300mm,V±500mm)
- * QL-C (H±300mm,2D)
- * QL-D (Exist Record)

NOTES:

1. Drawn to scale on an A3 sheet.
2. Contour Interval... 0.25m
3. All levels are in metres on the Australian Height Datum referred to PM1124 - RL 4.878m AHD situated in SURF STREET / ALEXANDRA AVENUE.
4. All Boundaries are vide title and subject to confirmation by survey.
5. The Location of Underground services are in accordance with AS5488:2019, the Australian Standard for classification of Subsurface Utility Information (SUI). The exact nature and location of these services should be confirmed prior to construction.
6. Area vide title : CP on BUP2545 - 507m²
   CP on BUP3459 - 507m²
7. Field Survey Completed on 13/12/2024.

Level datum: AHD Derived (PM1124)
Horiz datum: MGA Derived PLAN (IS303889)
Coord Origin: DCDB (PM1124)
GDA System: GDA2020 Coordinate System: Plane 1:1
Meridian: IS303889

Title:

VERIFICATION PLOT

Detail Survey of
7-9 Surf Parade, Broadbeach
(CP/BUP3459 & CP/BUP2545)

Client:	**Hirsch & Faigen**		
Locality:	Broadbeach		
Local Gov:	Council of the City of Gold Coast		
Surveyed By:	MSZ	Approved:	RC
Date Created:	18/12/24	Scale:	1:250
File Ref:			241959
Plan No:	**241959_S001_VER**	Rev:	**A**

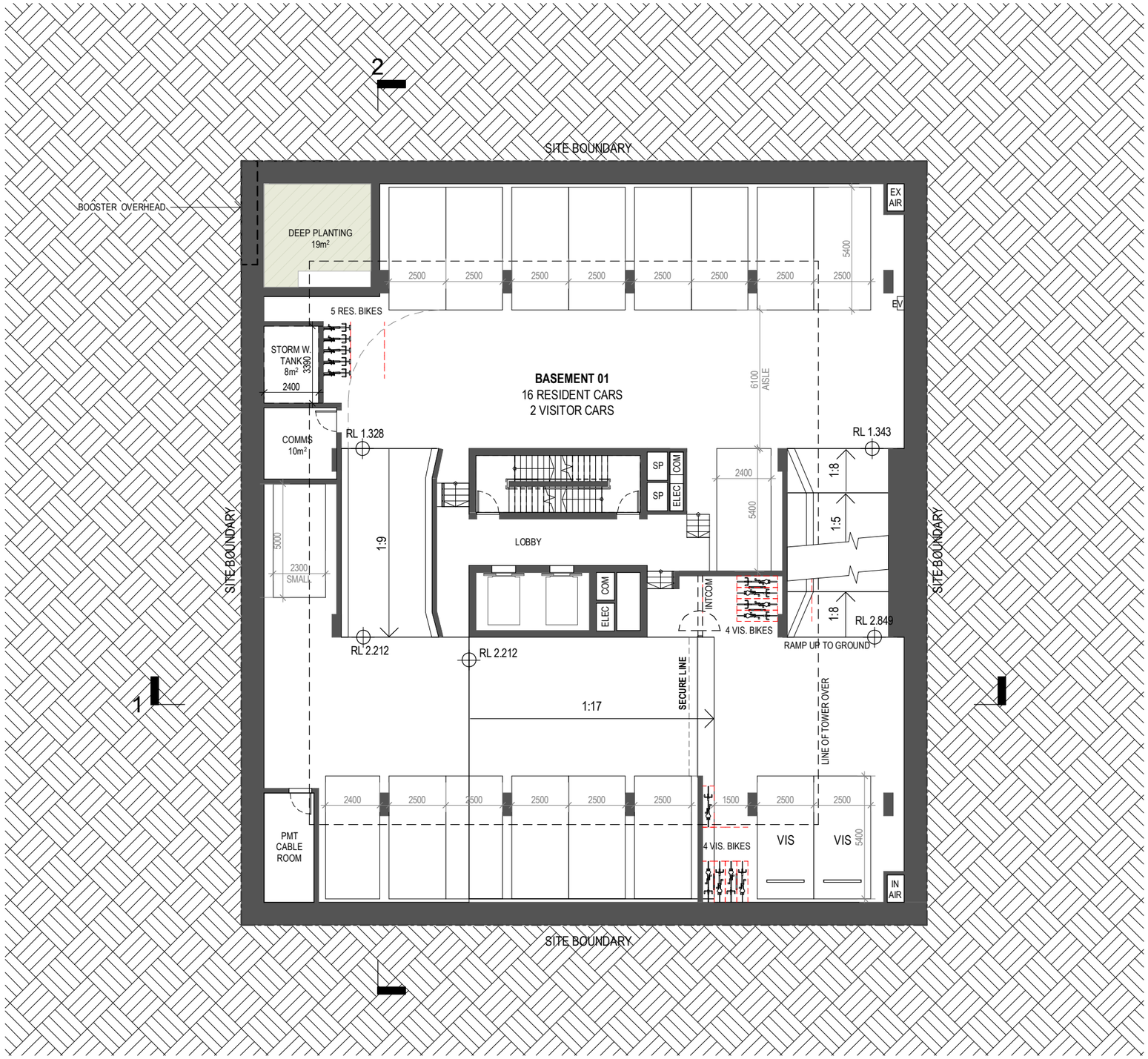
A3

APPENDIX

B

Rothelowman, Level 01 - Ground Floor Plan (Ref: TP01.04)

SURF PARADE



PRELIMINARY

Revisions

P2 20.12.2024	PRE-LODGEMENT	LR
P3 31.01.2025	FOR REVIEW	JS
P4 07.02.2025	FOR REVIEW	JS
P5 28.02.2025	FOR COMMENT	JS
P6 03.03.2025	PRE-LODGEMENT 02	JS
P7 13.03.2025	FOR REVIEW	JS
P8 21.03.2025	DRAFT DA	JS

26/03/2025 11:07:29 AM

Project **7-9 SURF PARADE**

Drawing **BASEMENT 01**

Project No **224261**

Author **JS**

Scale: @ A3 **1 : 200**

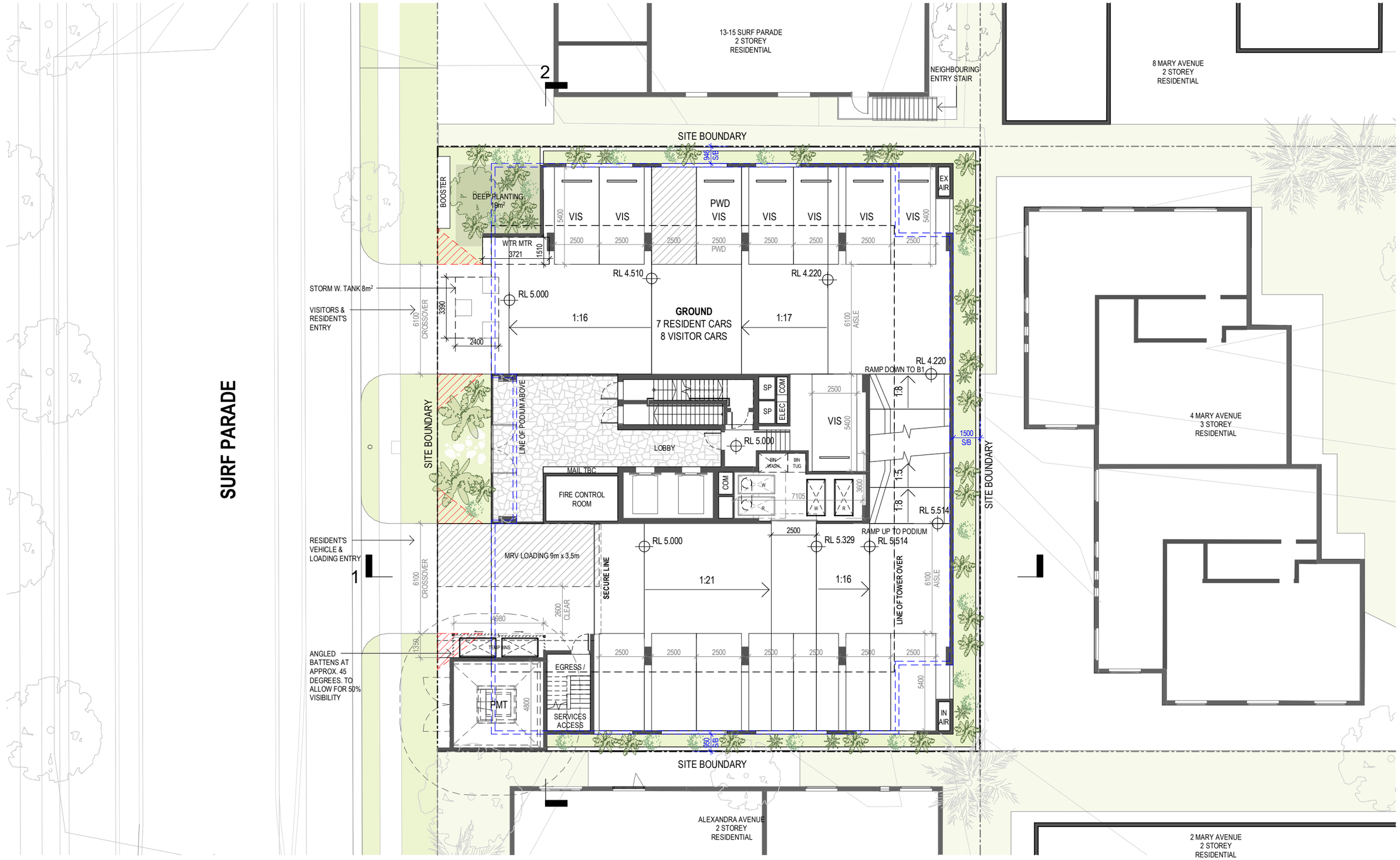
Drawing No. **TP01.03**

P8

7-9 SURF PARADE,
BROADBEACH, QLD, 4218

rothelowman

Brisbane, Gold Coast,
Melbourne, Perth, Sydney
www.rothelowman.com.au



PRELIMINARY

Revisions

P2	20.12.2024	PRE-LODGEMENT	LR
P3	31.01.2025	FOR REVIEW	JS
P4	07.02.2025	FOR REVIEW	JS
P5	28.02.2025	FOR COMMENT	JS
P6	03.03.2025	PRE-LODGEMENT 02	JS
P7	13.03.2025	FOR REVIEW	JS
P8	21.03.2025	DRAFT DA	JS

26/03/2025 11:07:29 AM

Project: **7-9 SURF PARADE**

7-9 SURF PARADE,
BROADBEACH, QLD, 4218

Drawing: **LEVEL 01 - GROUND FLOOR**

Project No: **224261**

Author: **RG**

Scale: @ A3: **1 : 200**

Drawing No.: **TP01.04**

P8

rothelowman

Brisbane, Gold Coast,
Melbourne, Perth, Sydney
www.rothelowman.com.au

APPENDIX

C

OSKA Consulting Group, Pre-Development Catchment Plan (Ref: OSK6957/P001/A)

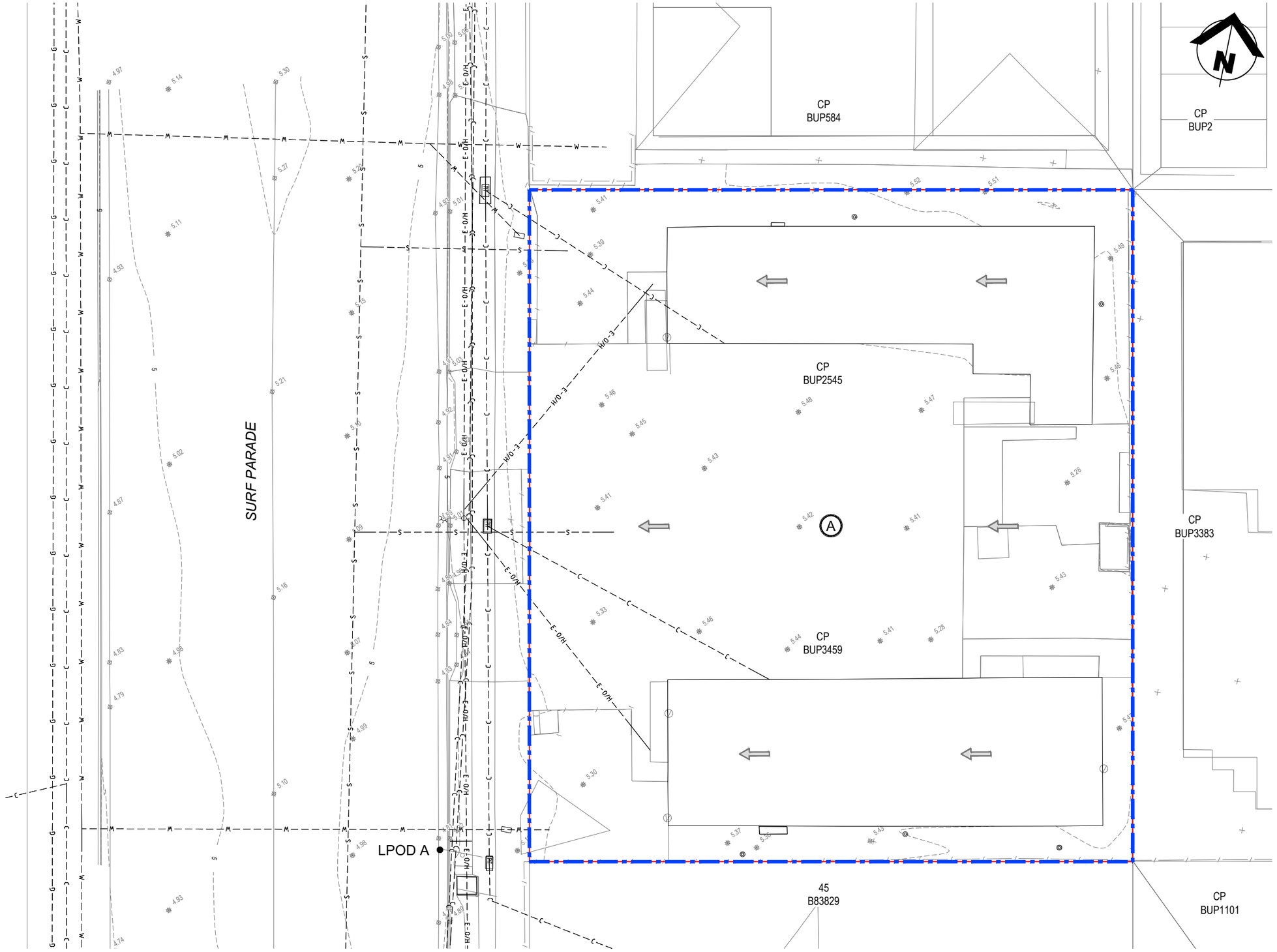
LEGEND

- STORMWATER CATCHMENT BOUNDARY
- SITE BOUNDARY
- (A) STORMWATER CATCHMENT I.D.
- 80.0 EXISTING SURFACE CONTOURS
- ● LPOD — LAWFUL POINT OF DISCHARGE
- FLOW DIRECTION

EXISTING SERVICES LEGEND

- S — EXISTING SEWER MAIN
- W — EXISTING WATER MAIN
- E-O/H — EXISTING ELECTRICAL CABLE
- SWD — EXISTING STORMWATER PIPE
- C — EXISTING COMMUNICATIONS CABLE
- G — EXISTING GAS MAIN

STORMWATER CATCHMENT TABLE	
STORMWATER CATCHMENT I.D.	AREA (m²)
A	1014
TOTAL	1014



CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

REV	DESCRIPTION	DRAWN	DATE
A	ISSUED FOR REPORT	BG	28-03-25

DRAWN BG | DESIGN BG | APPROVED

SIGNED

DATE

OSKA CONSULTING GROUP

DRAWING IS NOT TO BE SCALED

SCALE
1:100 AT A1 | 1:200 AT A3
0 2 4m

CLIENT
HIRSCH & FAIGEN PROPERTY GROUP

PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT
7-9 SURF PARADE
BROADBEACH QLD 4218

STAGE / PHASE
FOR INFORMATION ONLY NOT FOR CONSTRUCTION

TITLE
PRE-DEVELOPMENT CATCHMENT PLAN

DRAWING NUMBER
OSK6957-P001

REVISION
A

APPENDIX

D

OSKA Consulting Group, Post-Development Catchment Plan (Ref: OSK6957/P002/A) & Music Catchment Plan (Ref: OSK6957/P003/A)

LEGEND

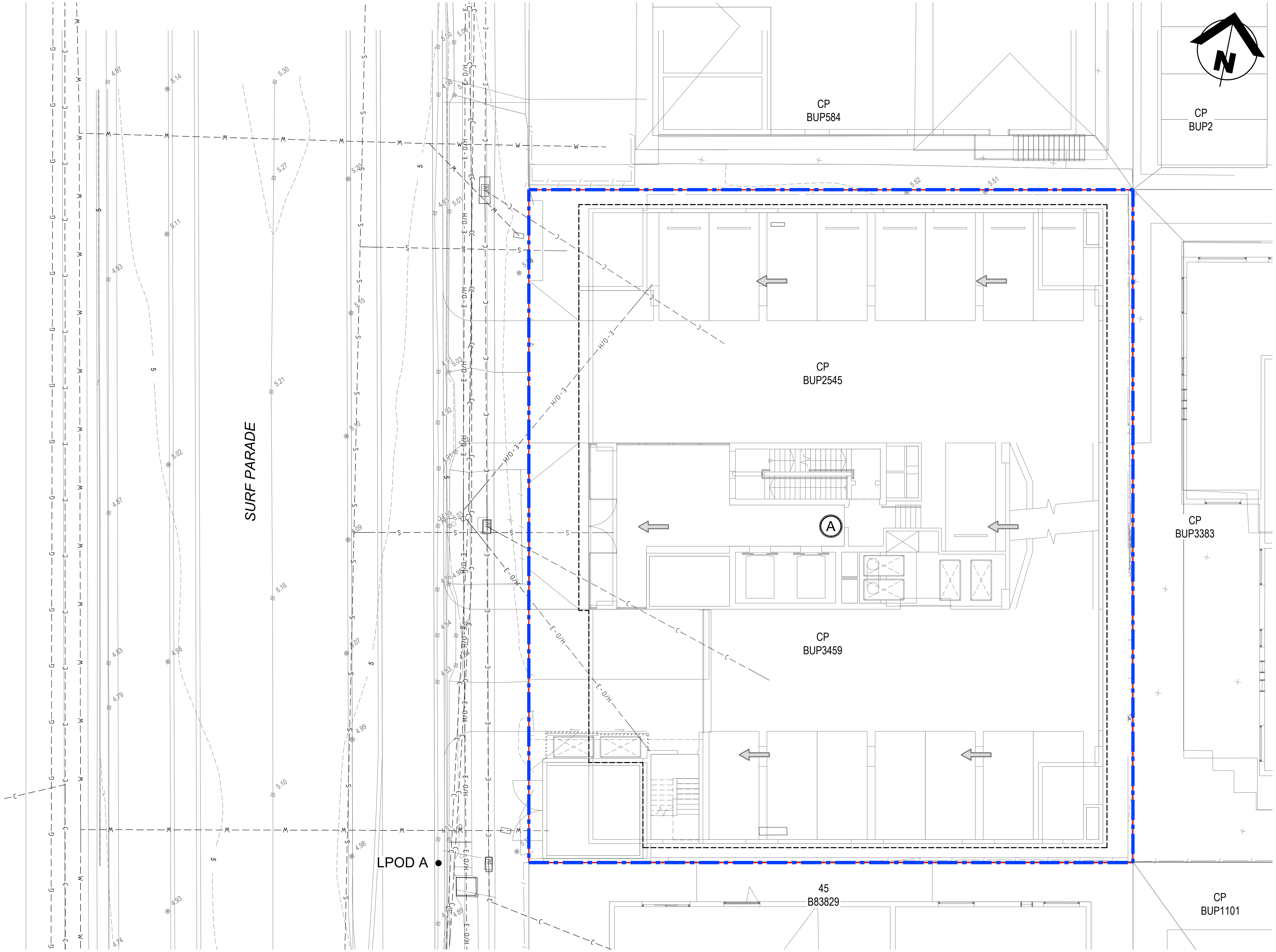
- STORMWATER CATCHMENT BOUNDARY
- SITE BOUNDARY
- (A) STORMWATER CATCHMENT I.D.
- EXISTING SURFACE CONTOURS
- ● LPOD — LAWFUL POINT OF DISCHARGE
- FLOW DIRECTION

EXISTING SERVICES LEGEND

- S — EXISTING SEWER MAIN
- W — EXISTING WATER MAIN
- E-O/H — EXISTING ELECTRICAL CABLE
- SWD — EXISTING STORMWATER PIPE
- C — EXISTING COMMUNICATIONS CABLE
- G — EXISTING GAS MAIN

STORMWATER CATCHMENT TABLE

STORMWATER CATCHMENT I.D.	AREA (m²)
A	1014
TOTAL	1014



CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

REV	DESCRIPTION	DRAWN	DATE
A	ISSUED FOR REPORT	BG	28-03-25

DRAWN: BG | DESIGN: BG | APPROVED: | SIGNED: | DATE:

OSKA CONSULTING GROUP

DRAWING IS NOT TO BE SCALED

SCALE: 1:100 AT A1, 1:200 AT A3 — 0, 2, 4m

CLIENT: HIRSCH & FAIGEN PROPERTY GROUP

PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT 7-9 SURF PARADE BROADBEACH QLD 4218

TITLE: POST-DEVELOPMENT CATCHMENT PLAN

STAGE / PHASE: FOR INFORMATION ONLY — NOT FOR CONSTRUCTION

DRAWING NUMBER: OSK6957-P002

REVISION: A

LEGEND

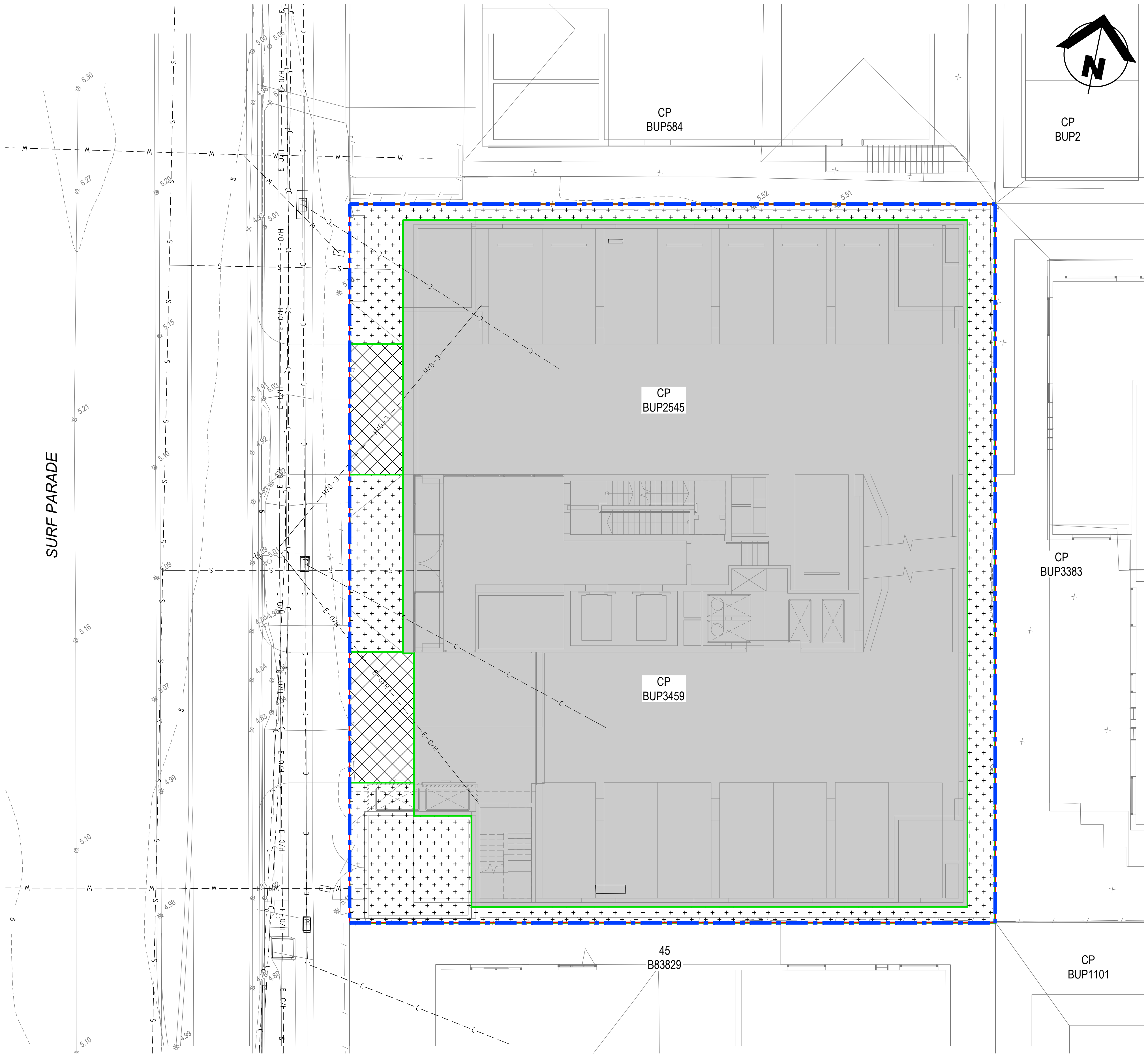
- STORMWATER CATCHMENT BOUNDARY
- SITE BOUNDARY
- 80.0 EXISTING SURFACE CONTOURS
- ROOF AREA
- ROAD & CARPARK AREA
- GROUND AREA

EXISTING SERVICES LEGEND

- S — EXISTING SEWER MAIN
- W — EXISTING WATER MAIN
- E-O/H — EXISTING ELECTRICAL CABLE
- SWD — EXISTING STORMWATER PIPE
- C — EXISTING COMMUNICATIONS CABLE
- G — EXISTING GAS MAIN

MUSIC CATCHMENT TABLE

MUSIC I.D.	AREA (ha)	IMPERVIOUS (%)
ROOF	829	100
ROAD & CARPARK	34	100
GROUND	151	93
TOTAL	1014	



CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

REV	DESCRIPTION	DRAWN	DATE
A	ISSUED FOR REPORT	BG	28-03-25

DRAWN	DESIGN	APPROVED
BG	BG	----

SIGNED ----

DATE

OSKA CONSULTING GROUP

DRAWING IS NOT TO BE SCALED

SCALE
1:100 AT A1
1:200 AT A3
0 2 4m

CLIENT
HIRSCH & FAIGEN PROPERTY GROUP

PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT
7-9 SURF PARADE
BROADBEACH QLD 4218

STAGE / PHASE
FOR INFORMATION ONLY NOT FOR CONSTRUCTION

TITLE
MUSIC CATCHMENT PLAN

DRAWING NUMBER
OSK6957-P003

REVISION
A

APPENDIX

E

OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957/P004/A) & Conceptual Stormwater Management Details (Ref: OSK6957/P005/A)

LEGEND

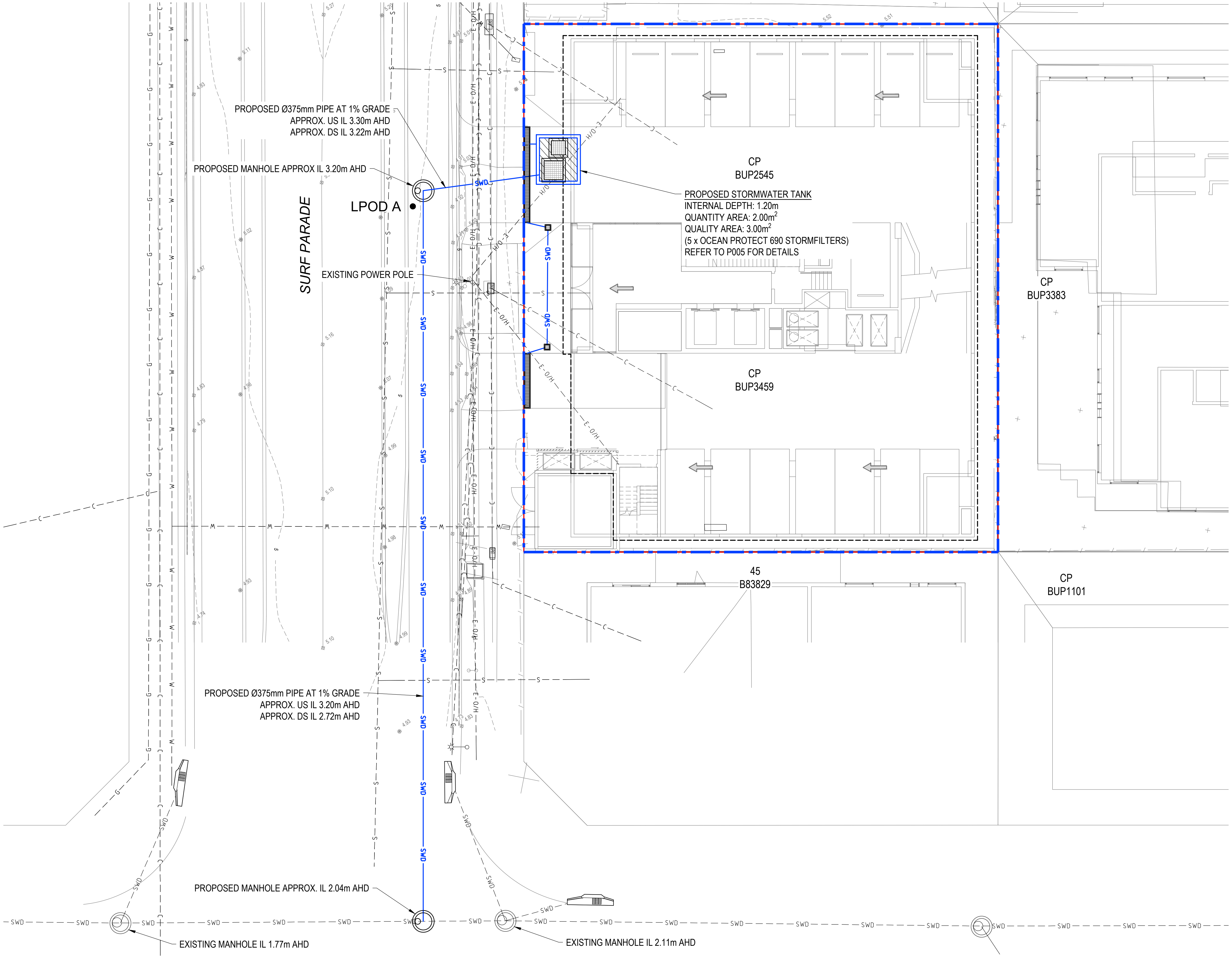
- STORMWATER CATCHMENT BOUNDARY
- 80.0 EXISTING SURFACE CONTOURS
- • LPOD — LAWFUL POINT OF DISCHARGE
- SITE BOUNDARY
- FLOW DIRECTION
- PROPOSED STORMWATER TANK
- SWD PROPOSED STORMWATER PIPE
- PROPOSED ACCESS LID
- PROPOSED STORMWATER MANHOLE
- PROPOSED INLET PIT
- PROPOSED GRATED DRAIN

EXISTING SERVICES LEGEND

- S — EXISTING SEWER MAIN
- W — EXISTING WATER MAIN
- E-O/H — EXISTING ELECTRICAL CABLE
- SWD — EXISTING STORMWATER PIPE
- C — EXISTING COMMUNICATIONS CABLE
- G — EXISTING GAS MAIN

NOTE:

INLET PITS ARE TO BE INSTALLED (IF REQUIRED) WITHIN PLANTER AREAS AND A STRIP DRAIN IS TO BE INSTALLED (IF REQUIRED) ALONG THE FRONT BOUNDARY TO HYDRAULIC ENGINEERS DESIGN TO ENSURE ALL RUNOFF FROM THE SITE IS CAPTURED AND CONVEYED TO THE STORMWATER TANK. FURTHER DETAILS ARE TO BE PROVIDED IN DETAILED DESIGN.



CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

REV	DESCRIPTION	DRAWN	DATE
A	ISSUED FOR REPORT	BG	28-03-25

DRAWN	DESIGN	APPROVED
BG	BG	

SIGNED

DATE

OSKA CONSULTING GROUP

DRAWING IS NOT TO BE SCALED

SCALE: 1:125 AT A1, 1:250 AT A3 (0 – 5m)

CLIENT: HIRSCH & FAIGEN PROPERTY GROUP

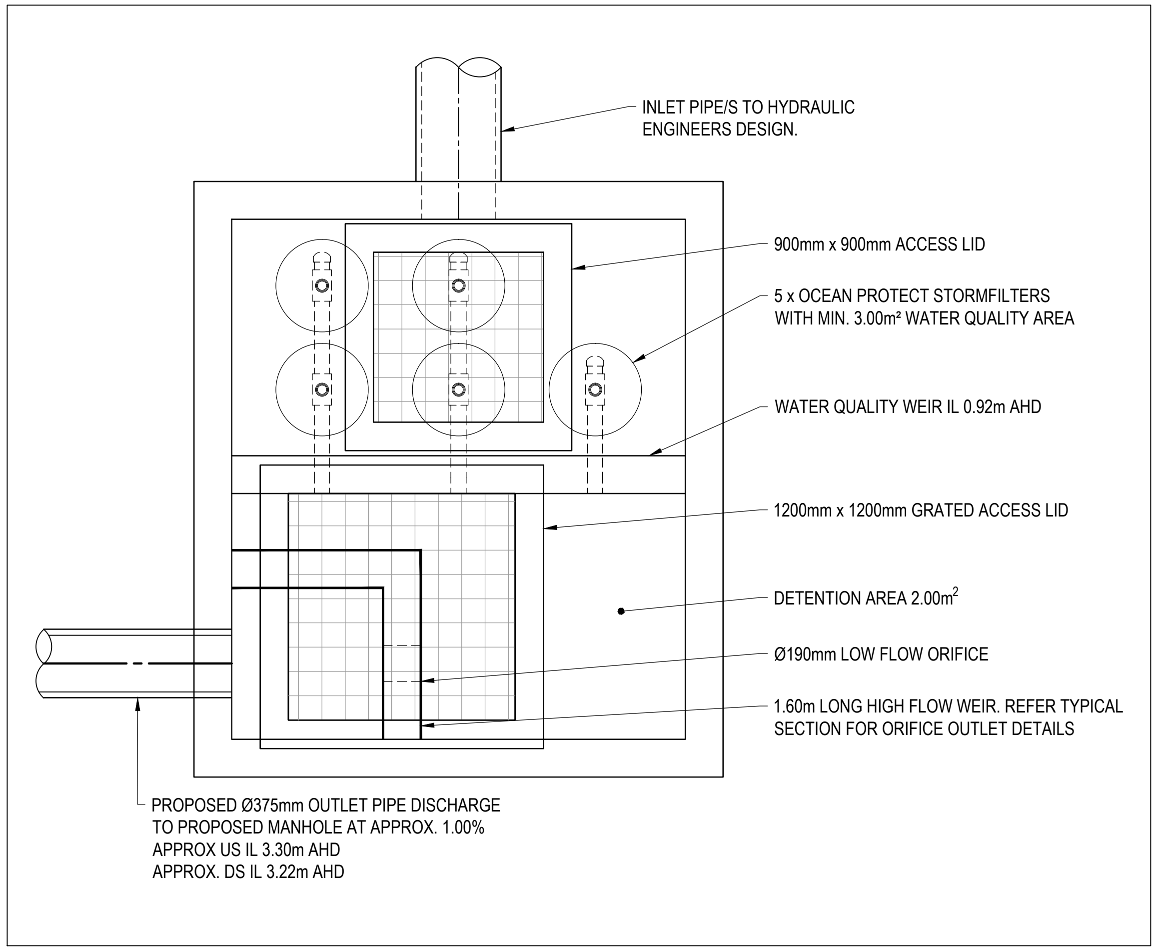
PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT, 7-9 SURF PARADE, BROADBEACH QLD 4218

TITLE: CONCEPTUAL STORMWATER MANAGEMENT PLAN

STAGE / PHASE: FOR INFORMATION ONLY — NOT FOR CONSTRUCTION

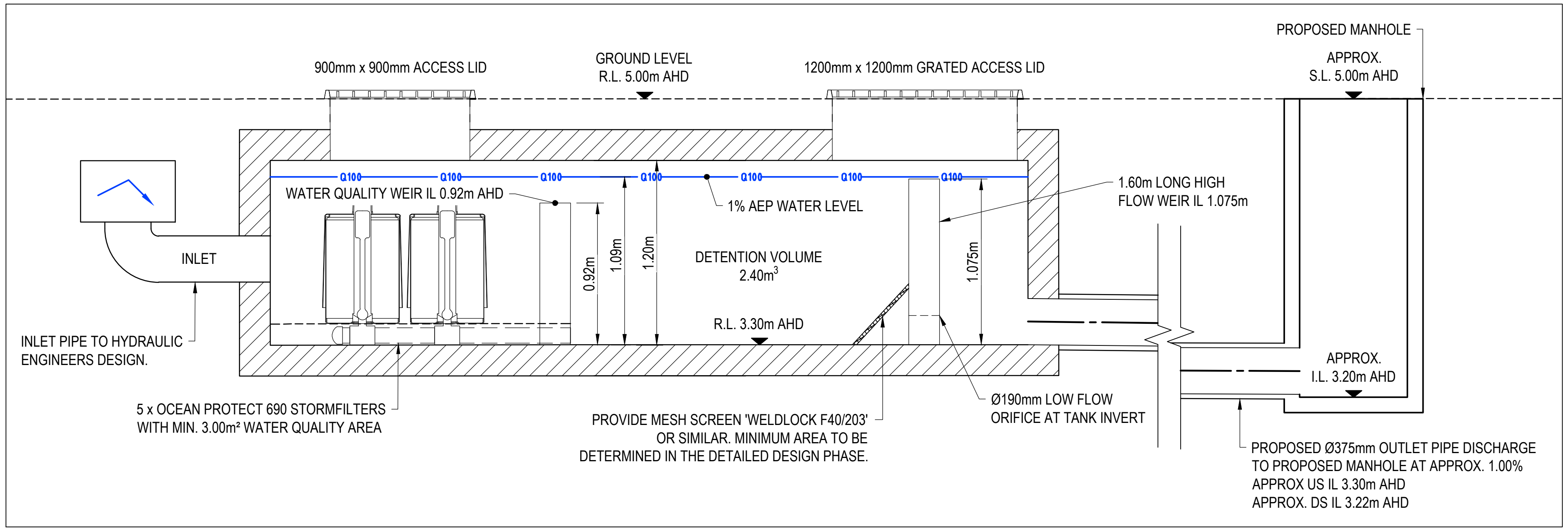
DRAWING NUMBER: OSK6957-P004

REVISION: A



UNDERGROUND TANK - TYPICAL LAYOUT

SCALE: 1:20



UNDERGROUND TANK - TYPICAL LONGITUDINAL SECTION

SCALE: 1:20

CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

REV	DESCRIPTION	DRAWN	DATE
A	ISSUED FOR REPORT	BG	28-03-25

DRAWN: BG | DESIGN: BG | APPROVED:

SIGNED

DATE

OSKA CONSULTING GROUP

DRAWING IS NOT TO BE SCALED

SCALE: 1:20 AT A1 / 1:40 AT A3 — 0, 500mm, 1m

CLIENT: HIRSCH & FAIGEN PROPERTY GROUP

PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT 7-9 SURF PARADE BROADBEACH QLD 4218

TITLE: CONCEPTUAL STORMWATER MANAGEMENT DETAILS

STAGE / PHASE: FOR INFORMATION ONLY — NOT FOR CONSTRUCTION

DRAWING NUMBER: OSK6957-P005

REVISION: A

APPENDIX

F

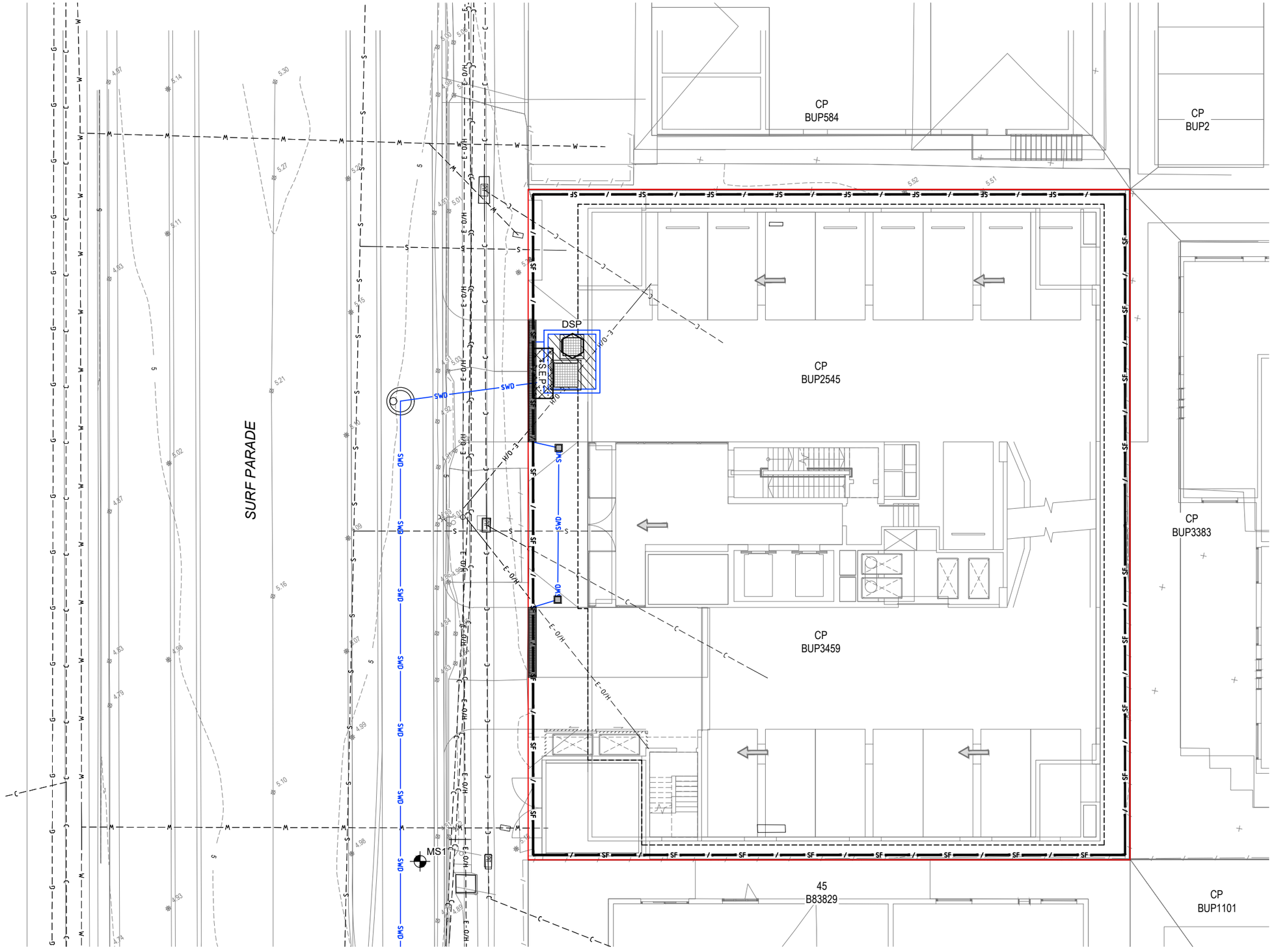
OSKA Consulting Group, Sediment and Erosion Control Plan (Ref: OSK6957/P006/A) & Sediment and Erosion Control Details (Ref: OSK6957/P007/A)

SEDIMENT & EROSION CONTROL LEGEND

- SEDIMENT FENCE
- EXISTING SURFACE CONTOURS
- PROPOSED STORMWATER TANK
- PROPOSED STORMWATER PIPE
- LOCATION OF STABILISED ENTRY/EXIT POINT
- DRAINAGE STRUCTURE PROTECTION
- WATER QUALITY MONITORING STATION
- SITE BOUNDARY
- FLOW DIRECTION

EXISTING SERVICES LEGEND

- EXISTING SEWER MAIN
- EXISTING WATER MAIN
- EXISTING ELECTRICAL CABLE
- EXISTING STORMWATER PIPE
- EXISTING COMMUNICATIONS CABLE
- EXISTING GAS MAIN



CONCEPT ONLY

IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN ADEQUATE SEDIMENT & EROSION CONTROL DURING ALL PHASES OF CONSTRUCTION TO THE SATISFACTION OF BOTH THE SUPERINTENDENT AND COUNCIL.

CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

REV	DESCRIPTION	DRAWN	DATE
A	ISSUED FOR REPORT	BG	28-03-25

DRAWN BG | DESIGN BG | APPROVED

SIGNED

DATE

OSKA CONSULTING GROUP

DRAWING IS NOT TO BE SCALED

SCALE

1:100 AT A1 | 1:200 AT A3 | 0 | 2 | 4m

CLIENT

HIRSCH & FAIGEN PROPERTY GROUP

PROJECT

PROPOSED RESIDENTIAL DEVELOPMENT
7-9 SURF PARADE
BROADBEACH QLD 4218

STAGE / PHASE

FOR INFORMATION ONLY NOT FOR CONSTRUCTION

TITLE

PRELIMINARY SEDIMENT & EROSION CONTROL PLAN

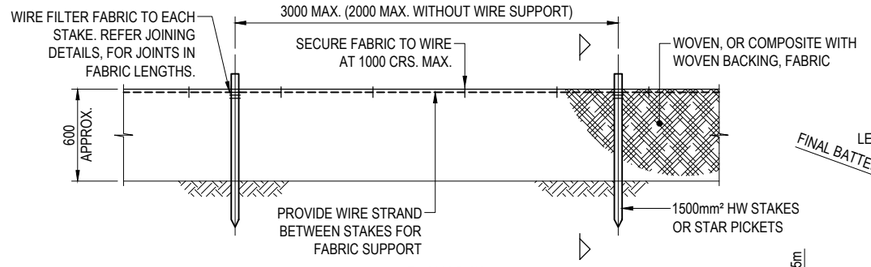
DRAWING NUMBER: OSK6957-P006

REVISION: A

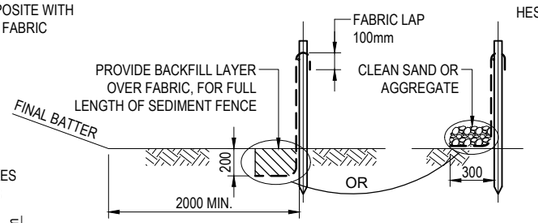
CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

CONCEPT ONLY

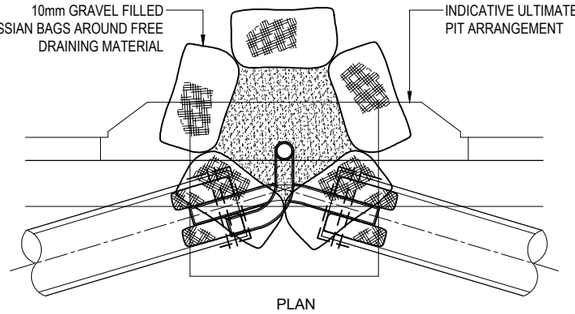
IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN ADEQUATE SEDIMENT & EROSION CONTROL DURING ALL PHASES OF CONSTRUCTION TO THE SATISFACTION OF BOTH THE SUPERINTENDENT AND COUNCIL.



ELEVATION

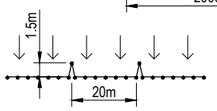


SECTION



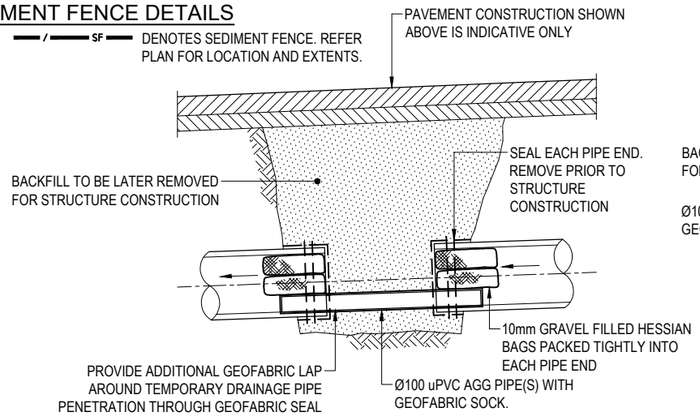
PLAN

NOTE: INSTALL 1.5m (MIN.) DEEP 'RETURNS' AT 20m SPACING (MAX.) ON UPSLOPE SIDE OF FENCELINE (5-10m MAX SPACING IF FENCE ALIGNED AT ANGLE TO CONTOUR). EG:

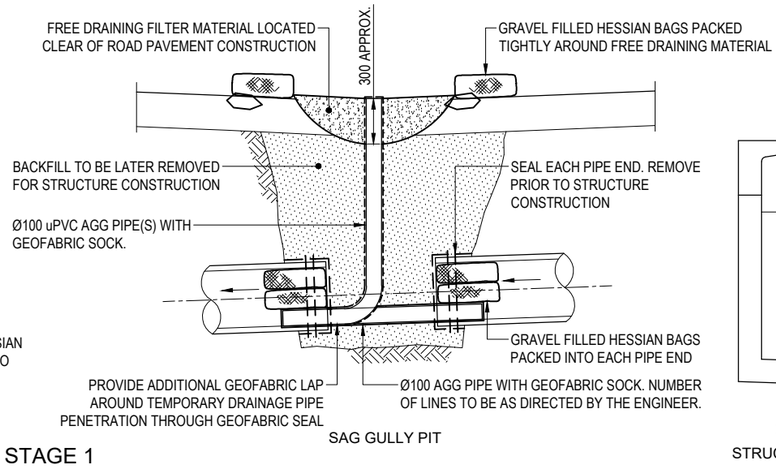


SEDIMENT FENCE DETAILS

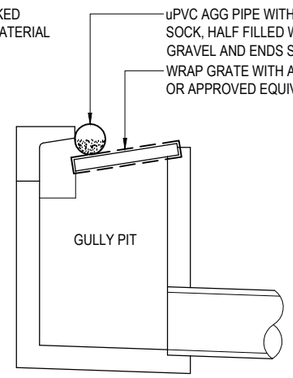
N.T.S. — / SF — DENOTES SEDIMENT FENCE. REFER PLAN FOR LOCATION AND EXTENTS.



ON GRADE GULLY PIT



SAG GULLY PIT



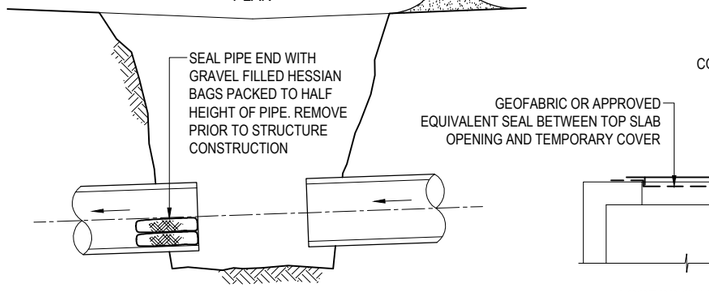
STAGE 2
STRUCTURE COMPLETE

STAGE 1
EXCAVATION, PIPE INSTALLATION AND INTERIM BACKFILLING

ROADWAY GULLY PIT

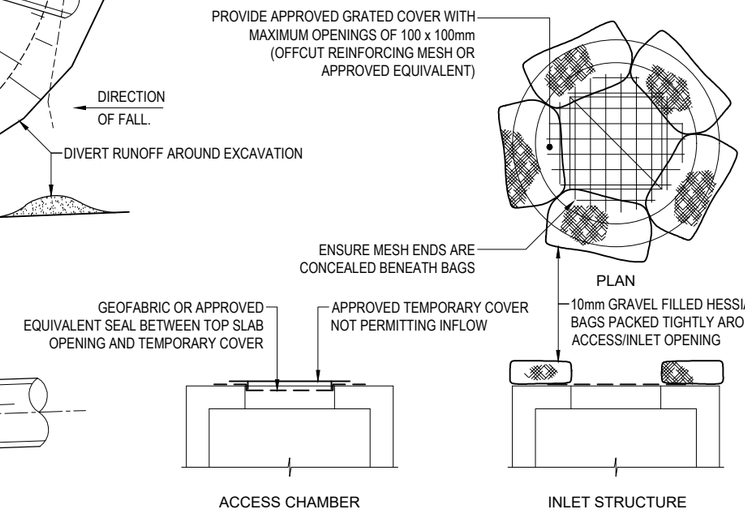
DSP — DENOTES DRAINAGE STRUCTURE PROTECTION. REFER PLAN FOR LOCATION & EXTENTS.

N.T.S.

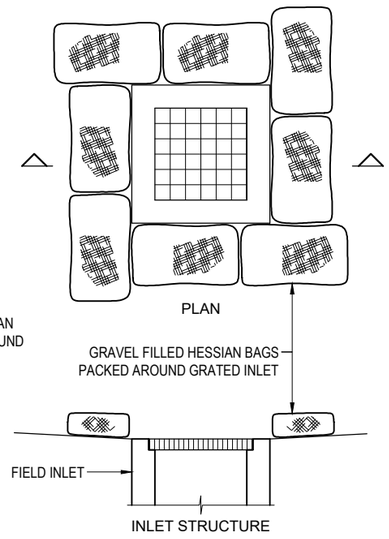


PLAN

STAGE 1
EXCAVATION AND PIPE INSTALLATION



STAGE 2
STRUCTURE COMPLETE UP TO TOP SLAB

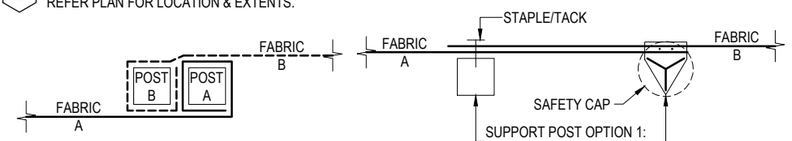


STAGE 3
STRUCTURE COMPLETE

ACCESS CHAMBER / INLET STRUCTURE

N.T.S.

DSP — DENOTES DRAINAGE STRUCTURE PROTECTION, REFER PLAN FOR LOCATION & EXTENTS.



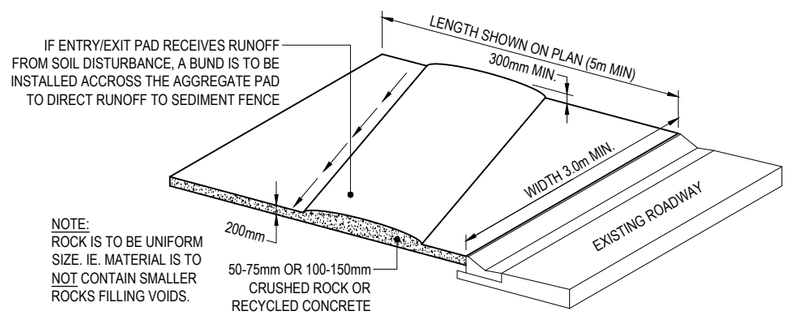
FABRIC TO FOLD AROUND EACH STAKE ONE FULL TURN. STAKE B TO BE DRIVEN TIGHTLY AGAINST STAKE A. THE TOPS OF BOTH STAKES TO BE SECURED WITH WIRE.

METHOD 1

METHOD 2

SEDIMENT FENCE FABRIC JOINING DETAILS

N.T.S.



NOTE:
ROCK IS TO BE UNIFORM SIZE. IE. MATERIAL IS TO NOT CONTAIN SMALLER ROCKS FILLING VOIDS.

STABILISED ENTRY/EXIT POINT

OR APPROVED EQUIVALENT

N.T.S.
SEP — DENOTES STABILISED ENTRY/EXIT POINT, REFER PLAN FOR LOCATIONS.

REV	DESCRIPTION	DRAWN	DATE
A	ISSUED FOR REPORT	BG	28-03-25

DRAWN BG | DESIGN BG | APPROVED

SIGNED

DATE

OSKA CONSULTING GROUP

DRAWING IS NOT TO BE SCALED

SCALE

CLIENT
HIRSCH & FAIGEN PROPERTY GROUP

PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT
7-9 SURF PARADE
BROADBEACH QLD 4218

STAGE / PHASE
FOR INFORMATION ONLY NOT FOR CONSTRUCTION

TITLE
PRELIMINARY SEDIMENT & EROSION CONTROL DETAILS

DRAWING NUMBER
OSK6957-P007

REVISION
A

APPENDIX

G

OSKA Consulting Group, Response to Healthy Waters Code (Ref: OSK6957-0004)

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

Note: In accordance with Section 2.1 of City Plan, an assessment against State interest - Water quality (policies 4 and 5) of the State Planning Policy 2017 is required as the Healthy water development code does not fully integrate this State interest. A response table for policies 4 and 5 have been included below.

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

9.4.5 Healthy waters code

9.4.5.3 Specific benchmarks for assessment

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 9.4.5-3: Healthy waters code – for assessable development

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Erosion and sediment control			
PO1 Stormwater discharge from a development site achieves the construction phase water quality objectives of **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards**.	**AO1** No acceptable outcome provided.	**PO** The stormwater discharge from the development extent achieves the construction phase water quality objectives of SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards. Refer to OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957-0002) prepared for 7-9 Surf Parade, Broadbeach for further details on the proposed treatment system.	
PO2 Erosion, sediment and dust is appropriately managed during the construction phase.	**AO2** The level of risk for soil erosion and sediment pollution to the environment is determined by an erosion hazard assessment, completed by a suitably-qualified person in accordance with the criteria in **Table 9.4.5-4: Erosion hazard assessment**. Where the erosion hazard assessment has a risk score of: (a) less than or equal to 10: A deemed to comply report is prepared by a suitably qualified person for Council approval, including conceptual location and design drawings of each treatment measure in plan and section views, in	**AO** An erosion hazard assessment was completed for the development in accordance with Table 9.4.5-4 and the proposed development totalled a risk score of 9. A sediment and erosion control plan is included in OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957-0002) prepared for 7-9 Surf Parade, Broadbeach. The plan addresses devices and management measures to control erosion and sediment for the pre-construction, construction and post-construction phases of the development, in accordance with the Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets **either** the performance outcome or overall outcome	Internal use
	accordance with the *Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008.* (b) greater than 10 or developments involving multiple stages of disturbance or more than 1.25 ha of land: (i) For material change of use or reconfiguring a lot, a conceptual erosion and sediment control plan (ESCP) is prepared by a suitably-qualified person for Council approval in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**, and the *Best Practice Erosion and Sediment Control: International Erosion Control Association (IECA) 2008, Australasia Chapter 2008*. (ii) For operational work, a detailed ESCP is prepared by a suitably-qualified person in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**, and *Best Practice Erosion and Sediment Control: International Erosion Control Association (IECA) 2008, Australasia Chapter 2008*. The ESCP is to detail appropriate		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	treatment measures for the construction phase of development, demonstrating how the minimum design objectives in **Table 9.4.5-5: Stormwater design objectives** are achieved, including: (a) measures to ensure the release of sediment-laden stormwater for the nominated design storm are minimised when the design storm is exceeded; (b) detailed design, installation, construction, monitoring and maintenance requirements of all approved proprietary products in accordance with local conditions and manufacturer's recommendations; and (c) details of how the ESCP aligns with the approved development staging plan.		
Stormwater quality			
PO3 Development appropriately manages stormwater quality to:	**AO3.1** For post developed sites, the following minimum pollutant reduction targets are achieved: (a) Gross pollutants (>5mm) – 90%; (b) Total Suspended Solids (TSS) – 80%, (c) Total Phosphorus (TP) – 60%; and (d) Total Nitrogen (TN) – 45%.	**AO** A Conceptual Stormwater Management Plan (CSWMP) has been prepared for the proposed Residential Development situated at 7-9 Surf Parade, Broadbeach. The CSWMP details the proposed treatment measures to be implemented to ensure compliance with SC6.12 City Plan policy – Land development guidelines. Refer to the OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957-0002) prepared for 7-9 Surf Parade, Broadbeach for further information.	
	AO3.2	**N/A**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
(a) protect natural ecosystems; (b) protect water quality; (c) reduce runoff and peak flows; and (d) meet the water quality objectives and environmental values for Queensland waters. **Note: Water quality objectives and environmental values for Queensland waters are contained within *Schedule 1* of the *Environmental Protection (Water) Policy 2009*. Water quality objectives are locally specific and vary between and within river catchments.** **Note: A stormwater quality management plan prepared by a suitably qualified person in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards, is Council's preferred method for addressing this performance outcome.**	For development on land less than 1.25ha, a deemed to comply solution for stormwater quality is achieved in accordance with **Table 9.4.5-6: Stormwater quality deemed to comply solutions**.		
	AO3.3 For development on land greater than 1.25ha, a stormwater quality management plan is to be prepared by a suitably qualified person in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards**, is required.	**N/A**	
Waterway stability			
PO4 In-stream erosion, downstream of urban development is prevented by controlling the rate (or magnitude) and duration of sediment transporting flows.	**AO4** Post-development peak 0.632 Annual Exceedance Probability (AEP) event discharge within receiving waterway is limited to pre-development peak 0.632 AEP event discharge and is in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards.**	**N/A** The development proposes to discharge stormwater to the existing Council Stormwater Drainage System.	
Stormwater quantity control			
PO5	**AO5** The following is achieved external to the	**AO**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets **either** the performance outcome or overall outcome	Internal use
Stormwater quantity management outcomes demonstrate no adverse impact on stormwater flooding or the drainage of properties external to the subject site.	development site: (a) no increase in peak flood flow rate from the development site for all events up to and including the 1% AEP; (b) no increase in peak flood velocities from the development site for all events up to and including the 1% AEP; (c) no increase in peak flood level from the development site for all events up to and including the 1% AEP; and (d) stormwater outfalls or discharge is located to avoid conflict with existing usage of downstream land or impacts on existing watercourse or drainage.	The development proposes a detention tank to ensure post development flow rates are mitigated to pre-development rates and that there is no increased runoff on downstream properties in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards. Refer to the OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957-0002) prepared for 7-9 Surf Parade, Broadbeach for further details.	
Lawful point of discharge			
PO6 Development ensures the stormwater systems are designed to not cause actionable nuisance that would adversely affect adjoining (upstream or downstream) properties.	**AO6** A lawful point of discharge must be identified and demonstrated that all discharge point/s from the development are in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards**.	**AO** The development proposed to discharge all flows to a proposed manhole within Surf Parade which is a Lawful Point of Discharge in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards. Refer to the OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957-0002) prepared for 7-9 Surf Parade, Broadbeach for further details.	
Overland flow paths			
PO7 Development must not obstruct free open surface flow of stormwater through a site.	**AO7** Overland flowing stormwater is allowed free open surface flow between the street and any waterway at the rear or sides of a property, in accordance with the provisions	**N/A**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
	of the *Building Code of Australia.*		
Whole of life costs			
PO8 Stormwater infrastructure is designed and constructed to: (a) remain fit for purpose for the life of the development and maintains full functionality in the design flood event; (b) be cost effective to maintain; and (c) ensure no structural damage to existing stormwater infrastructure.	**AO8** No acceptable outcome provided.	**PO** The proposed stormwater infrastructure for the development has been designed to be fit for purpose for the development and is a cost effective solution. A Maintenance Management Plan will be required during the detailed design phase to ensure sufficient maintenance of the treatment system throughout the life of the development. Any damages that occur to the existing Council infrastructure during construction will be rectified. Refer to the OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957-0002) prepared for 7-9 Surf Parade, Broadbeach for further details.	
Landscape integration			
PO9 Stormwater treatment devices and stormwater infrastructure are designed to:	**AO9.1** Where stormwater treatment devices and stormwater infrastructure are integrated into public open space, a Statement of Landscape Intent is to be prepared by a suitably qualified person, for approval by Council. The plan is to demonstrate that the operation of stormwater infrastructure does not compromise the function of any co-located uses and reflect the design principles within **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards.** **Note: A Statement of landscape intent is to be prepared in accordance with SC6.13 City Plan policy – Landscape work.**	**PO** The proposed stormwater treatment devices and stormwater infrastructure have been designed to be incorporated within the landscape outcomes, enhance visual amenity and to protect the environment in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards. Refer to the OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957-0002) prepared for 7-9 Surf Parade, Broadbeach for further details.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
(a) integrate with the urban design and landscape outcomes of the development; (b) complement natural environments, wetlands and watercourses; (c) protect environmental values; (d) enhance visual amenity; and (e) incorporate CPTED principles in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**.	**AO9.2** Stormwater treatment devices are located offline to any upstream catchment. **Note: This provision relates to the integration of stormwater treatment devices and stormwater infrastructure into the landscape. Development identified on the Environmental significance – wetlands and watercourse overlay map will still require assessment against the Environmental significance overlay code.**	**AO** The development is not impacted by any external/upstream catchments and therefore the proposed stormwater devices are not impacted by external/upstream catchments. Refer to the OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957-0002) prepared for 7-9 Surf Parade, Broadbeach for further details.	
	AO9.3 All stormwater outlets that are located adjacent to watercourses, creeks and drainage paths are aligned at a maximum of 45 degrees to the downstream direction of flow, and energy dissipation measures installed to minimise scour.	**N/A**	
Public safety			
PO10 Stormwater treatment devices and stormwater infrastructure minimise impacts on public health and safety.	**AO10** All stormwater quantity control measures are designed in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards**.	**AO** The development proposes a detention tank to ensure post development flow rates are mitigated to pre-development rates and that there is no increased runoff on downstream properties in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards. Refer to the OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957-0002) prepared for 7-9 Surf Parade, Broadbeach for further details.	
Maintenance access			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO11 Maintenance access is provided for all stormwater management systems and considers: (a) the type of vehicle or machinery needed to service particular assets; and (b) the need to ensure a safe working environment for maintenance personnel and the public.	**AO11.1** All weather vehicle access is to be provided to inlet zones of the stormwater treatment systems in accordance with **Table 9.4.7-9: Maintenance access requirements (slope).**	**N/A**	
	AO11.2 Maintenance access is to be provided around the perimeter of all stormwater treatment systems in accordance with **Table 9.4.5-8: Maintenance access requirements (size).**	**N/A**	
	AO11.3 A maintenance buffer is provided around the perimeter of all stormwater treatment devices and adjoining private property equal to: (a) 1m in width; or (b) the width of a perimeter maintenance access, as delivered in AO11.2, plus 0.5m. The maintenance buffer is measured from the adjacent allotment boundary to the top of batter around the treatment measure. The maximum slope on the maintenance buffer is 1 in 10.	**N/A**	
Fauna movement			
PO12 Stormwater conveyance structures and channels are designed to ensure the safe movement of native fauna and provide for terrestrial and aquatic passage.	**AO12.1** Stormwater drainage structures and channels minimise impacts on aquatic fauna and associated habitats and provide opportunities for beneficial habitat uses of structures in accordance with the *Department of Primary Industries and*	**N/A**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
	Fisheries – Fisheries guidelines for Fish-friendly structures (2006).		
	AO12.2 Stormwater drainage structures allow for the safe movement of terrestrial fauna in accordance with: (a) the Queensland Government Fauna Sensitive Road Design Manual Volume 2: Preferred Practices; and (b) the Queensland Government Koala-Sensitive Design Guidelines.	**N/A**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Wastewater management			
PO13 Development does not discharge wastewater to receiving waters or areas external to the site unless demonstrated to be the best-practice environmental management for that site and takes into consideration: (a) the applicable water quality objectives for the receiving waters; and (b) the potential adverse impact on ecosystem health of receiving waters.	**AO13** Where the development involves the discharge of wastewater, a Wastewater Management Plan (WWMP) is prepared, demonstrating compliance with the performance outcome, by a suitably qualified person and submitted to the Council, detailing all of the following: (a) wastewater type; (b) climatic conditions; (c) water quality objectives; (d) best-practice environmental management; (e) waste management hierarchy; and (f) the WWMP provides for the management of wastewater in accordance with a wastewater management hierarchy that: (i) avoids wastewater discharge to watercourses; or (ii) if wastewater discharge to the environment cannot practicably be avoided wastewater discharge to watercourses is minimised through re-use, recycling, recovery and treatment for disposal to sewer, surface water and groundwater.	**N/A** The proposed development does not propose to discharge wastewater into receiving waters. All wastewater will be discharged appropriately into Council's sewerage network.	
Dewatering management			
PO14 Dewatering occurs in accordance with an	**AO14** No acceptable outcome provided.	**N/A**	

approved Dewatering management plan.			
Woongoolba flood mitigation catchment area			
PO15 In the Woongoolba flood mitigation catchment area, shown on the **Water catchments and dual supply system area overlay map**, peak outflow and its timing for Q2, Q5 and Q10 for rainfall events up to 72 hours does not change as a result of development.	**AO15** No acceptable outcome provided.	**N/A**	

State Planning Policy July 2017

Policies	Demonstrate how the proposal meets the policy?	Internal use
State interest – water quality		
ASSESSMENT BENCHMARK 4 (POLICY 4): At the construction phase, development achieves the applicable stormwater management design objectives in table A (appendix 2) of the State Planning Policy.	A sediment and erosion control plan is included in OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957-0002) prepared for 7-9 Surf Parade, Broadbeach. The plan addresses devices and management measures to control erosion and sediment for the pre-construction, construction and post-construction phases of the development, in accordance with the Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008 to ensure compliance with Assessment Benchmark 4 (Policy 4) of the State Planning Policy.	
ASSESSMENT BENCHMARK 5 (POLICY 5): (5) At the post-construction phase, development: a) achieves the applicable stormwater management design objectives on-site, as identified in table B (appendix 2) of the State Planning Policy; or b) achieves an alternative locally appropriate solution off-site that achieves an equivalent or improved water quality outcome to the relevant stormwater management design objectives in table B (appendix 2) of the State Planning Policy.	A Conceptual Stormwater Management Plan (CSWMP) has been prepared for the Proposed Residential Development situated at 7-9 Surf Parade, Broadbeach. The CSWMP details the proposed treatment measures to be implemented to ensure compliance with Assessment Benchmark (Policy 5) of the State Planning Policy. Refer to OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK6957-0002) prepared for 7-9 Surf Parade, Broadbeach.	

Table 9.4.5-3: Erosion hazard assessment

Controlling factor	Points	Score
Average slope of the whole site prior to operational works		
Slope less than 2%	0	
More than or equal to 2% but less than 5%	1	1
More than or equal to 5% but less than 10%	2	
More than or equal to 10% but less than 15%	4	
More than or equal to 15%	5	
Soil type (to be disturbed)		
Gravels and sandy soils	1	1
Sandy loam	2	
Clays on flood plains	3	
Shallow soils on slopes	4	
Clays on slopes greater than 5%/imported fill or untested fill	5	
Anticipated duration of site disturbance		
Duration less than 2 weeks	0	
More than 2 weeks but less than 3 months	2	2
More than 3 months but less than 6 months	4	
More than 6 months	5	
Anticipated erosive rainfall risk during site disturbance		
Low (monthly average rainfall less than 45 mm)	0	
Moderate (monthly average rainfall 46 - 100 mm)	1	
High (monthly average rainfall 101 - 225 mm)	2	2
Very high (monthly average rainfall 226 - 1500 mm)	4	
Extreme (monthly average rainfall more than 1500 mm)	5	

Off-site sediment control (down-slope of the soil disturbance)		
Score 1 point if there is no purpose-built sediment trap (e.g. sediment basin, gross pollutant trap or purpose-built wetland).	1	1
Run-off entering the site		
Score 1 point if stormwater run-off is not diverted from entering the site or away from soil disturbance.	1	0
Extent of site disturbance		
Score 2 points if the building works requires reshaping of the ground surface.	2	2
Total Score **Note: High erosion risk - if score 11 or greater, or five for any factor.**		9

This Erosion Hazard Assessment form is adapted from the *Best Practice Erosion and Sediment Control, International Erosion Control Association (Australasia), IECA 2008 Appendix H - Building Sites, the Brisbane City Council Erosion Hazard Assessment Form* and *Attachment 2 to the QDC Draft Part 16 Erosion and Sediment Control*.

APPENDIX

H

Ocean Protect, Operations and Maintenance Manual

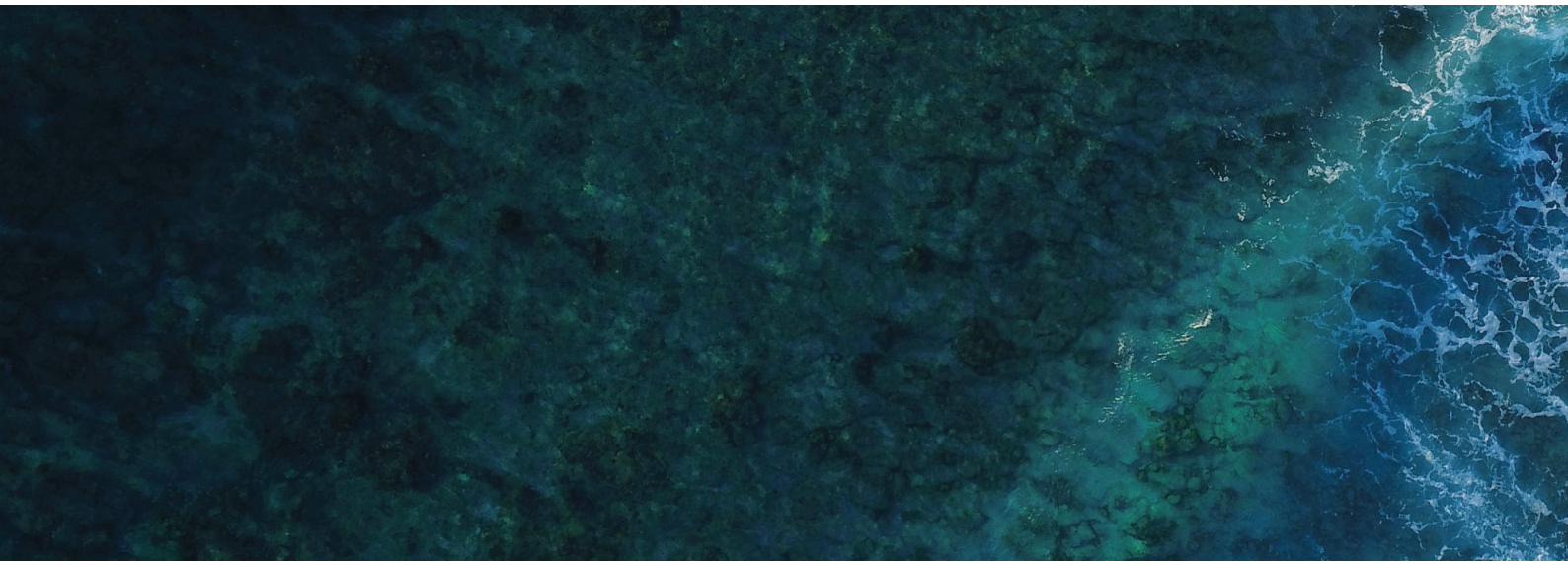
OCEAN PROTECT

StormFilter®

Operations & Maintenance Manual

Stopping Pollution Entering Waterways

11/24



www.oceanprotect.com.au

Introduction

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

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

Why do I need to perform maintenance?

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

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

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

Health and Safety

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

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

Personnel health and safety

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

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

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

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

How does it work?

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

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

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

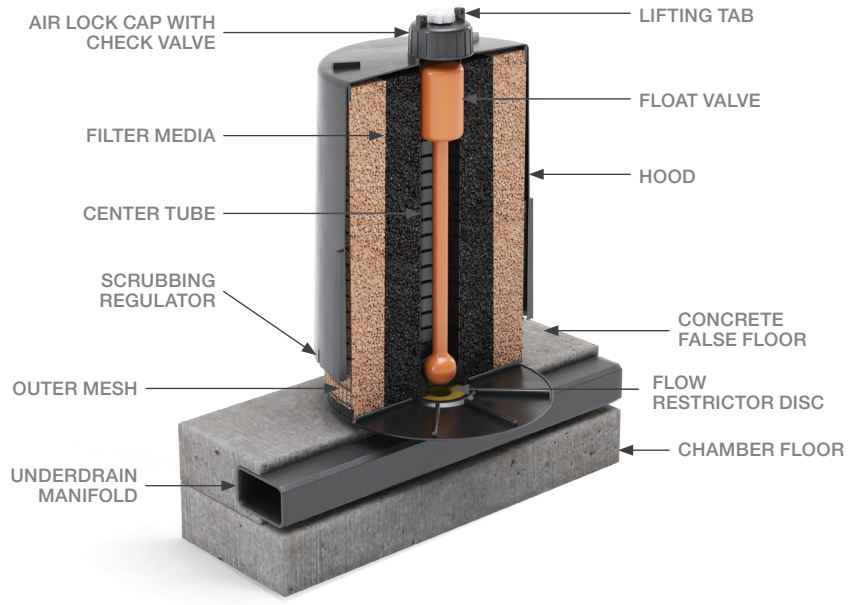


Figure 1: StormFilter® components

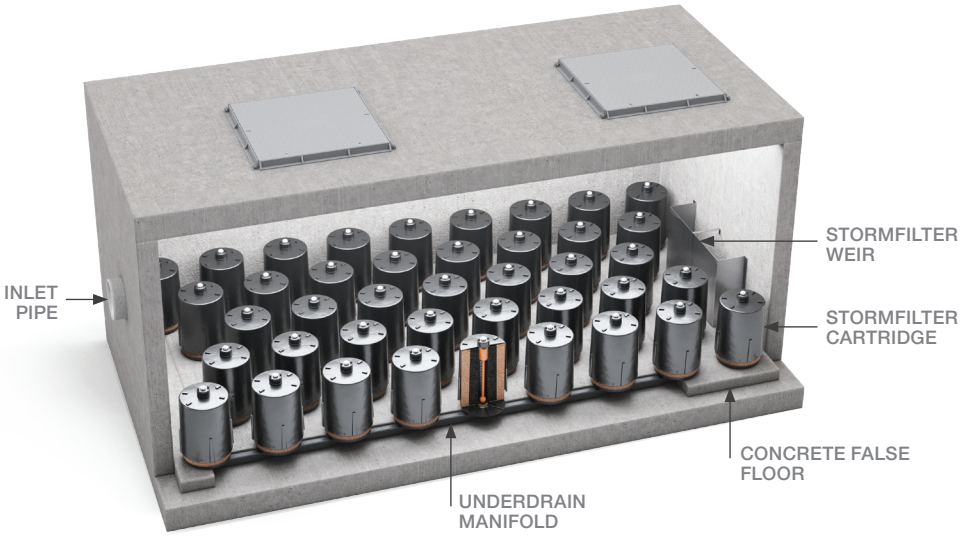


Figure 2: Example conceptual diagram of a StormFilter® system

Maintenance Procedures

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

Primary types of maintenance

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

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

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

Inspection

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

Minor Service

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

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

Major Service (Filter Cartridge Replacement)

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

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

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

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

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

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

Additional Types of Maintenance

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

Hazardous Material Spill

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

Blockages

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

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

Major Storms and Flooding

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

.

Disposal of Waste Materials

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

Maintenance Services

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

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

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

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

Call 1300 354 722

www.oceanprotect.com.au