hay CONSULTING & ENGINEERING

STORMWATER MANAGEMENT PLAN

39-41 Nuwarra Circuit, Forster

Proposed Multi-Unit Development

Lots 151 & 152 DP1043081

10 January 2025

Document No. 1575 SWMP Rev A

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Document History

Revision / Issue Record

Revision	Prepared By	Reviewed By	Date Issued
A	Sam Hull	Michael Hay	10 January 2025

Distribution Record

	Revision No. / Issue			
Issued To	A	B	C	D
Peta Stimson (Swift Planning)	1			

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1. INTRODUCTION

1.1. General

The following report is a Stormwater Management Plan (SWMP) which outlines the stormwater quantity and quality requirements for the proposed multi-unit development within Lots 151 and 152 DP1043081, Nuwarra Circuit, Forster.

This report has been prepared based on the following documentation:

- *Neil Ryan - Proposed B/V Multi-Units Issue A-8, dated October 2024.*

1.2. Existing Site

The proposed developed is located over two adjacent lots within an existing residential subdivision, referred to commonly as Lakes Estate within Forster. The development site is identified as numbers 39 and 41 Nuwarra Circuit. The proposed development site is shown in Figure 1.

Figure 1. Site Location Plan (image source – Nearmap)

1.3. Proposed Development

The development proposes the construction of four detached units, with associated communal driveway and garden areas. A small bioretention basin will form the majority of the remaining greenspace within the site.

A site plan of the proposed development has been included in Appendix A, with an extract shown in Figure 2 below.

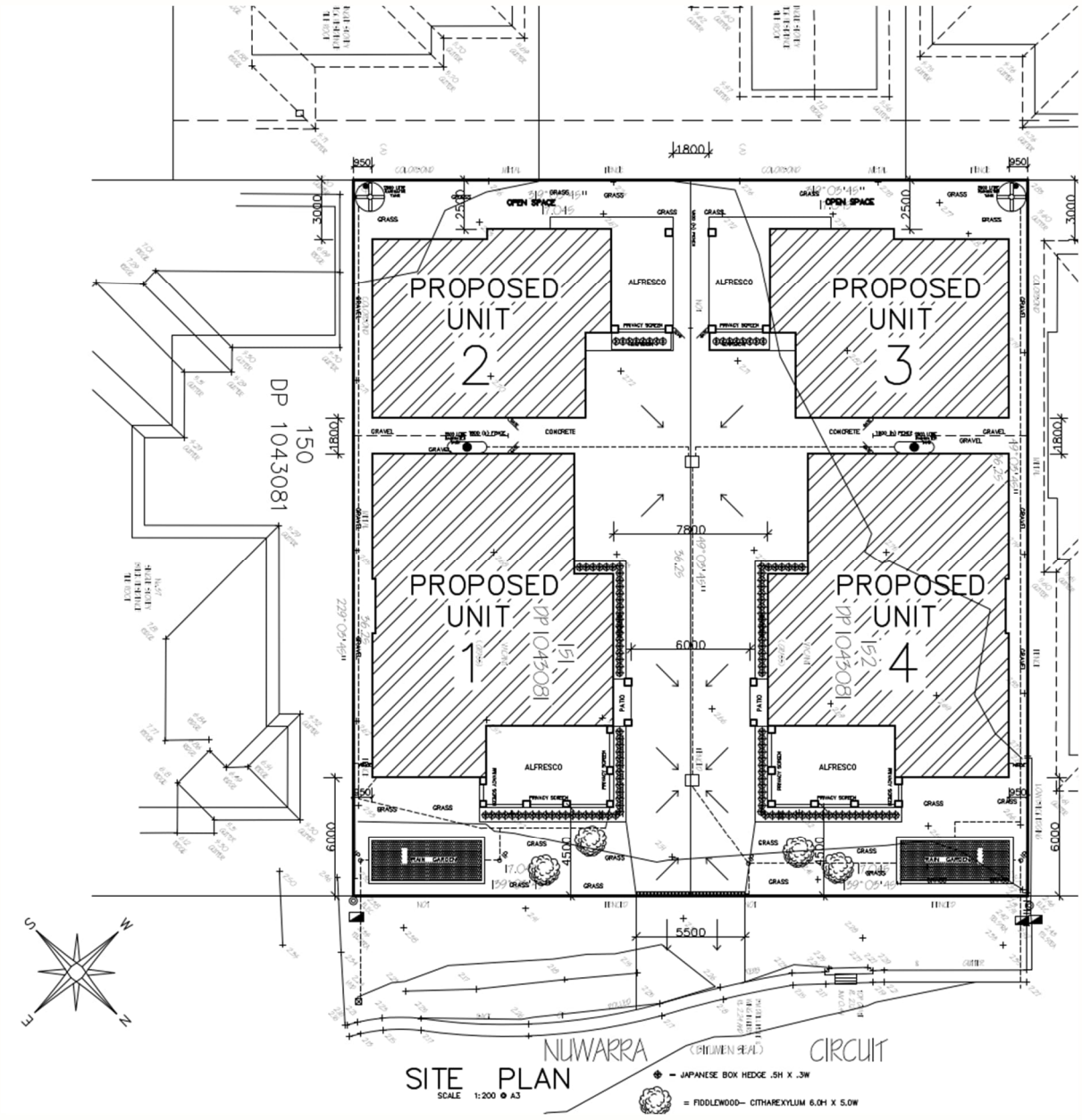


Figure 2. Extract of Architectural Site Plan

2. STORMWATER QUALITY ASSESSMENT

2.1. General

This section outlines how the proposed development will manage stormwater quality to acceptable standards as outlined by MidCoast Council.

2.2. Water Quality Requirements

To prevent degradation of MidCoast waterways, ecologically sustainable development principles have been adopted by MidCoast Council.

Guidelines for Water Sensitive Design Strategies - Mid-Coast Council October 2019 includes following general objectives of Water Sensitive Design (WSUD) are to:

- To safeguard the environment by maintaining or improving the quality of stormwater run-off.
- To protect and restore aquatic, estuarine, or riparian ecosystems and bushland areas.
- To harvest rainwater and urban stormwater runoff for use where appropriate.
- To control the hydrological impacts of development on receiving surface and
- ground water systems by controlling the frequency, magnitude, and duration of flows to preserve, as far as practicable, pre-development groundwater and surface water regimes and interactions.
- To control the impacts of development on channel bed and bank erosion by controlling the magnitude, nature, and duration of sediment-transporting flows.
- To promote disconnection of impervious areas to the drainage system by introducing appropriate measures to minimise the rate, frequency, and volume of urban runoff events to improve WSD performance.

For the purpose of this assessment of a multi-unit development, MidCoast Council's DCP identifies the site as being within the *Coastal Drainage Area*, and as such must provide measures to address treatment of pollutants as shown in Table 1.

Pollutant	Reduction Percentage
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	60%
Total Nitrogen (TN)	45%
Gross Pollutants (GP)	90%

Table 1. MidCoast Council Water Quality Targets

2.3. Rainfall and Evapotranspiration

Rainfall and evapotranspiration data was provided from MidCoast Council. A 9-year consecutive period of data from 1969 – 1978, which included both wet and dry years with an average annual rainfall over the period being close to the historic average. The rainfall template to be adopted exhibits an average annual rainfall of 1234mm.

A 6-minute rainfall time step was considered necessary to accurately model the performance of rainwater tanks and biofiltration devices. Areal potential evapotranspiration values have also been provided in the template to be adopted within the LGA.

2.4. MUSIC Modelling Parameters

Assessment of the pollution reduction from stormwater quality devices has been undertaken using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) which is an industry standard stormwater quality modelling software package.

The model was calibrated in accordance with the *Guidelines for Water Sensitive Design Strategies - Mid-Coast Council October 2019* for a Soil Hydrologic Group 'B', which broadly corresponds to a sandy loam soil. All input parameters to the MUSIC model were derived from the NSW MUSIC Modelling Guidelines (2015). These specific parameters are outlined in Table 2.

MUSIC Parameter Group	MUSIC Rainfall Runoff Parameter	Value
Impervious Rainfall Threshold	Road Surfaces	1.5 mm
	Roof Surfaces	0.3 mm
	Pervious Surfaces	1.0 mm
Pervious Area Parameters	Soil Storage Capacity	105 mm
	Initial Storage	25%
	Field Capacity	75 mm
	Infiltration Capacity Coefficient A	250
	Infiltration Capacity Coefficient B	1.3
Groundwater Properties	Initial Depth	10 mm
	Daily Recharge Rate	60%
	Daily Baseflow Rate	45%
	Daily Deep Seepage Rate	0%

Table 2. MUSIC Rainfall Runoff Parameters

Table 3 shows the MUSIC catchments adopted for the analysis. For the purposes of post-developed MUSIC modelling, the proposed development was separated into roof areas, pavement areas and other adjacent hardstand and pervious areas.

Sub Catchment	Area (m^2)	% Imperviousness
Roof	750	100%
Sealed Driveway	212	100%
Sealed Driveway Bypassing Treatment	12	100%
Pervious Area (Including Basins)	194	0%
Pervious Area Bypassing Treatment	68	0%
Totals	1236	79%

Table 3. Post-Development MUSIC Contributing Catchments

2.5. MUSIC Pollutant Concentrations

The pollutant concentrations adopted for modelling are shown below in Table 4. The event mean concentrations (EMC's) for each of these land uses were derived from *Fletcher et al (2004)* and *NSW MUSIC Modelling Guidelines (2015).*

Land use/ Surface Type	Storm Flow Concentration Log_{10} mg/l	Standard Deviation Log_{10} mg/l	Base Flow Concentration Log_{10} mg/l	Standard Deviation Log_{10} mg/l
Roofs				
Suspended Solids	1.30	0.32	-	-
Total Phosphorous	-0.89	0.25	-	-
Total Nitrogen	0.30	0.19	-	-
Urban Residential				
Suspended Solids	2.15	0.32	1.20	0.17
Total Phosphorous	-0.60	0.25	-0.85	0.19
Total Nitrogen	0.30	0.19	0.11	0.12
Sealed Roads				
Suspended Solids	2.43	0.32	1.20	0.17
Total Phosphorous	-0.30	0.25	-0.85	0.19
Total Nitrogen	0.34	0.19	0.11	0.12

Table 4. MUSIC Pollutant Concentrations

2.6. MUSIC Modelling Results

MUSIC modelling has indicated that the proposed treatment train can achieve the required MidCoast Council requirement for the pollutant reduction targets as specified previously.

Figure 3 shows the MUSIC model layout.

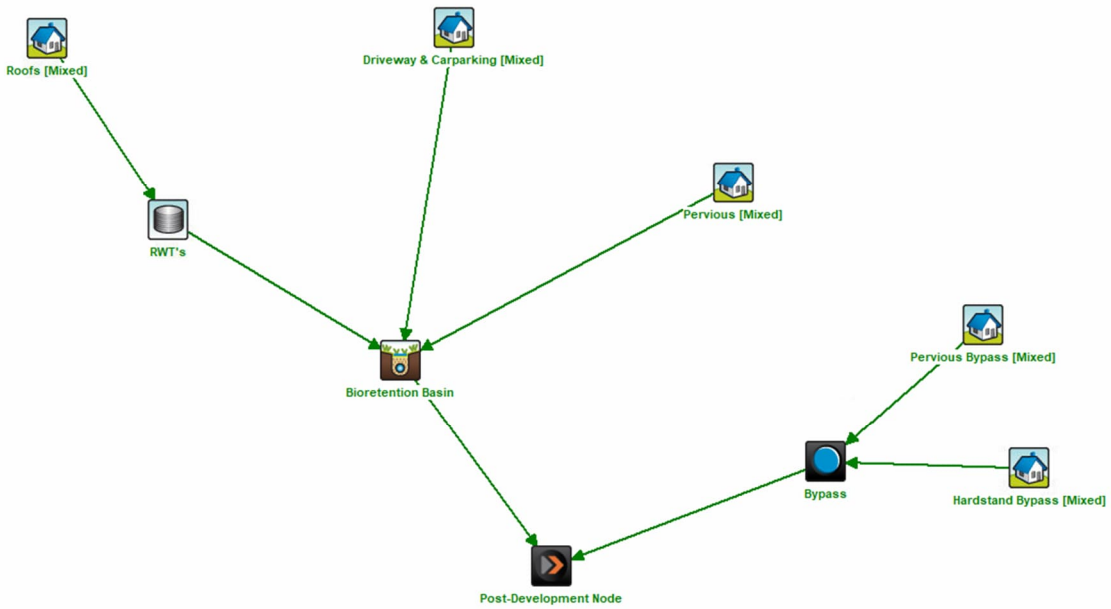


Figure 3 MUSIC model layout

Table 5 outlines the average annual pollutant export loads at the downstream extent of the development compared with the undeveloped site pollutant loads.

Pollutant	Proposed Development Catchment		
	Existing Site Load (kg/yr)	Developed Site Load (Without Treatment) (kg/yr)	% Reduction
Total Suspended Solids (TSS)	114	22.3	**80.4**
Total Phosphorus (TP)	0.30	0.11	**64.4**
Total Nitrogen (TN)	2.70	1.11	**58.9**
Gross Pollutants	28.4	0.26	**99.1**

Table 5 Summary of MUSIC Results

The results in Table 5 indicate that the proposed treatment measures would meet or exceed the water quality objectives for the site for all required treatment parameters.

2.7. Proposed Treatment Devices

For the purpose of this water quality assessment, it is proposed to incorporate at source control measures such as rainwater tanks, as well as an end-of-line bioretention basin in order to manage pollutant loadings from the site.

Roofwater will be captured by a rainwater tank for the purpose of indoor and outdoor re-use. Any overtopping of this captured roofwater will discharge to the underground stormwater system, and directed to the end-of-line bioretention basin. Discharging subsoil flows will be directed to an existing kerb inlet pit adjacent to the development site within Nuwarra Circuit.

Preliminary stormwater design drawings are included in Appendix B of this report which include further detail on treatment devices and proposed locations.

2.7.1. Bio-Retention Basin

Water quality bioretention basins are shallow, extensively vegetated water bodies that use enhanced sedimentation, fine filtration and pollutant uptake processes to remove pollutants from stormwater. These processes are engaged by slowly passing runoff through vegetated areas. Plants filter sediments and pollutants from the water, while bio-films that grow on the plants can absorb nutrients and other associated contaminants.

A typical section is also presented in Figure 4 showing a typical bioretention basin within an urban setting.

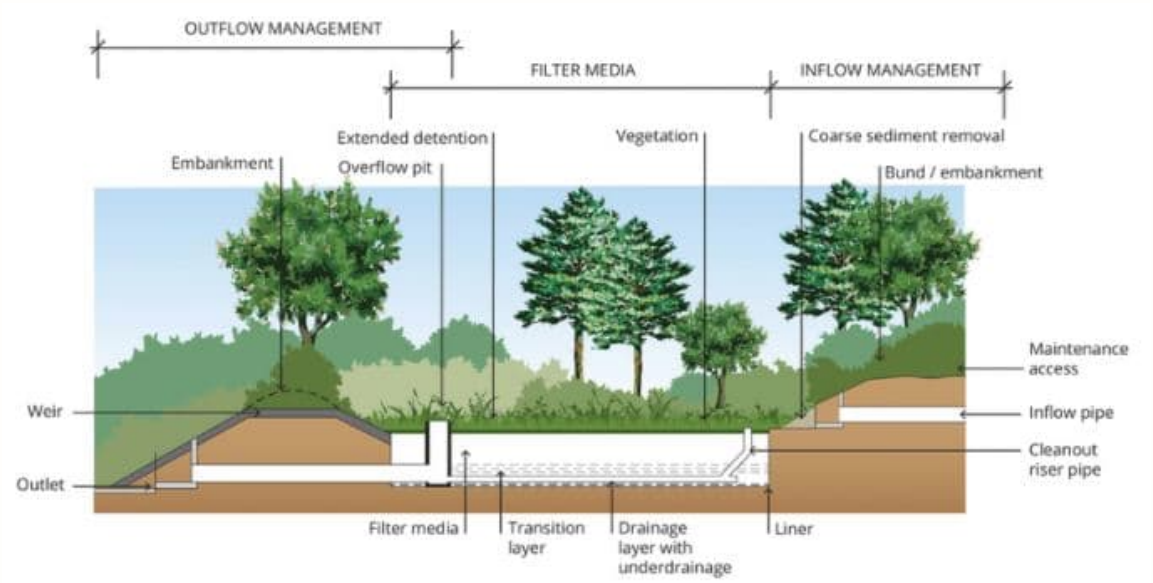


Figure 4. Typical bio-retention basin configuration (Image sourced from Healthy Waterways by Design, 2014.)

It should be noted that infiltration into the existing soil stratum has not been considered. The basin is proposed to be lined with an impermeable liner under, and all subsoil drainage directed to the proposed stormwater outlet.

Parameters adopted for the bioretention basin have been summarised in Table 6.

Parameter	Bioretention System
Minimum Filter Area (m²)	15
Surface Area (m²)	15
Extended Detention Depth (m)	0.30
Overall Basin System Depth (m)	0.65
Minimum Filter Media Depth (m)	0.40
Saturated Hydraulic Conductivity (mm/hour)	100
TN Content of Filter Media (mg/kg)	400
Orthophosphate Content of Filter Media (mg/kg)	40

Table 6. Summary of Proposed Bioretention Basin Properties

2.7.2. Rainwater Tanks

Roofwater from each unit will be drained to a rainwater tank, with 100% of roof area captured for the purpose of indoor (plumbed to toilets and cold water laundry) and outdoor re-use. Any overtopping of this captured roofwater will discharge to the underground stormwater system.

These tanks will require a council approved first flush stormwater filter device, prior to water entering the unit. The rainwater tank is to have re-use capabilities in accordance with BASIX requirements. All taps connected to the rainwater tanks are to be identified as *'Rainwater'* with a sign complying with AS1319.

Re-use of the collected stormwater runoff is to be used for non-potable indoor and outdoor purposes only including toilet flushing and cold water laundry, and outdoor garden irrigation.

For MUSIC modelling, the following parameters were used:

- 5kL rainwater tanks for all units, incorporating 2.5kL for re-use and a further 2.5kL for OSD purposes
- Constant Internal Re-use of 150L/day/dwelling (*Guidelines for Water Sensitive Design Strategies - Mid-Coast Council October 2019)* with re-use for toilet and laundry
- Outdoor Re-use of 36kL/year/dwelling (*Guidelines for Water Sensitive Design Strategies - Mid-Coast Council October 2019)*
- The conservative PET – Rain option was chosen for re-use modelling (i.e. outdoor re-use demand is zero when the rainfall exceeds the PET).

A typical rainwater tank arrangement is shown below in Figure 5.

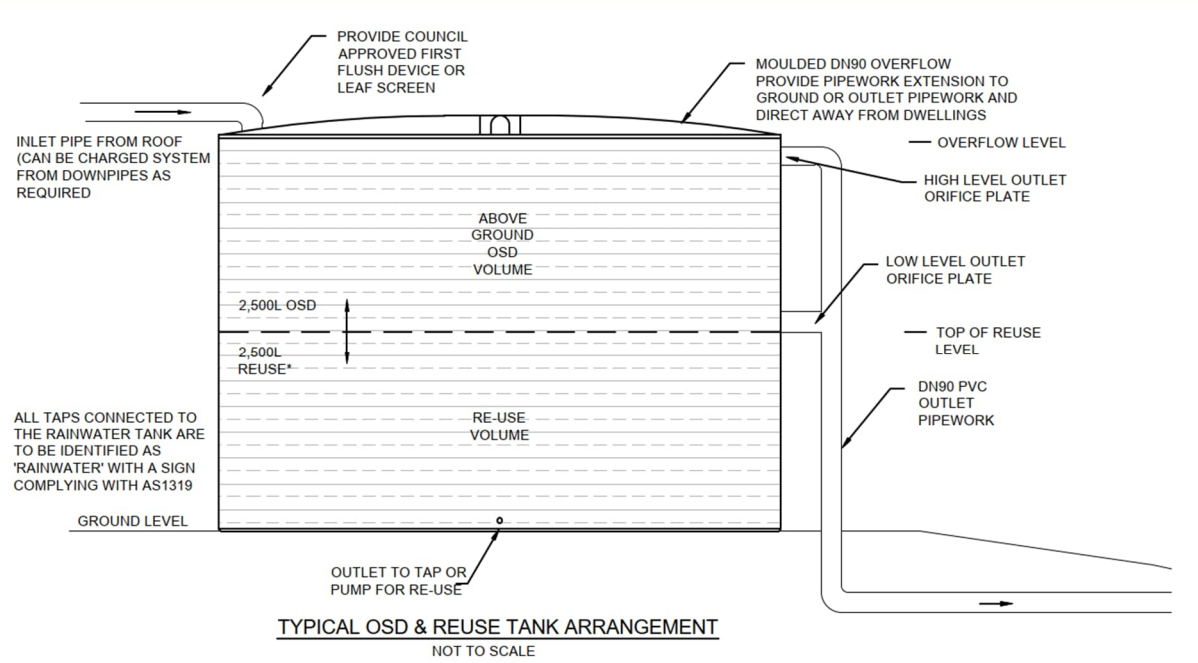


Figure 5. Typical Rainwater Tank Arrangement

3. STORMWATER QUANTITY ASSESSMENT

3.1. General

This section outlines how the proposed development will manage stormwater quantity.

The objectives for stormwater quantity measures are as per MidCoast Council's *Site Stormwater Drainage Guidelines – February 2024,* which require attenuation to post-development peak discharges to maintain existing flows for all storm events up to and including the 1% AEP rainfall event.

3.2. Proposed Discharge Arrangement

The proposed nominated point of discharge is the existing kerb inlet pit adjacent to the development site within Nuwarra Circuit.

An internal stormwater network will collect surface flows generated from the driveway and curtilage areas and accept flows from the roof downpipes. These will be discharged through the bioretention basin system, where stormwater will be treated and exit the site via a subsoil drainage line, directed to the aforementioned kerb inlet pit.

3.3. Flood Impact

The development lot is subject to flood development controls based on *Great Lakes Council Local Environmental Plan (LEP), 2014.*

A Flood Level Certificate was sought from MidCoast Council, which identified an FPL3 – Flood Planning Level of RL.3.2m AHD. Practically, this represents the 1% AEP Flood Level in the year 2100, plus 0.5m of freeboard. All dwellings will be constructed at or above this level.

Additionally, the 2100 1% AEP level (FPL2) is identified as RL.2.7m. Curtilage and yard space areas range in height from RL.2.4m to RL.2.8m, and as such backwater from a 1% AEP event may inundate the bioretention basin. This may require extra maintenance of the system, but the overall impact is expected to be minimal.

3.4. Stormwater Quantity Modelling

3.4.1. Catchment Hydrology

Hydrological modelling was undertaken for the proposed development in accordance with the Australian Rainfall & Runoff Guidelines 2019 (ARR2019) utilising rainfall data from Bureau of Meteorology (BoM) and catchment specific rainfall parameters from the ARR2019 online data hub.

Hydrological analysis was undertaken using the Watercom DRAINS software package. The performance of the internal stormwater network was assessed using the Initial Loss Continuing Loss model (ILCL).
Loss model parameters are shown in Table 7.

Parameter	Value
Impervious Area Initial Loss	1 mm
Impervious Area Continuing Loss	0 mm/hr
Pervious Area Initial Loss	29 mm
Pervious Area Continuing Loss	0.92 mm/hr (reduced 60% based on NSW Office of Environment & Heritage guide)

Table 7. Loss Model Parameters

The DRAINS model was used to determine discharge flow rates of each catchment for standard Annual Exceedance Probabilities (AEP's) of 5% and 1%, (corresponding the minor and major storms respectively) from 5-min to 2-hour durations.

Figure 6 shows a screen shot of the DRAINS model used for the assessment.

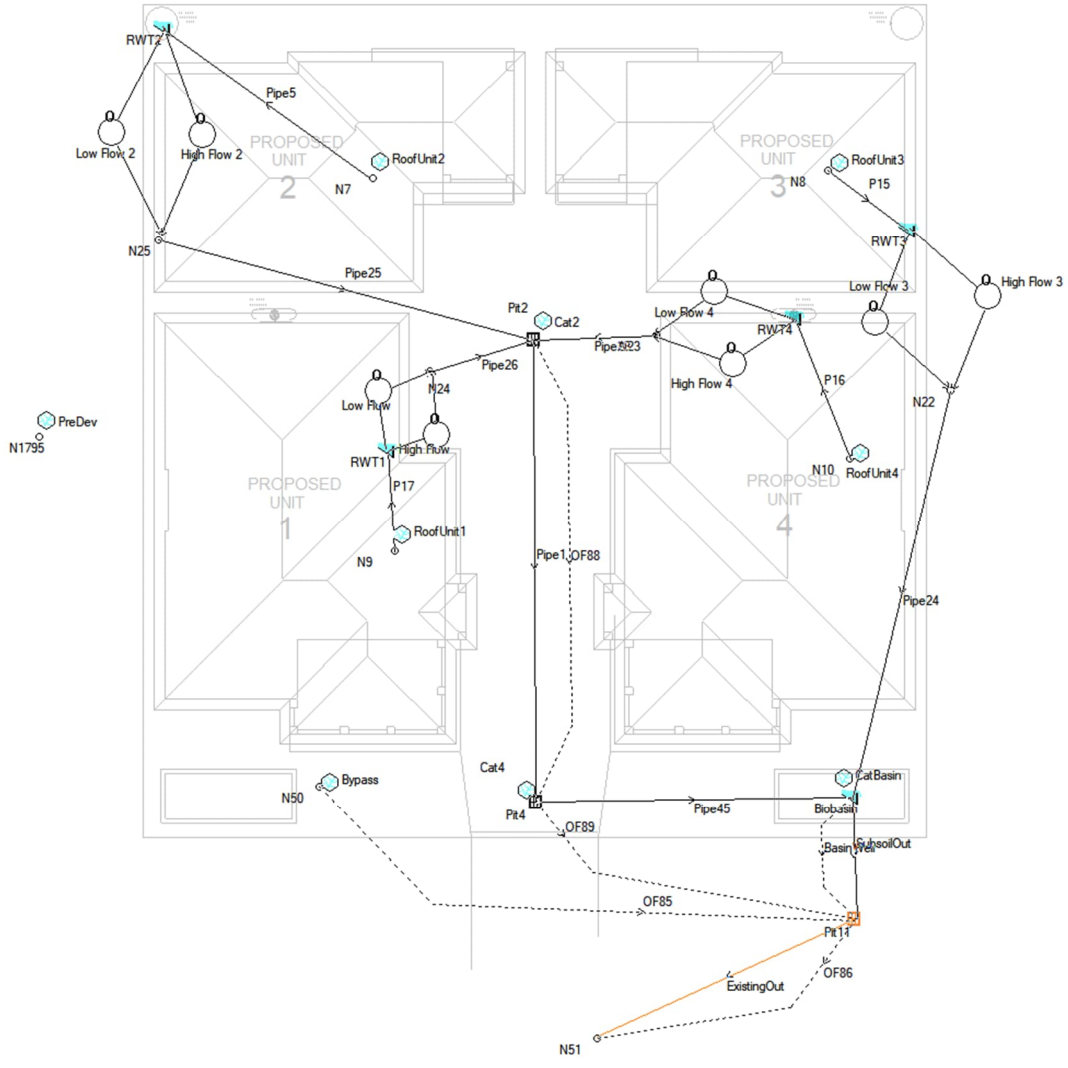


Figure 6. DRAINS Model Arrangement

3.4.2. DRAINS Model Results

The results seen in Tables 8 below are from the DRAINS model which summarises the peak discharge rates for each identified critical storm across the assessed Annual Exceedance Probability (AEP) range at the assessment point for the catchments, in a mitigated scenario.

Scenario	Peak Flow Rate for Average Recurrence Interval (L/s)	
	20% AEP	1% AEP
Pre-Developed	40	90
Post-Developed	36	80

Table 8. DRAINS Results

The results in Table 8 indicate that the proposed OSD arrangement achieves the MidCoast Council stormwater quantity requirements outlined in *Site Stormwater Drainage Guidelines – February 2024.*

3.4.3. OSD Storage Parameters

The storage properties of the bioretention basin are summarised in Table 9.

Base Area (m^2)	Nom. Total Depth (m)	Nom. Storage Volume (m^3)	Discharge Pipe Configuration	Overflow Weir Details
15 (Base RL.1.80)	Max. Depth 0.68m (Modelled Top Water Level = RL.2.48)	10 (to weir level)	150dia Outlet to Existing Kerb Inlet Pit	Weir 3m wide at RL.2.45 (blockwork formed)

Table 9. Bioretention Basin Details

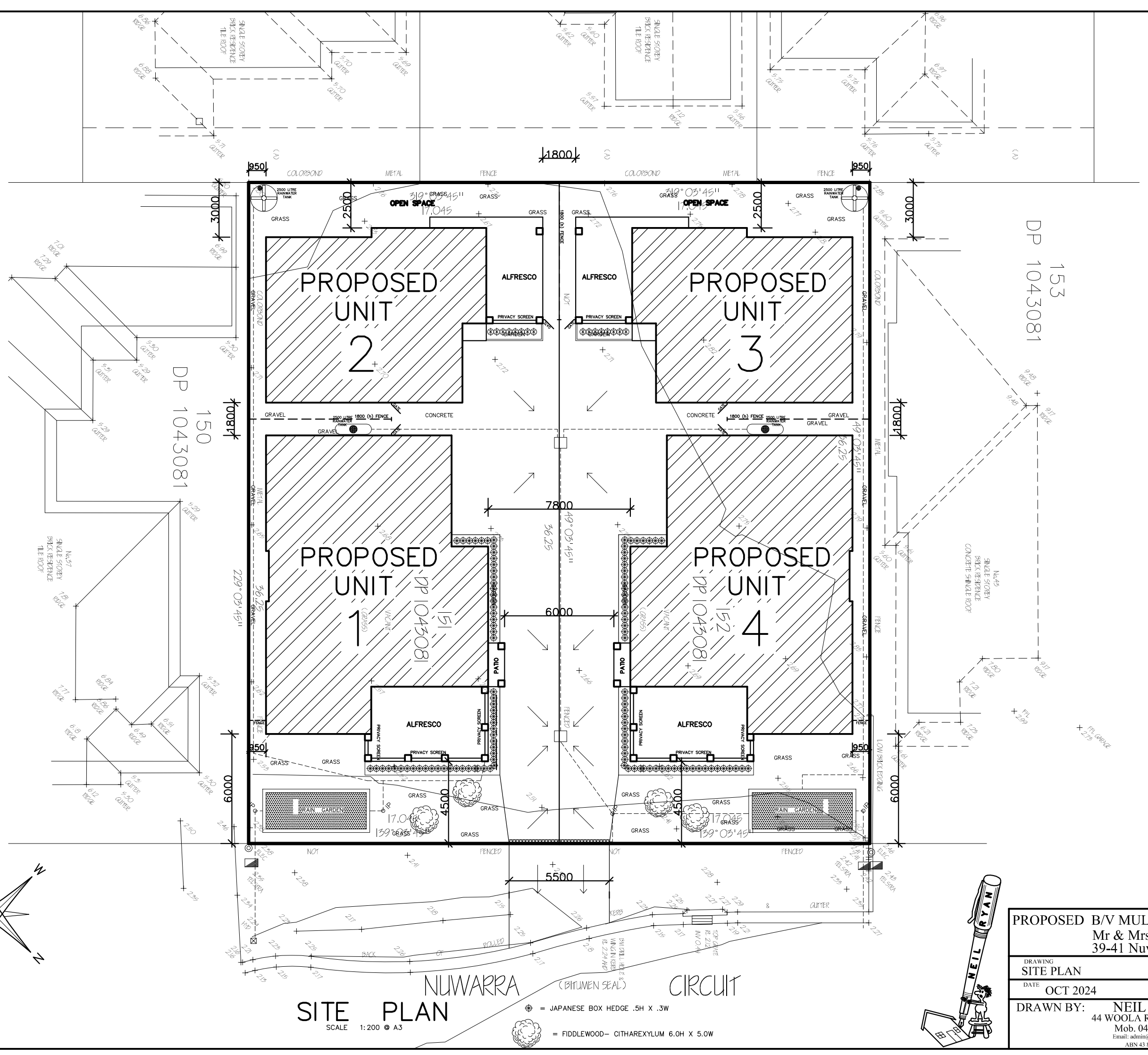
4. SUMMARY

This Stormwater Management Plan has been prepared to demonstrate the proposed development's compliance with MidCoast Council stormwater quantity requirements outlined in *Site Stormwater Drainage Guidelines – February 2024*, and *Guidelines for Water Sensitive Design Strategies - Mid-Coast Council October 2019.*

The analysis presented in this report shows that the development overall will increase flows from the undeveloped state. However, this increase will be managed by diverting captured stormwater to rainwater tanks and an end of line bioretention basin. The proposed measures will ensure no adverse impacts to downstream receiving waterways, properties or infrastructure is achieved.

Based on the outcomes of this report, the proposed stormwater system will treat the stormwater generated onsite to a level that is compliant with MidCoast Council's Water Quality and Quantity objectives.

Appendix A – Architectural Site Plan (extract from Neil Ryan Documentation)



SITE PLAN

SCALE 1:200 @ A3

ALL CARE IS TAKEN WITH DIMENSIONS BUT NO RESPONSIBILITY ACCEPTED FOR DISCREPANCIES. MEASUREMENTS TAKE PRECEDENCE OVER SCALE.
IT IS THE TENDER'S RESPONSIBILITY TO CHECK ALL ON SITE HEIGHTS, LEVELS & MEASUREMENTS.
EVERY PART OF THE BUILDING & ASSOCIATE COMPONENTS MUST BE CONSTRUCTED IN AN APPROPRIATE MANNER TO ACHIEVE THE REQUIREMENTS OF THE HOUSING PROVISIONS USING MATERIALS THAT ARE FIT FOR THE PURPOSE FOR WHICH THEY ARE INTENDED.
THE BUILDING & ANY ASSOCIATED SITE WORK IS TO BE CONSTRUCTED IN A WAY THAT PROTECTS SURROUNDING OCCUPANTS & PROPERTY FROM ADVERSE EFFECTS OF REDIRECTED SURFACE WATER.
THE BUILDING IS TO BE CONSTRUCTED TO PROVIDE RESISTANCE TO MOISTURE FROM OUTSIDE & MOISTURE RISING FROM THE GROUND.
ANY HEATING APPLIANCE & ASSOCIATED COMPONENT MUST BE INSTALLED BY A LICENSED PERSON & COMPLY TO BCA PART 3.10.7.
ALL CONSTRUCTION METHODS & MATERIALS MUST COMPLY TO ANY & ALL BASIX, NATHERS OR ALTERNATIVE THERMAL/ENERGY ASSESSMENTS & IT IS THE BUILDERS RESPONSIBILITY TO ENSURE ALL TRADES RECEIVE COPIES OF SUCH ASSESSMENTS.
ALL EARTHWORKS ARE TO BE UNDERTAKEN STRICTLY TO COMPLY TO NCC PART 3.1.
ALL STORM WATER & SURFACE DRAINAGE IS TO BE UNDERTAKEN STRICTLY TO COMPLY TO NCC 3.1.
A TERMITE BARRIER MUST BE INSTALLED STRICTLY TO COMPLY TO NCC 3.1.
ALL CONCRETE FOOTINGS & SLABS ARE TO BE CONSTRUCTED STRICTLY TO BCA 3.2. & ENGINEERS SPECIFICATIONS.
ALL MASONRY & ASSOCIATED COMPONENTS IS TO BE CONSTRUCTED STRICTLY TO COMPLY TO NCC 3.3.
SUB–FLOOR VENTILATION WHERE REQUIRED MUST COMPLY TO NCC 3.4.1.
ALL TIMBER FRAMING ,WIND BRACING & ASSOCIATED COMPONENTS MUST COMPLY TO AS1684–N1/N2–2010 OR ENGINEERS DESIGN.
ROOF CLADDING & ASSOCIATED COMPONENTS MUST BE INSTALLED STRICTLY AS TO COMPLY TO NCC 3.5.1. OR 3.5.2.
GUTTERS, DOWN PIPES & ASSOCIATED COMPONENTS MUST BE INSTALLED STRICTLY AS TO COMPLY TO NCC 3.5.3.
ALL WALL CLADDING & ASSOCIATED COMPONENTS MUST COMPLY TO NCC 3.5.4 OR 3.5.5.
ALL GLAZING IS TO COMPLY TO NCC 3.6. & ANY REQUIREMENTS UNDER BASIX, NATHERS OR ALTERNATIVE THERMAL/ENERGY ASSESSMENTS.
DIRECT WIRED SMOKE DETECTORS MUST COMPLY WITH AS3786 & BE INSTALLED AS TO COMPLY TO NCC 3.7.5.
ALL REQUIRED AREAS ARE TO BE PROTECTED AGAINST WATER IN ACCORDANCE WITH NCC 3.8.1.2.

PROPOSED B/V MULTI-UNITS FOR:
Mr & Mrs Freyler
39-41 Nuwarra Circuit Forster

DRAWING: SITE PLAN	JOB No. 2023-056	SHEET No. 1 OF 7
DATE: OCT 2024	SCALE: 1:200 @ A3	ISSUE: A-8

DRAWN BY: NEIL RYAN
44 WOOLA ROAD TAREE
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CHECKED

Appendix B – DA Concept Stormwater Drawings

148
DP1043081

147
DP1043081

146
DP1043081

153
DP1043081

150
DP1043081

N

OPEN SPACE

OPEN SPACE

ALFRESCO

PROPOSED UNIT 2

PROPOSED UNIT 3

PROPOSED UNIT 1

PROPOSED UNIT 4

GARDEN

GARDEN

ALFRESCO

ALFRESCO

2

4

5

Ex.1

PROVIDE 5kL RAINWATER TANKS FOR ALL UNITS (2.5kL REUSE & 2.5kL OSD) OVERFLOWS TO BE DIRECTED TO NEAREST STORMWATER PIT

DRIVEWAY TO INCORPORATE 'V' PROFILE TO DIRECT SURFACE FLOWS TO CENTRAL STORMWATER PITS

BIORETENTION BASIN WITH MINIMUM FILTER MEDIA AREA OF 15m². REFER TO SHEET SW02 FOR FURTHER DETAILS

CATCHMENT BYPASSING WATER QUALITY TREATMENT

CONNECT SUBSOIL OUTLET INTO EXISTING KERB INLET PIT WITHIN NUWARRA CIRCUIT

No.37 SINGLE STOREY BRICK RESIDENCE TILE ROOF

No.43 SINGLE STOREY BRICK RESIDENCE CONCRETE SHINGLE ROOF

ELEC

TELSTRA

HYD

KERB

BACK OF ROLLED

BM DRILL HOLE & WING IN KERB RL 2.24AHD

TOP GRATE RL 2.24 INV OUT 2.14

FFL 2.99

0 2 4 6 8 10 METRES
SCALE 1:200

NUWARRA ° CIRCUIT

LEGEND

	PROPOSED PAVEMENT
	PROPOSED STORMWATER PIPE
	EXISTING STORMWATER PIPE
	PROPOSED GRATED SURFACE INLET PIT
	INDICATIVE AS3500 DRAINAGE
	INDICATIVE RAINWATER TANK LOCATION
	POSTDEVELOPED CATCHMENT BOUNDARY
	CATCHMENT FLOWPATH

CAUTION:

* DETAILED SERVICE INVESTIGATION HAS NOT BEEN UNDERTAKEN.
* PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELEVANT AUTHORITY SHOULD BE CONTACTED TO ESTABLISH DETAILED LOCATION AND DEPTH.
* IT IS THE RESPONSIBILITY OF THE USER OF THIS PLAN TO ESTABLISH THE EXISTENCE AND LOCATION OF ALL PUBLIC UTILITIES PRIOR TO COMMENCEMENT OF WORKS.

POSTDEVELOPED CATCHMENT SUMMARY

Name	Pit or Node	Total Area (ha)	EIA %	Perv Area %	RIA %	EIA Time (min)	Perv Time (min)	RIA Time (min)
RoofUnit2	N7	0.015	100	0	0	5	5	5
RoofUnit3	N8	0.015	100	0	0	5	5	5
RoofUnit1	N9	0.023	100	0	0	5	5	5
RoofUnit4	N10	0.023	100	0	0	5	5	5
Bypass	N50	0.008	10	85	5	5	5	5
Cat2	Pit2	0.02	45	47	8	5	5	5
Cat4	Pit4	0.013	100	0	0	5	5	5
CatBasin	Biobasin	0.007	0	90	10	5	5	5
	Σ	0.124						

No.	Description	Drawn by	Approved	Date
A	ISSUED FOR DEVELOPMENT APPLICATION	SH	MH	08/01/2025

Client: MR & MRS FREYLER

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Drawing Status: FOR DEVELOPMENT APPLICATION

Mr Michael C Hay
MIEAust CPEng NER RPEQ
Signature: . . . . . .
Registered on the NER in the area(s) of practice of Civil/Structural

FOR PRELIMINARY USE ONLY IF NOT ENDORSED

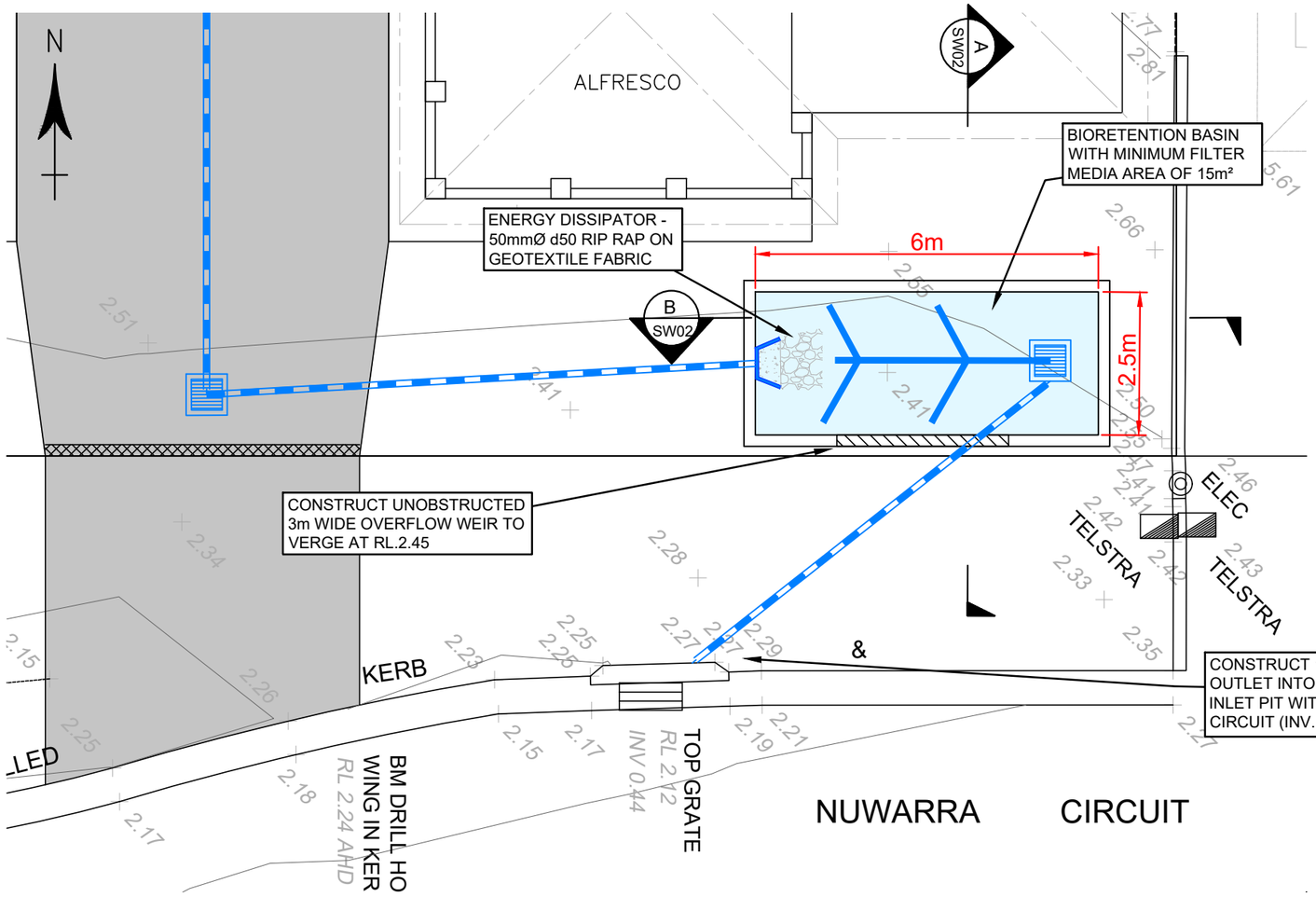
Project Name: LOTS 151 & 152 DP1043081 NUWARRA CIRCUIT, FORSTER

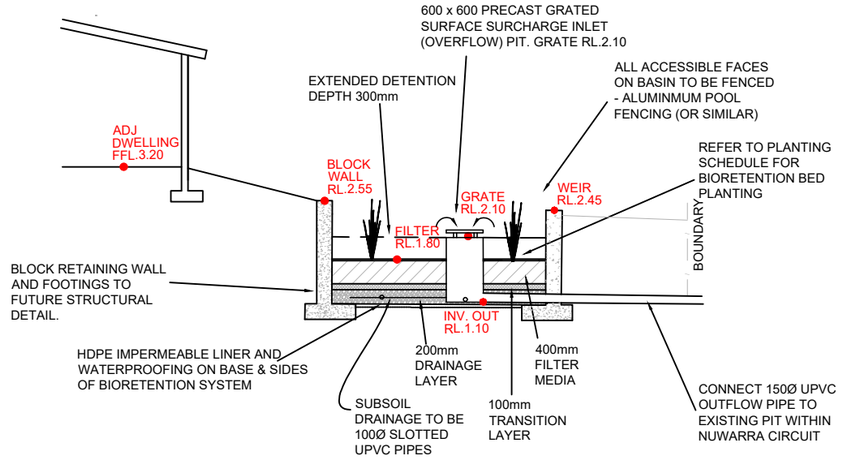
Drawing Title: CATCHMENT PLAN

Sheet Size:	Designed:	Drawn:	Checked:	Approved:	Project No.:	Sheet	Drawing No.	Revision
A3	SH	SH	MH	MH	1575	1 of 3	SW01	A

Date: Wednesday, 8 January 2025 12:14:32 PM

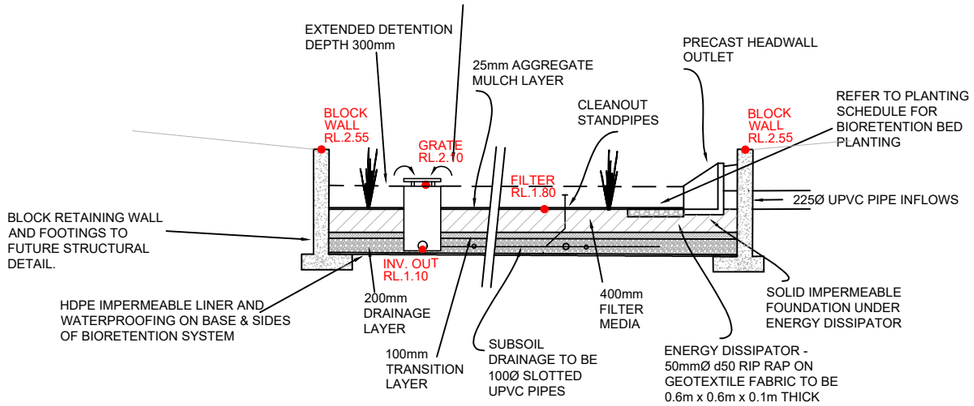
CAD File: C:\Users\SamHull\OneDrive - Hay Consulting\2 - Projects\1575 - Swift Planning - 39-41 Nuwarra Circuit, Forster\4. CAD\39-41 Nuwarra Circuit_recover.dwg





TYPICAL BASIN SYSTEM - SECTION A

NOT TO SCALE



TYPICAL BASIN SYSTEM - SECTION B

NOT TO SCALE

PLANTING SCHEDULE

Plant Name	Planting Density	Planting Area	Plant Numbers
Carex Appressa*	6 Plants/m²	7.5m²	45
Dianella Caerulea	6 Plants/m²	7.5m²	45

* or other effective raingarden plant species approved by Mid Coast Council. Refer to Mid Coast Council's WSUD DCP Factsheet 15 for alternative planting.

QUANTITIES

Plant Name	Depth (m)	Area (m²)	Volume* (m³)
Filter Media	0.4m	15m²	6m³
Transition Layer	0.1m	15m²	1.5m³
Drainage Layer	0.3m	15m²	4.5m³

*Note: Approximate volume without consideration of bulk/compaction factors or allowance for pipework. The contractor shall verify all quantities.

LEGEND	
	PROPOSED PAVEMENT
	PROPOSED STORMWATER PIPE
	EXISTING STORMWATER PIPE
	PROPOSED GRATED SURFACE INLET PIT

0 1 2 3 4 5 METRES
SCALE 1:100

No.	Description	Drawn by	Approved	Date
A	ISSUED FOR DEVELOPMENT APPLICATION	SH	MH	08/01/2025

Client: MR & MRS FREYLER

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Drawing Status: FOR DEVELOPMENT APPLICATION

Mr Michael C Hay
MIEAust CPEng NER RPEQ
Signature: .....
Registered on the NER in the area(s) of practice of Civil/Structural

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Project Name: LOTS 151 & 152 DP1043081 NUWARRA CIRCUIT, FORSTER

Drawing Title: BIORETENTION BASIN DETAILS

Sheet Size:	Designed:	Drawn:	Checked:	Approved:	Project No.:	Sheet	Drawing No.	Revision
A3	SH	SH	MH	MH	1575	2 of 3	SW02	A

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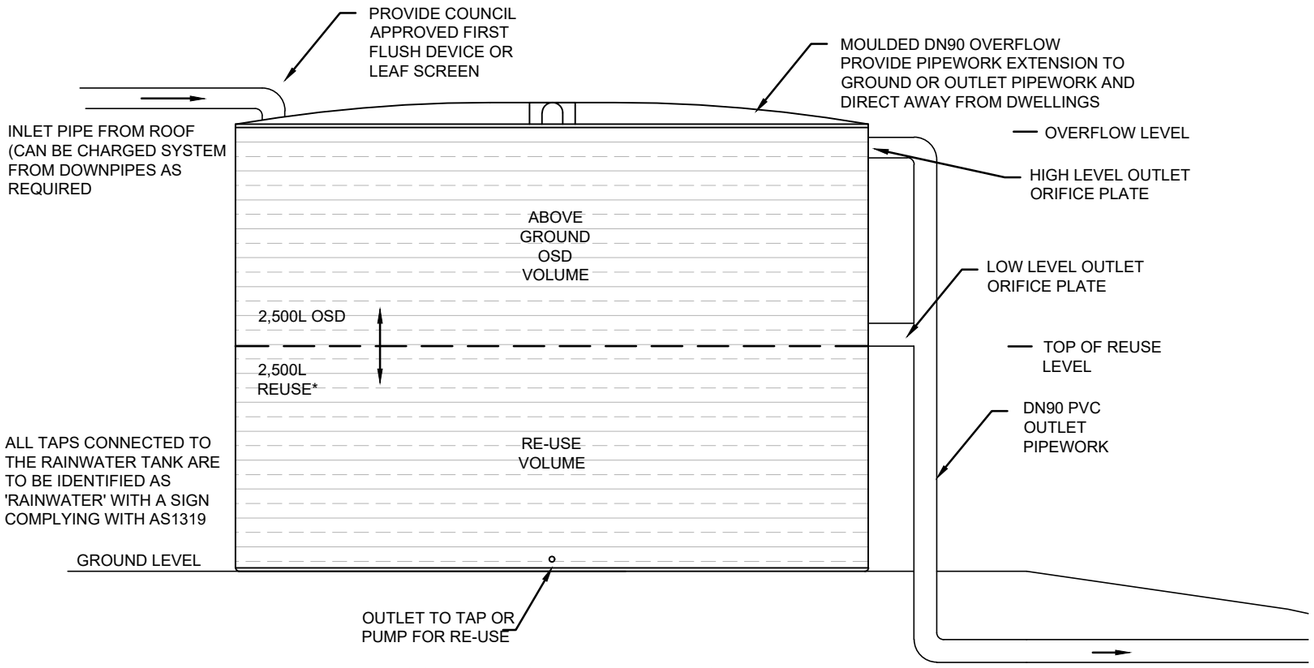
Date: Wednesday, 8 January 2025 12:34:32 PM

OSD / REUSE TANK PARAMETERS				
	UNIT 1	UNIT 2	UNIT 3	UNIT 4
TANK SIZE	5000 L	5000 L	5000 L	5000 L
RE-USE VOLUME	2500 L	2500 L	2500 L	2500 L
OSD VOLUME	2500 L	2500 L	2500 L	2500 L
LOWER OUTLET DIA	65 mm	50 mm	50 mm	65 mm
UPPER OUTLET DIA	90 mm	90 mm	90 mm	90 mm
BASE OF TANK (ASSUMED)	RL 2.80 m	RL 2.80 m	RL 2.80 m	RL 2.80 m
CL LOWER OUTLET	RL 3.80 m	RL 3.80 m	RL 3.80 m	RL 3.80 m
CL HIGHER OUTLET	RL 4.60 m	RL 4.60 m	RL 4.60 m	RL 4.60 m
OVERFLOW LEVEL	RL 4.80 m	RL 4.80 m	RL 4.80 m	RL 4.80 m



TYPICAL OSD & REUSE TANK ARRANGEMENT

NOT TO SCALE

OSD TANK HYDROLOGY & HYDRAULIC NOTES

1. ON SITE DETENTION (OSD) TANKS DESIGNED IN ACCORDANCE WITH AS3500.3-2018
2. CATCHMENT HYDROLOGY AND HYDRAULIC MODELLING UNDERTAKEN IN ACCORDANCE WITH THE AUSTRALIAN RAINFALL & RUNOFF GUIDELINES 2019 (ARR2019) URBAN BOOK 9
3. CATCHMENT HYDROLOGICAL MODELLING WAS UNDERTAKEN USING THE INITIAL LOSS CONTINUING LOSS MODEL WITH PARAMETERS FOR INITIAL AND CONTINUING LOSSES OUTLINED BELOW:
   - 3.1. IMPERVIOUS AREA INITIAL LOSS 1 mm
   - 3.2. IMPERVIOUS AREA CONTINUING LOSS 0mm/hr
   - 3.3. PERVIOUS AREA INITIAL LOSS 29mm
   - 3.4. PERVIOUS AREA CONTINUING LOSS 0.92mm/hr
4. CATCHMENT PARAMETERS FOR MODELS OBTAINED FROM THE ARR2019 DATA HUB
5. PERVIOUS AREA CONTINUING LOSS VALUES MODIFIED BY THE NSW OFFICE OF ENVIRONMENT AND HERITAGE (NSW SPECIFIC TAB OF THE ARR2019 DATA HUB) WITH A MULTIPLIER OF 0.4
6. HYDROLOGICAL AND HYDRAULIC MODELLING UNDERTAKEN USING THE DRAINS SOFTWARE BY WATERCOM
7. MODELLING HAS ADOPTED BURST EVENTS WITH INITIAL LOSSES, HENCE PRE-BURST RAINFALL DEPTHS HAVE ALSO BEEN INCLUDED IN THE MODEL TO CATER FOR CATCHMENT PRE-WETTING AS PER ARR2019. THIS ENABLES DIRECT USE OF THE INITIAL LOSS VALUE FROM THE DATA HUB.
8. CATCHMENT TIME OF CONCENTRATIONS AS BELOW:
   - 8.1. ROOF AREA 5 MINUTES
   - 8.2. DRIVEWAYS (REMAINING IMPERVIOUS AREA) 5 MINUTES
   - 8.3. PERVIOUS AREAS 5 MINUTES
   - 8.4. PRE-DEVELOPMENT PERVIOUS AREA 6 MINUTES
9. DESIGN EVENTS FOR OSD TANK ARE 20% AND 1% AEP EVENTS FOR THE MINOR AND MAJOR STORM EVENTS RESPECTIVELY.
10. PRE-DEVELOPMENT CONDITIONS ASSUME AN UNDEVELOPED SITE

No.	Description	Drawn by	Approved	Date
A	ISSUED FOR DEVELOPMENT APPLICATION	SH	MH	08/01/2025

Client: MR & MRS FREYLER

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Drawing Status: FOR DEVELOPMENT APPLICATION

Mr Michael C Hay
MIEAust CPEng NER RPEQ
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Project Name: LOTS 151 & 152 DP1043081 NUWARRA CIRCUIT, FORSTER

Drawing Title: TYPICAL RAINWATER TANK DETAILS

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