LandDynamics
AUSTRALIA

On Behalf of
Laurus Projects Pty Ltd

Land Dynamics Australia

June 2022

Document No. 5115 SWMP Rev H

STORMWATER MANAGEMENT PLAN

13-17 Pacific Drive, Port Macquarie

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Laurus Projects Pty Ltd					1

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CONTENTS

EXECUTIVE SUMMARY

Land Dynamics has been engaged by Laurus Projects Pty Ltd to prepare a Stormwater Management Plan (SWMP) for development approval application of a multi storey residential apartment building for Laurus Projects Pty Ltd at Pacific Drive, Port Macquarie.

This report demonstrates the development will be constructed and operated generally in accordance with the Water Sensitive Urban Design (WSUD), requirements of Port Macquarie Hastings Council (PMHC) and best management practices.

In this document are assessments for two primary areas:

- Stormwater Quantity (Hydrology & Detention Sizing)
- Stormwater Quality (Water Sensitive Urban Design)

A hydrologic analysis was undertaken to assess rainfall runoff generated within the pre-developed area and the post developed area. Results show that the overall development will increase flows from pre-developed state. The flow difference will be managed by a single underground storage tank. The underground storage tank will have a direct connection to the PMHC underground stormwater reticulation, with some additional infrastructure proposed to improve hydraulics. The existing site discharged stormwater overland through adjacent private property to the southwest of the site, which has now been reconfigured to connect directly to the PMHC stormwater system.

The proposed detention tank has been sized to mitigate flows for 20%, 10%, 5% and 1% AEP storm events, from 5-min to 2-hour durations. Pre-developed and post-developed flow comparisons are included within this report. There are no external catchments draining through the proposed development site.

There are two proposed pump stations: one basement pump station to cater for the wet wall drainage inflows and access ramp stormwater catchment, and the other is to capture the southwest corner of the site instead of allowing the existing drainage condition to continue (discharge overland into private property with no piped connection).

The stormwater quality assessment was undertaken to design the preliminary treatment train to meet the Water Quality objectives and MC quality requirements. This has been prepared in conjunction with OceanProtect and their proprietary products.

The proposed treatment train consists of a litter basket for the access driveway (Oceanguard) and a stormfilter chamber within the underground detention tank with six (6) tall filter cartridges for stormwater treatment, including nutrient removal. Results show that full compliance with PMHC Auspec D7 requirements can be met with the proposed solution.

This report is Revision G and is part of the revised design submission as part of the approval process for the development.

1.0 INTRODUCTION

This Stormwater Management Plan (SWMP) identifies the stormwater quantity and quality management measures required for the proposed development of a multi storey residential apartment building for Laurus Projects Pty Ltd at Pacific Drive, Port Macquarie.

Laurus Projects Pty Ltd provided a draft architectural site layout which has been adopted for the preparation of this SMCP. The site layout plan provided is included in Appendix A, which may be subject to minor change without amendment of this report.

This development has been significantly amended since the first iteration of the stormwater management plan, and is now a significantly smaller scale to the original submission. The stormwater strategy has also changed significantly as outlined within this report.

2.0 EXISTING SITE CHARACTERISTICS

2.1 Site Description

The proposed development is located at 13-17 Pacific Drive, Port Macquarie. The development site comprises multiple land parcels:

- Lot 1 & 2 DP538077
- Lot A DP441800

The combined proposed development lot is 0.298Ha (2985m^2) in size and slopes from east to west across the site. There is no nominated stormwater connection at the low point of the lot.

It is possible to convey site stormwater through the existing drainage infrastructure on Home Street (kerb inlet pit), however the levels of the site result in a portion of the site not being able to be serviced under gravity.

An aerial photo of the site location is provided in Figure 2-1.

Figure 2-1 Site Aerial Photo (SIX Maps)

2.2 Existing Land Use

Lot 1 DP538077 is an existing motel with a driveway access from Pacific Drive. The remainder of the development site is currently undeveloped, with grass cover.

There is an existing masonry block retaining wall on the western boundary from the northwest corner before it returns into the development lot along the boundary of Lot 2 DP538077 and Lot A DP441800.

Below this point there is no boundary retaining structure.

3.0 PROPOSED DEVELOPMENT

The proposed development is a 5-storey apartment building complex with a basement and ground floor level utilised mostly for car parking. The architectural plans have been prepared by Dickson Rothschild (D.R. Design Pty Ltd) with an extract included in Appendix A.

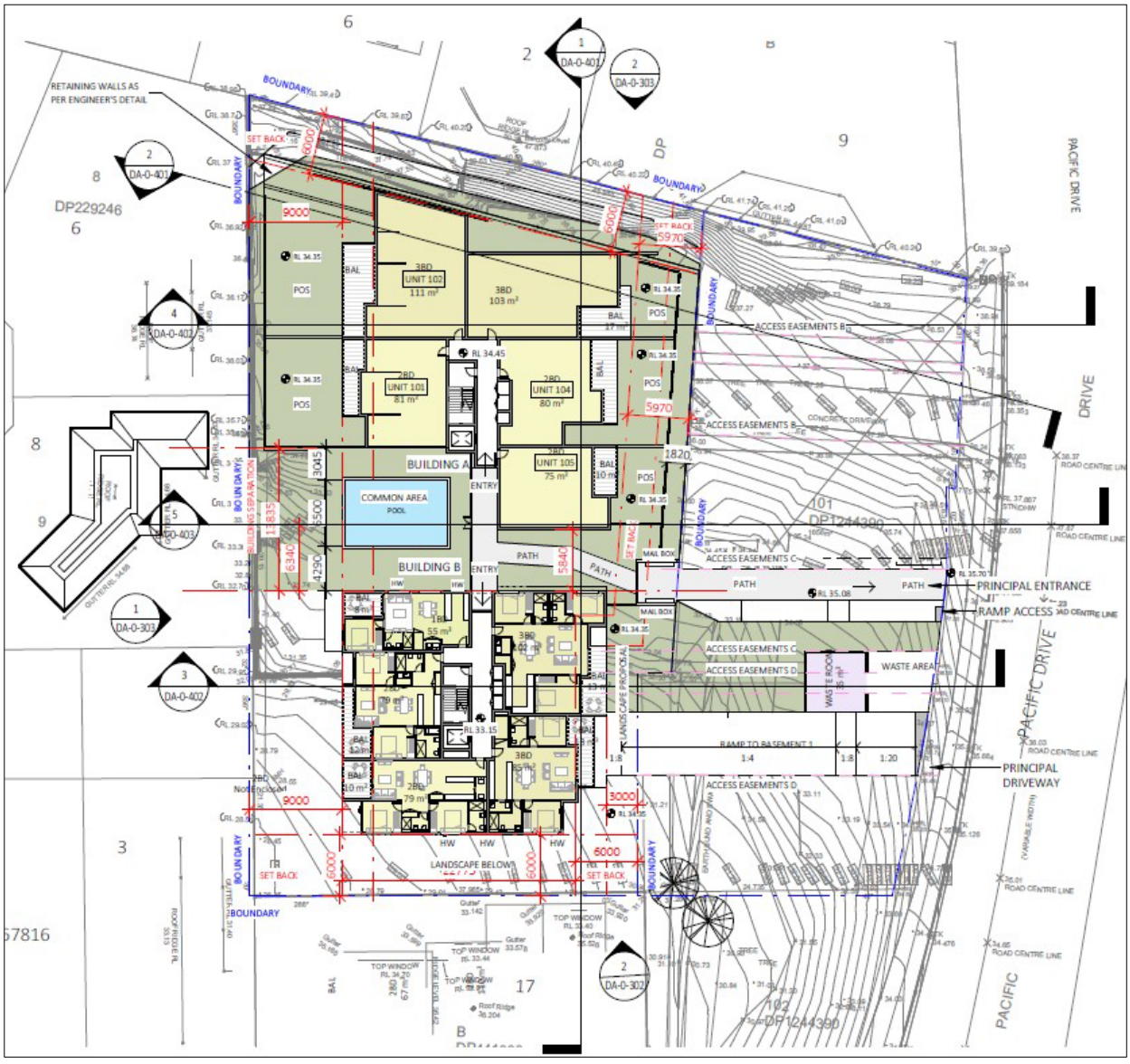
The overall footprint varies with each level, with the maximum footprint being the combined ground floor and level 1 footprint, which is approximately 2305m^2.

There is a small landscape area proposed on the northern and southern boundary.

Appendix B shows the proposed concept servicing plan for the development which includes a drainage layout.

Figure 3-1 shows the proposed development (Level 01) as per the architectural documentation supplied to LDA.

Figure 3-1 Proposed Development Layout



4.0 STORMWATER QUANTITY MANAGEMENT

4.1 Existing Topography and External Catchments

The development site slopes from Pacific Drive to the rear boundary. There is no nominated stormwater connection at the low point of the lot, which is unusual.

There is anecdotal evidence from adjacent landowners on the western and southern side of the development who state that there are existing flooding issues of their lots due to the un-serviced nature of the lot.

There are no external catchments which affect the proposed site, with the verge proposed to be re-graded to ensure that water falling outside of the lot is directed to Pacific Drive.

Whilst lot DP157217 A & B partially falls towards the subject lot and Pacific Drive based on LiDAR contours, this catchment has not been included in the assessment due to:

- Roof drainage (significant portion of the site) is directed via kerb outlets to Pacific Drive
- There is an impervious fence line on the boundary (brick) which prevents the flow of stormwater to the south, directing it to Pacific Drive
- Whilst there is no guarantee that fence will remain, we cannot consider future modification of private infrastructure in this assessment. In its current condition it does not discharge to the proposed development site, and the removal of the fence is unlikely to see a significant additional catchment as a worst-case scenario
- Even upon re-development of the lot, stormwater would not be captured and directed to the proposed development site

A quantity assessment has been based on the building footprint in 2D, utilising the total impervious area for the building (not just a specific level layout).

There is a significant portion of the development site which cannot be serviced for stormwater collection under gravity in its current condition. The majority of this area will be developed and re-directed to the stormwater network; however, a small portion of this existing area is not being developed. This area was originally proposed to discharge via natural overland flow to the adjacent properties as per the existing runoff condition, however it will now be drained to a stormwater pump station in the southwest corner of the development lot. This will then pump to the OSD tank and discharge under gravity via the nominated lot connection.

It is estimated the original catchment for the southwest corner of the site (adjacent to Lot DP 213585 and Lot B DP 441800) is approximately 3600m^2, with this being reduced to approximately 568m^2 which is nominally 16% of the original catchment size. This makes a pump station feasible for this location, however a provision for emergency overflows is still required.

Figure 4.1 shows the non-gravity serviced region of the site in red hatching which will now be collected and pumped to the OSD tank.

Figure 4-1 Non-Gravity serviced catchment (southwest corner)

The PMHC owned lot on the southern boundary of the development (Lot 102 DP1244390) currently has an existing letter box opening pit which is considered the nominated connection location for the proposed development.

This drains into a kerb inlet pit on Home Street. This pit collects further upstream road drainage infrastructure as well.

4.2 Proposed Discharge Characteristics

It is proposed that the existing stormwater infrastructure on Home Street be utilised to convey stormwater from the proposed development, with the letter box pit in Lot 102 DP1244390 not utilised as a direct connection.

This is given the anecdotal flooding issues experienced by Lot B DP441800, which is obvious by visual inspection given the property levels relative to the road. This change to the lot discharge location is to improve hydraulics of the overall system and reduce the flooding impact on this adjacent property owner.

It is proposed that the upstream road drainage from Pacific Drive also bypass the letter box pit as part of this upgrade. This will result in the existing letter box pit not requiring any modification, but also will have a significantly reduced catchment.

It will be subject to tailwater levels form the Home Street system, however modelling shows this is a much-improved outcome.

The originally non-serviced area of the site adjacent to Lot DP 213585 and Lot B DP 441800) is now being directed to a stormwater pump station.

4.3 Flooding

The subject site is not subjected to regional flooding.

4.4 Groundwater

A full assessment of the impact of the development on the groundwater table at the development site is outside the scope of this report. This assessment is being undertaken by EIAustralia.

Further clarification has been supplied in relation to groundwater indicating that groundwater is not an issue on this site. Subsurface flows were found in upper layers of the soil profile which are likely the pervious component of rainfall, not related to groundwater.

Any groundwater or subsurface flow will be captured via subsoil drainage and directed to the pump station in the southwest corner of the site.

This measure will address concerns raised by the independent reviewer in relation to the impact the development will have on groundwater and the adjacent landowners.

4.5 Hydrology

A hydrological assessment was undertaken in accordance with the current edition of the Australian Rainfall & Runoff Guidelines 2019 (ARR2019), using rainfall data and temporal which were derived specifically for the proposed development site from ARR Hub and from Bureau of Meteorology respectively.

The site has been assessed under three scenarios:

- Existing Scenario – the site in its current state.
- Developed Unmitigated Scenario – the site is developed excluding stormwater detention.
- Mitigated Scenario – the site is developed including stormwater detention.

An Initial Loss, Continuing Loss (ILCL) loss model has been adopted given the urban catchment location, utilising loss parameters as per ARR2019. The NSW modification factor to continuing losses has been applied.

4.6 DRAINS Analysis

A DRAINS model has been developed which consists of a single model that incorporates nodes representing areas for both the existing and developed case scenarios.

The DRAINS program performs design and analysis calculations for urban stormwater drainage systems and models the flood behaviour of rural and urban catchments.

DRAINS displays the components of a drainage system as “objects” and presents information about these and the results of calculations pictorially. DRAINS has many applications, from sizing of single drainage pipes to complex analyses of large, established pipe drainage systems and river basins.

Figure 4-2 below shows the DRAINS model configuration adopted for the assessment.

Figure 4-2 DRAINS Model

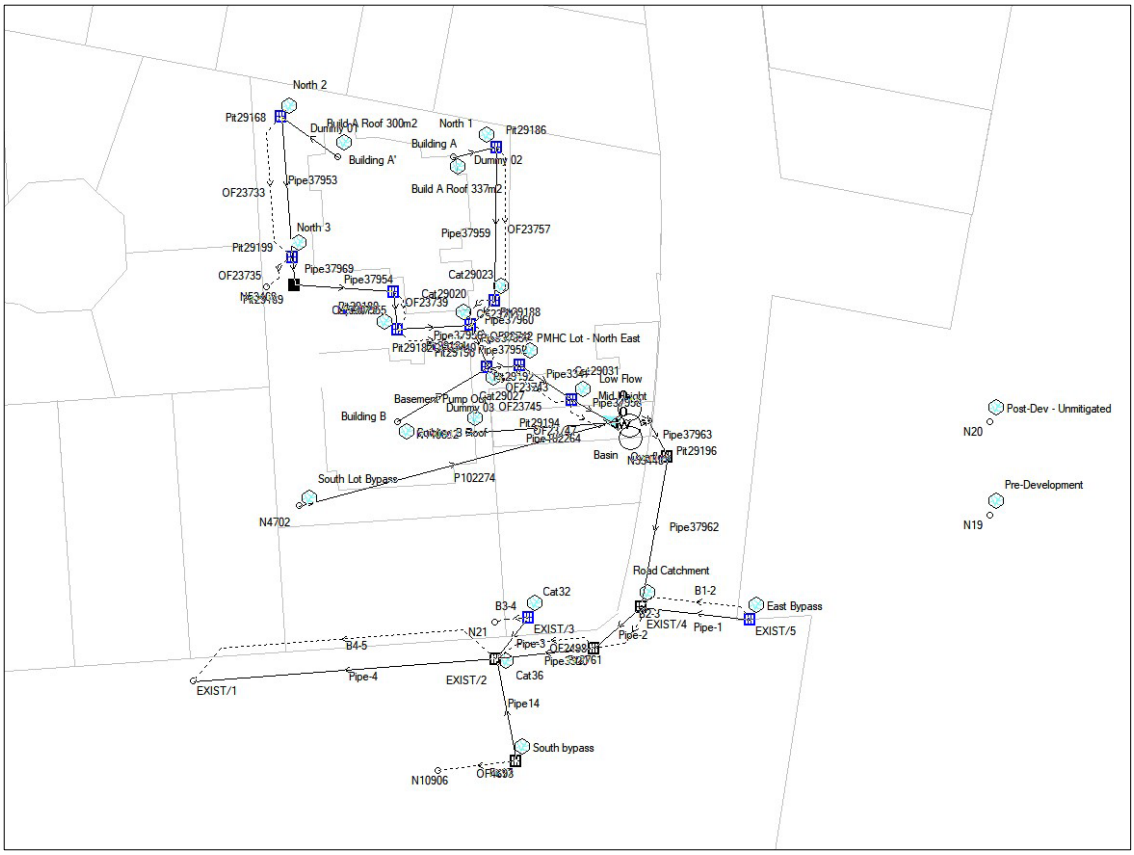
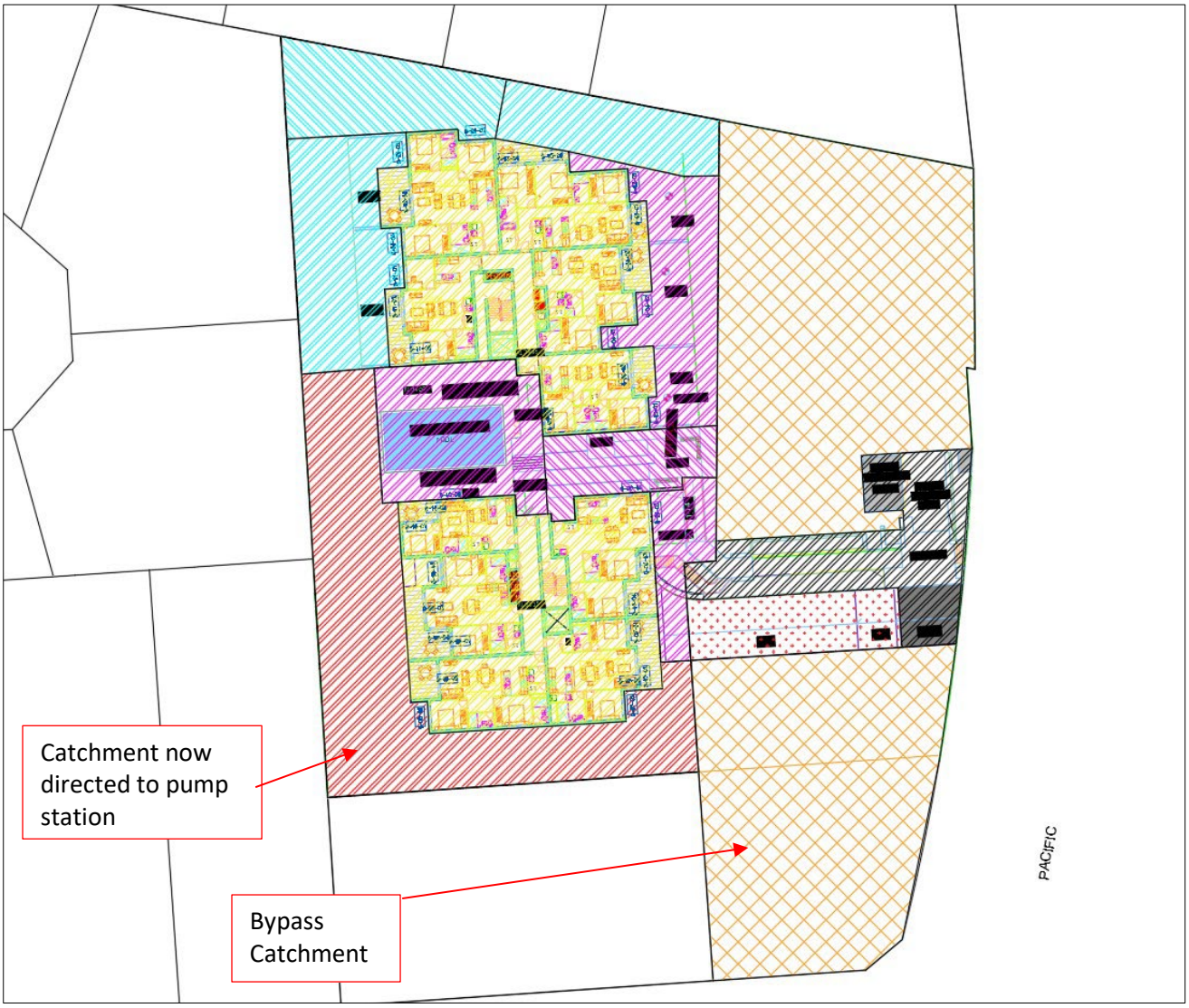


Figure 4-3 shows the catchments for the DRAINS model. The total catchment area (except the bypass catchment to the south of the driveway ramp) is 4905m^2.

Figure 4-3 DRAINS Model Catchments



4.6.1 DRAINS Results – Unmitigated Scenario

A summary of the results is provided in Table 4-1 below.

Table 4-1 Discharge Summary from DRAINS Analysis (Existing Site and Unmitigated Developed Site)

	Peak Flow Rate for Average Recurrence Interval (m^3/s)				
	5 year	10 year	20 year	50 year	100 year
Existing	0.112	0.133	0.160	0.188	0.217
Developed	0.141	0.169	0.202	0.242	0.287

The results in Tables 4-1 show that the proposed development increases the peak flows from the site, indicating that there is a need for stormwater detention.

Hence, to satisfy council requirements, further hydraulic and hydrological assessment is necessary. The increase can be attributed to the undeveloped nature of the site in the existing scenario and the increase in impervious runoff area in the developed scenario.

4.6.2 DRAINS Results – Mitigated Scenario

Based on the results for the existing and unmitigated developed scenarios, a stormwater detention basin was modelled as part of the mitigated scenario to detain and manage discharge flows from the site to ensure non-worsening of downstream conditions.

The results seen in Table 4-2 are from the DRAINS model which summarizes the peak discharge rates for each identified critical peak storm across the assessed ARI range at the assessment point for the catchments, in the mitigated scenario.

The results show the proposed development can be satisfactorily attenuated to meet non-worsening criteria.

Table 4-2 Discharge Summary from DRAINS Analysis (Existing site and Mitigated Developed site)

	Peak Flow Rate for Average Recurrence Interval (m^3/s)				
	5year	**10year**	**20year**	**50year**	**100year**
Existing	0.112	0.133	0.160	0.188	0.217
Developed	0.141	0.169	0.202	0.242	0.287
Mitigated	0.106	0.126	0.135	0.167	0.181
Non-worsening criteria	Passed	Passed	Passed	Passed	Passed

Note that the proposed basement pump station and southwest pump station outflows will be directed to the detention tank.

This has been showed to drain as a standard catchment to the OSD tank, as the pump operation is to be finalized during the detailed design phase. This is an appropriate representation for a DA SWMP given it is more conservative than the pump's operating and discharging to the OSD tank, as the model does not allow for any detention volume from the pump stations.

4.7 Detention Basin Details (Underground Storage Tank)

The properties of the underground storage tank are summarized in Table 4-3. It is proposed that this basin is a cast in-situ reinforced concrete which achieves the appropriate storage volume, depth and footprint. This will be further defined during detailed design.

Table 4-3 Stormwater Detention Basin Details

Basin Base Area (m^2)	Total Depth (m) to MFL	Storage Volume to Spill (m^3)	Discharge Pipe Configuration
40 sqm	Maximum depth 2.65m Depth to MFL (1%) 2.32m	90 Nom.	DN375 low flow outlet with 280mm dia orifice plate – RL31.55 Additional higher orifice outlet at RL 33.0 – 280mm dia High level overflow weir – DN375 vertical pipe – RL 34.0

The hydraulic investigation and runoff-routing exercise has demonstrated that the proposed development increases stormwater discharge off site. The incorporation of an underground detention tank in the mitigated scenario demonstrates that flows can be controlled and managed to ensure non-worsening of the proposed development.

Refer to Appendix B for concept plans showing further details of the on-site detention basin.

4.8 Pump Stations

Based on the site levels, the access ramp into the basement will not be serviceable under gravity to the lot connection point or detention basin. This will require a separate basement sump pump stormwater system to manage these inflows from the access ramp. This pump station will also collect groundwater from the basement wet wall construction.

An additional pump station is provided in the southwest corner of the site to capture surface flows from the portion of the site which cannot drain under gravity to the OSD tank.

The details of both pump systems have been prepared by NAS Hydraulic Consulting, and included in Appendix C.

Further modelling and confirmation will be required during the detailed design to establish duty cycles and final pump arrangements. Preliminary flowrate determination is included with the DA as shown on the drawings in Appendix C.

4.9 Rainwater Tanks

Whilst rainwater tanks may be proposed for the development, their interaction and impact on the proposed OSD tank have not currently been included with the modelling.

4.10 Extreme Rainfall Event Assessment

Through the review process of this application, a request has been made to assess the impact of events which are greater than a 1% AEP rainfall event.

Note whilst this is outside the requirement of PMHC AUSPEC, there are advantages to understanding the behaviour of the system for rare rainfall events, specifically in managing overland flow paths and underground infrastructure.

It has been requested that an assessment of the overland flow paths be undertaken on the assumption of internal pit blockages for the site.

Figure 4-4 shows the likely overland flow paths based on natural site contours and the proposed design based on this requested scenario.

Figure 4-4 Overland Flow Path

The overland flow paths shown in Figure 4-4 show stormwater to follow natural contours through private property. This is an acceptable outcome given the extreme rainfall scenario coupled with a blocked stormwater network and natural topography of the region. A weir is proposed in the south-west corner of the lot which discharges any extreme event stormwater into No. 3 Home Street. This is the current low point of the site. Details of the proposed weir are included in Appendix B.

Note that given this extreme rainfall event is conceptual, there are no calculations available to support the quantum of the discharge. It has been assumed for the assessment of the weir capacity, that three (3) times the 1% AEP peak flow of the bypass catchment in the south west corner as the design flow. This equates to 114 L/s. This results in a 5m wide weir with a flow depth of nominally 70mm.

The weir will form part of a proposed retaining wall in the corner of the development site which is nominally 700mm high. This will see a rebate into the wall to act as the weir, with the fence line continuing over with a nominal 100mm gap for the weir operation.

An additional consideration is that for more frequent events with minor blockages, the proposed stormwater pump station in the southwest corner of the site would capture these additional flows and pump them to the OSD tank, within the capacity of the selected pumps and control programming. The levels proposed for the weir take into consideration the required dynamic head to drive stormwater into the corner pit without causing a spill onto the adjacent property. This is based off the 3x 1% AEP flow rate to be conservative.

5.0 STORMWATER QUALITY MANAGEMENT

5.1 Environmental Values and Water Quality Objectives

To prevent degradation of waterways, ecologically sustainable development principles have been embraced and regulated by Port Macquarie Hastings Council (PMHC). The core principles of Water Sensitive Urban Design (WSUD) are to:

- Protect natural ecosystems.
- Integrate stormwater treatment into the urban landscape.
- Protect water quality.
- Reduce runoff and peak flows; and
- Add value while minimising development costs.

With these principles in mind, this stormwater management plan aims to:

1. Identify the water quality and quantity objectives and performance criteria.
2. Estimate the pollutant loads; and
3. Detail within the management plan, strategies aimed at achieving the required objectives.

Table 5-1 outlines the water quality parameters for this development based on the PMHC Auspec guidelines Part D7.11 (13).

Table 5-1 Port Macquarie Hastings Council Stormwater Treatment Pollutant Reduction Targets

Pollutant	Objective
Suspended Solids (SS)	80% retention of average annual load
Total Phosphorus (TP)	45% retention of average annual load
Total Nitrogen (TN)	45% retention of average annual load
Gross Pollutants	100% retention of litter greater than 5mm for flows up to 3month ARI peak flow

5.2 Proposed Stormwater Treatment Devices

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

In order to treat the stormwater runoff from the site, various treatment devices can be used throughout the development area; and these concepts can be integrated into the overall design of the road layouts, road cross sections, stormwater layouts and water supply reticulation systems.

Stormwater from the development will follow a specially designed stormwater quality treatment train prior to discharge from the site, which will ensure compliance with the water quality objectives.

Due to the type of development, and available area on site for treatment devices, proprietary devices have been selected to achieve compliance with Auspec Part D7. Generally fundamental treatment options such as bio-retention basins, swales, buffer zones, wetlands and the like are preferred, however there is insufficient available space to achieve these options, specifically within an infill development site.

It is proposed to use a stormfilter device designed and supplied by OceanProtect, along with two Oceanguard little baskets at the access ramp.

5.3 Stormfilter (OceanProtect Product)

The primary treatment device proposed is the OceanProtect Stormfilter, which is a stormwater filtration system specifically designed for high pollutant reduction in a small footprint without the need for vegetation for nutrient removal. It includes a treatment chamber within the underground on site detention tank which contains a series of filters.

OceanProtect assisted Land Dynamics Australia in the preparation of the site stormwater treatment strategy. The stormfilter unit has been modelled using the MUSIC software (refer Section 5.4) for compliance with the required reduction targets of PMHC.

Appendix D has detailed product information and sample drawings for the proposed stormfilter system provided by OceanProtect.

5.4 Modelling Approach (MUSIC)

Modelling of the site was undertaken using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software package.

The development was modelled using the split catchment approach. An appropriate type of land use was applied to all surface types within the developed catchments, where individual treatment devices were assigned the relevant modelling treatment parameters. Consequently, a treatment train was established for the site, ensuring that water discharging from the site adheres to the specified Water Quality Objectives.

Meteorological data was input from the PMHC website which provides the required rainfall and PET data for modelling.

5.5 MUSIC Model Layout and Results

The developed site has been modelled in accordance with a detailed sub-catchment regime to ensure the entire site meets pollutant reduction objectives.

Refer to Figure 5-3 below for the modelled MUSIC layout, with Figure 5-4 showing the results.

Figure 5-3 MUSIC Model Layout

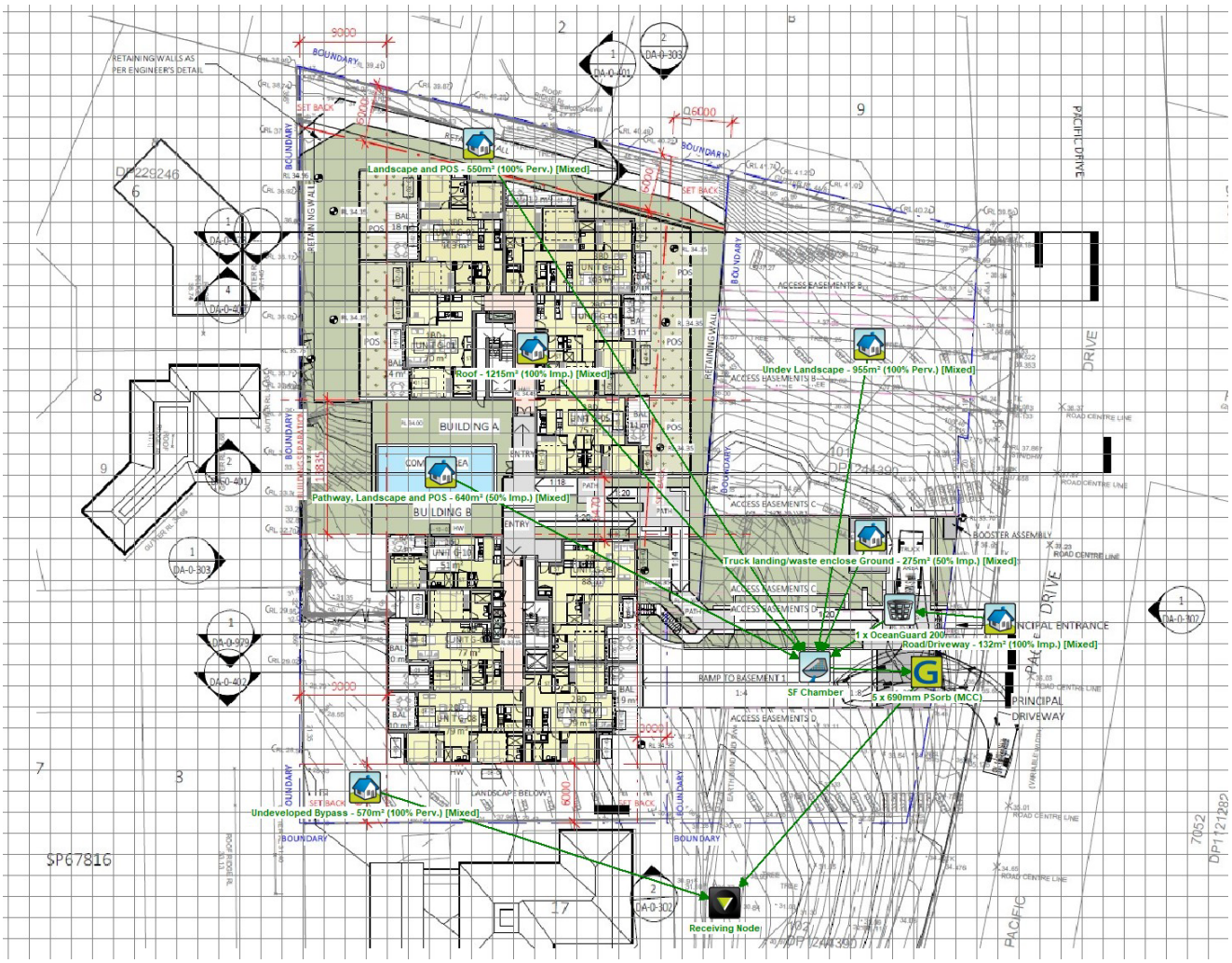
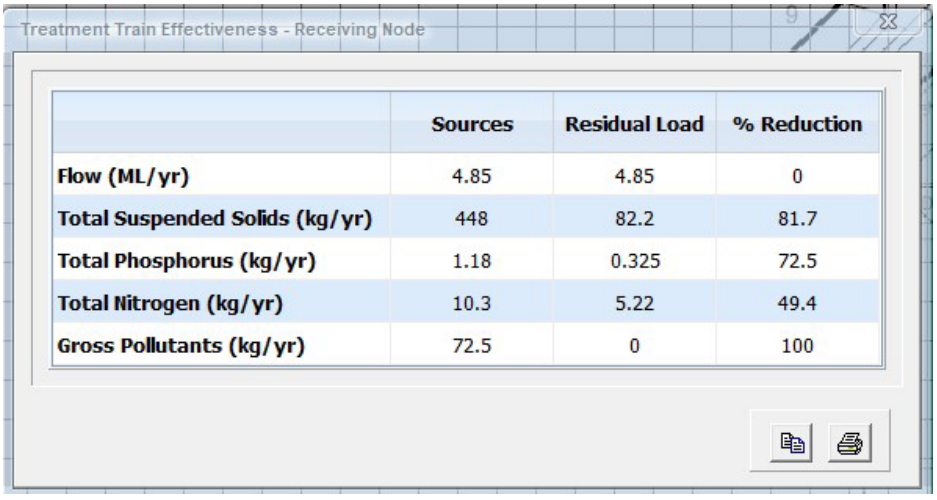


Figure 5-4 MUSIC Model Results



	Sources	Residual Load	% Reduction
Flow (ML/yr)	4.85	4.85	0
Total Suspended Solids (kg/yr)	448	82.2	81.7
Total Phosphorus (kg/yr)	1.18	0.325	72.5
Total Nitrogen (kg/yr)	10.3	5.22	49.4
Gross Pollutants (kg/yr)	72.5	0	100

The results in Table 5-5 summarize site pollutant reductions achieved from the mitigated site, as compared to the nominated load reduction targets. The MUSIC results below show that the proposed stormwater treatment devices will improve the discharging stormwater quality as such the development's runoff meets the nominated load reduction targets set by PMHC.

Table 5-3 Bioretention Pollutant Reduction Results

Pollutant	PMHC reduction targets	Bioretention reduction
Total Suspended Solids (TSS)	80%	81.7%
Total Phosphorus (TP)	45%	72.5%
Total Nitrogen (TN)	45%	49.4%
Gross Pollutants	100%	100%

The MUSIC Model has been supplied with the SWMP.

6.0 CONCLUSION

This Stormwater Management Plan (SWMP) has been prepared to provide a design proposal and guide to the stormwater quantity and quality management techniques for the site.

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

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

- Details of a proposed stormwater quality treatment train are provided to ensure discharge of stormwater from the site is of adequate quality standards to comply with the requirements of Port Macquarie Hastings Council.

A hydrologic analysis was undertaken to assess rainfall runoff generated within the pre-developed area and the post developed area. Results show that the overall development will increase flows from pre-developed state. The flow difference will be managed by a single underground storage tank. The underground storage tank will have a direct connection to the PMHC underground stormwater reticulation, with some additional infrastructure proposed to improve hydraulics. The existing site discharged stormwater overland through adjacent private property to the southwest of the site, which has now been reconfigured to connect directly to the PMHC stormwater system.

The proposed detention tank has been sized to mitigate flows for 20%, 10%, 5% and 1% AEP storm events, from 5-min to 2-hour durations. Pre-developed and post-developed flow comparisons are included within this report. There are no external catchments draining through the proposed development site.

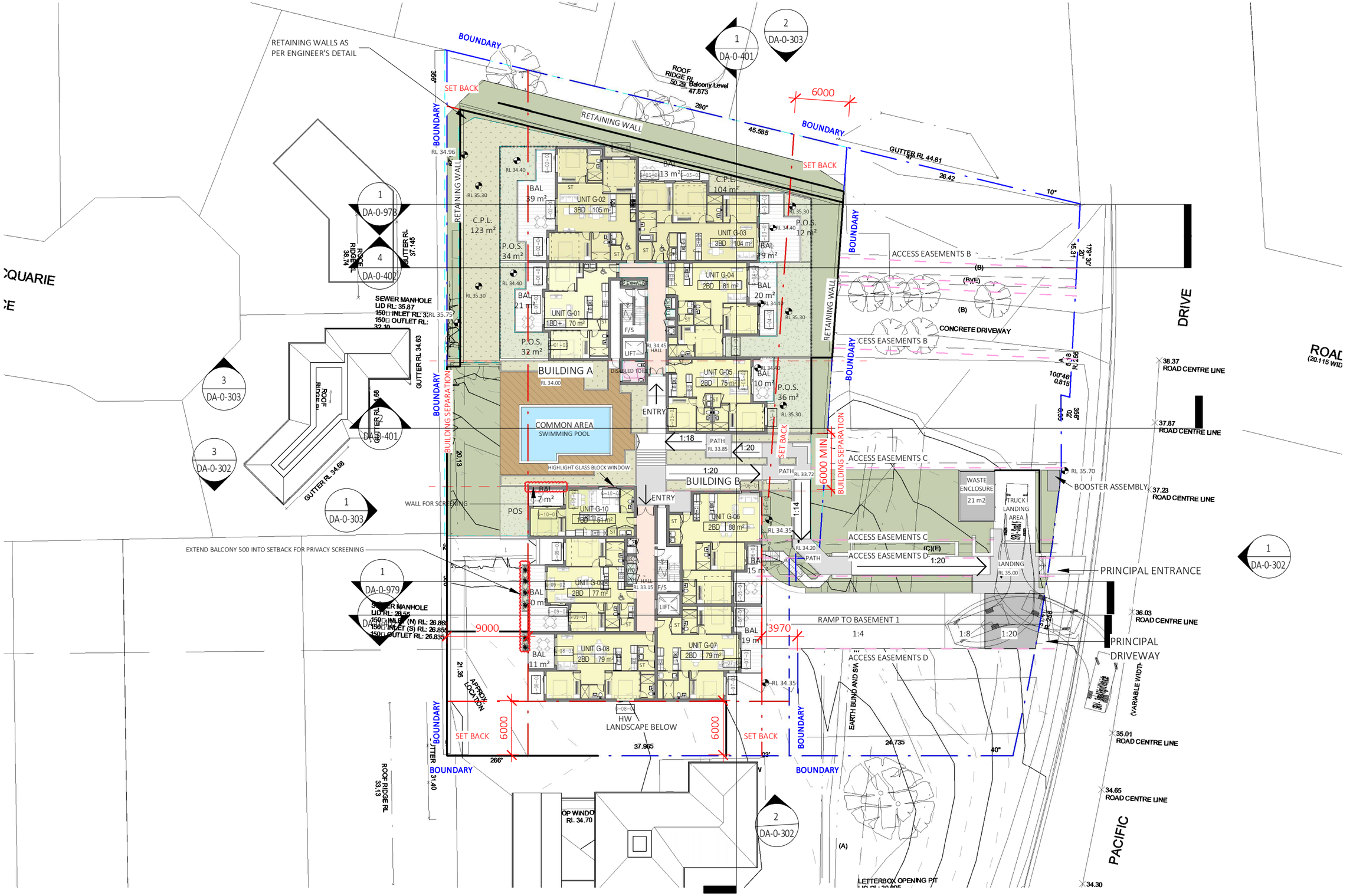
There are two proposed pump stations: one basement pump station to cater for the wet wall drainage inflows and access ramp stormwater catchment, and the other is to capture the southwest corner of the site instead of allowing the existing drainage condition to continue (discharge overland into private property with no piped connection).

The stormwater quality assessment was undertaken to design the preliminary treatment train to meet the Water Quality objectives and MC quality requirements. This has been prepared in conjunction with OceanProtect and their proprietary products.

The proposed treatment train consists of a litter basket for the access driveway (Oceanguard) and a stormfilter chamber within the underground detention tank with six (6) tall filter cartridges for stormwater treatment, including nutrient removal. Results show that full compliance with PMHC Auspec D7 requirements can be met with the proposed solution.

Note a summary of stormwater responses to previous reviews/comments are included in this report in Appendix E.

Appendix A – Architectural Site Plan – Ground Level



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Fergus William Cumming
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REV	DESCRIPTION	DATE	ISSUED	CHECKED
A	ISSUE FOR REVIEW	31/03/2022	AC	PO
B	ISSUE FOR REVIEW	06/04/2022	AC	PO
C	PRELIMINARY PANEL UPDATED	20/04/2022	AC	PO
D	ISSUE FOR S34	26/04/2022	AC	PO
E	ISSUED FOR BASIX	10/05/2022	AC	PO
F	EXPERT COMMENT UPDATE	25/05/2022	PB	PO

PROJECT
Pacific Drive

10-16 Pacific Drive, Port Macquarie NSW 2444

CLIENT
Laurus Projects Pty Ltd

Project Status

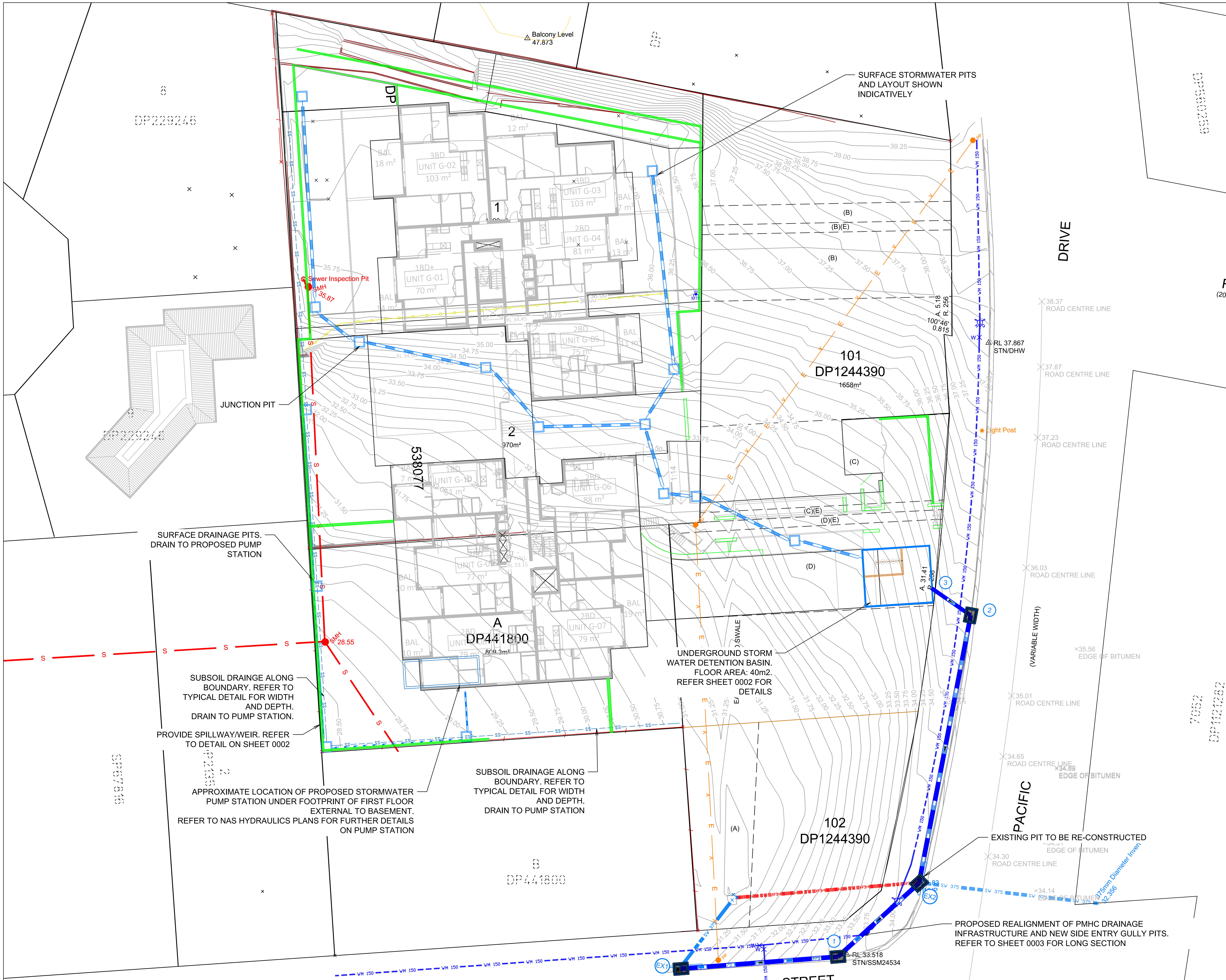
F:\22-020 DA- (CEN)- 0 R22- Pacific Drive V5_acorreaRESQ.rvt

DRAWING
GROUND FLOOR PLAN

PROJECT NO.	DRAWING NO.	REVISION	DATE
22-020	DA-0-212	F	25/05/2022
SCALE @ A3		DRAWN	AUTHORISED
1 : 400		AC	PO

PRINTED: 9/06/2022 5:14:30 p.m.

Appendix B – Concept Civil Drawings

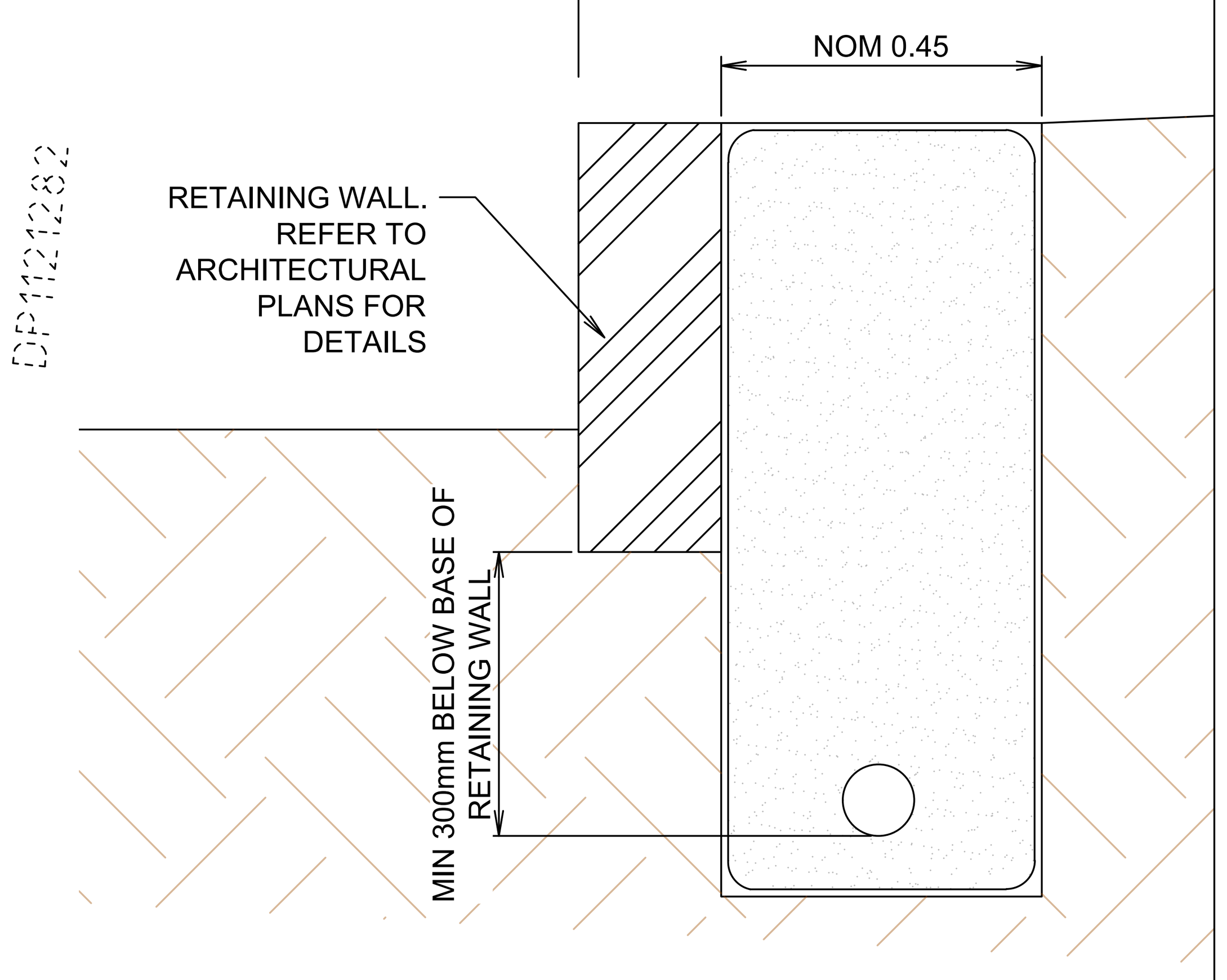


LEGEND

- INTERNAL DRAINAGE
- PIPE TO BE REMOVED
- ROAD DRAINAGE
- NEW 900X900 IAD PIT
- PIT ON ROAD
- EXISTING SEWER
- SUBSOIL DRAINAGE
- RETAINING WALLS

TANK LEVELS

TANK INVERT	RL 31.55m
LOW LEVEL (ORIFICE Ø2800) OUTLET	RL 31.55m
MID LEVEL (ORIFICE Ø280) OUTLET	RL 33.00m
MFL	RL 33.87m
OVERFLOW WEIR	RL 34.00m
MIN UNDERSIDE SLAB LEVEL OVER (REFER ARCHITECT DESIGN)	RL34.20m



BOUNDARY SUBSOIL LINE

NOT TO SCALE

REV	DESCRIPTION	DATE	DRAWN	SURVEY	CHECK	APPROVED
H	FOR DEVELOPMENT APPLICATION	10.05.22	N.H	MH	M.H	MJS
I	FOR DEVELOPMENT APPLICATION	14.06.22	N.H	MH	M.H	MJS
C	FOR DEVELOPMENT APPLICATION	11.03.21	MH	MH	MJS	MJS
D	FOR DEVELOPMENT APPLICATION	25.06.21	N.H	M.H	M.H	MJS
E	FOR DEVELOPMENT APPLICATION	20.04.22	NH	MH	MH	MJS
F	FOR DEVELOPMENT APPLICATION	26.04.22	N.H	M.H	M.H	MJS
G	FOR DEVELOPMENT APPLICATION	27.04.22	N.H	M.H	M.H	MJS

SCALES: 0 2 4 8 12
Full Size 1:200 ; Half Size 1:400
Scale (m)

DO NOT SCALE FROM DRAWING

N

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NOTE:
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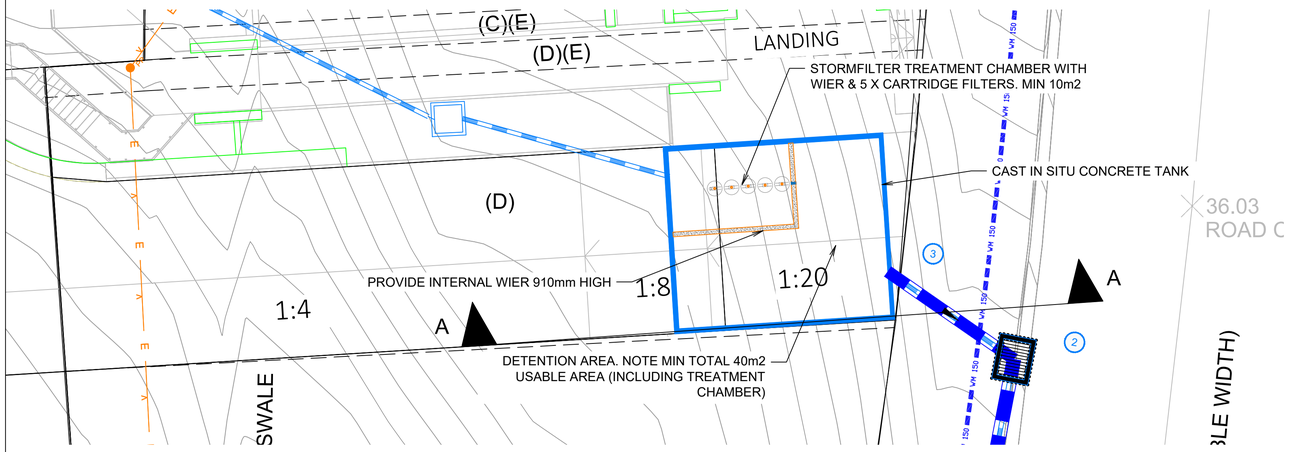
PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

PROJECT: 13-17 PACIFIC DRIVE
DRAWING TITLE: CONCEPT SERVICING PLAN

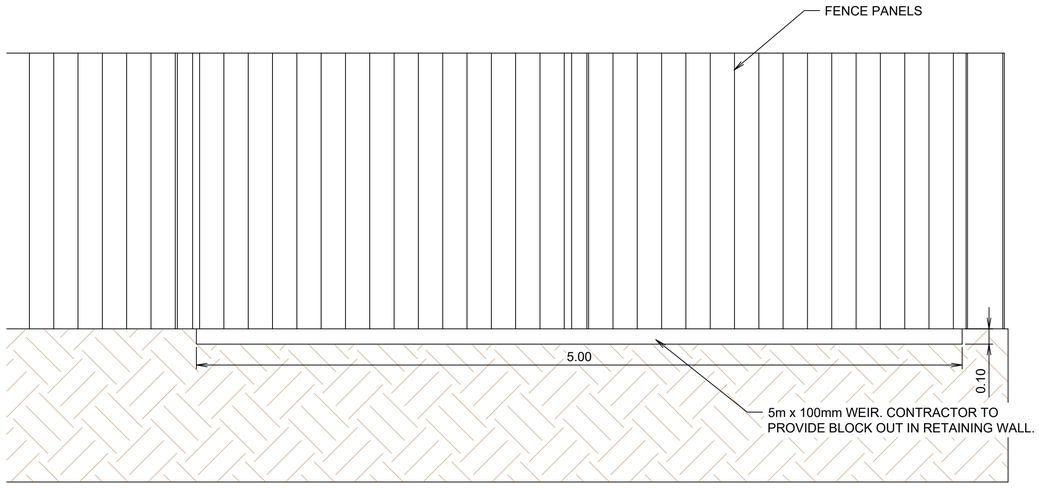
ORIGINAL SIZE:	LAND DYNAMICS JOB No.:	DRAWING No.:	REV:
A1	5115	0001	I

CAD FILE: W:\5115 - 13-17 PACIFIC DRIVE\P - PLANS - DRAWINGS\5115_CONCEPT SERVICING PLAN REV I.DWG PLOTTED BY: NICK PLOT DATE: 14/06/2022 3:37:01 PM

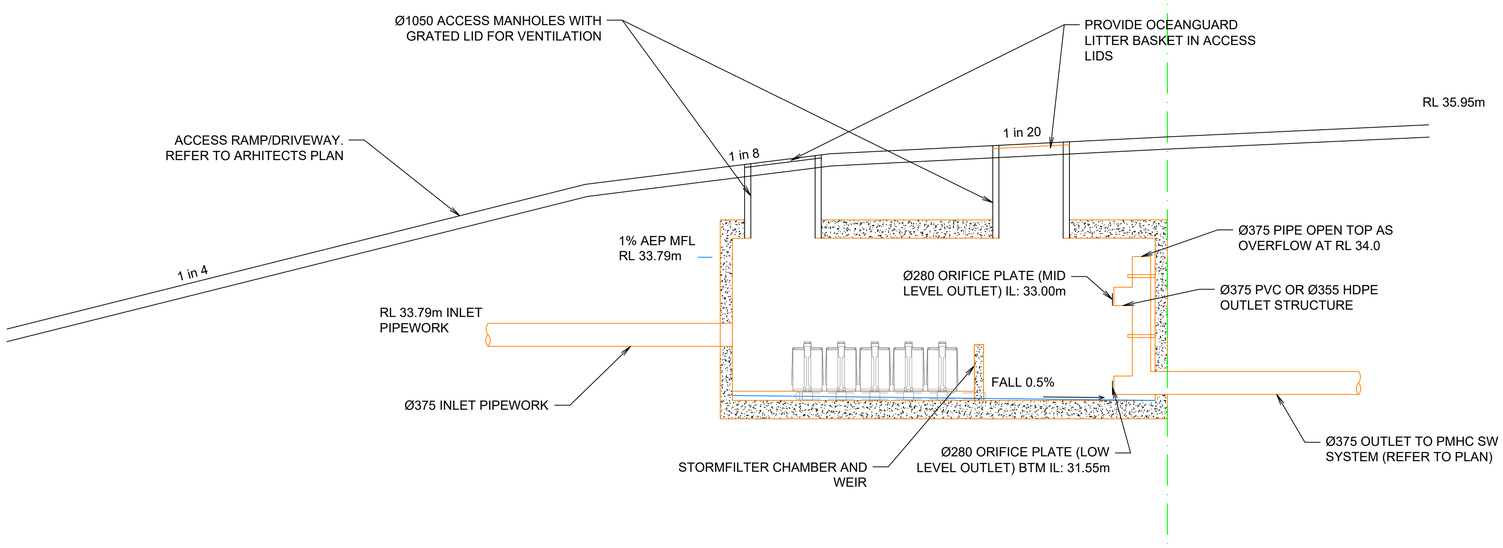
100mm AT ORIGINAL SIZE



PLAN VIEW - OSD TANK
SCALE 1:100



WEIR ELEVATION
SCALE 1:20



DETENTION TANK - SECTION A
SCALE 1:50

TANK LEVELS

FLOOR AREA:	40m2
OUTLET LEVELS:	
LOW FLOW =	31.55m
MID FLOW =	33.00m
HIGH FLOW =	34.00m
20% MFL	32.23m
1% MFL	33.87m

NOTE:
FINAL OSD TANK CONFIGURATION TO BE CONFIRMED DURING DETAILED DESIGN PHASE

REV	DESCRIPTION	DATE	DRAWN	SURVEY	CHECK	APPROVED
A	FOR DEVELOPMENT APPLICATION	10.05.22	N.H	M.H	M.H	MJS
B	FOR DEVELOPMENT APPLICATION	14.06.22	N.H	M.H	M.H	MJS

SCALES:
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Full Size 1:200 ; Half Size 1:400
Scale (m)
0 0.5 1 2 3
Full Size 1:50 ; Half Size 1:100
Scale (m)
DO NOT SCALE FROM DRAWING

N

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PROJECT:
13-17 PACIFIC DRIVE

DRAWING TITLE:
TYPICAL DETAILS & BASIN PLAN

ORIGINAL SIZE:	LAND DYNAMICS JOB No.:	DRAWING No.:	REV:
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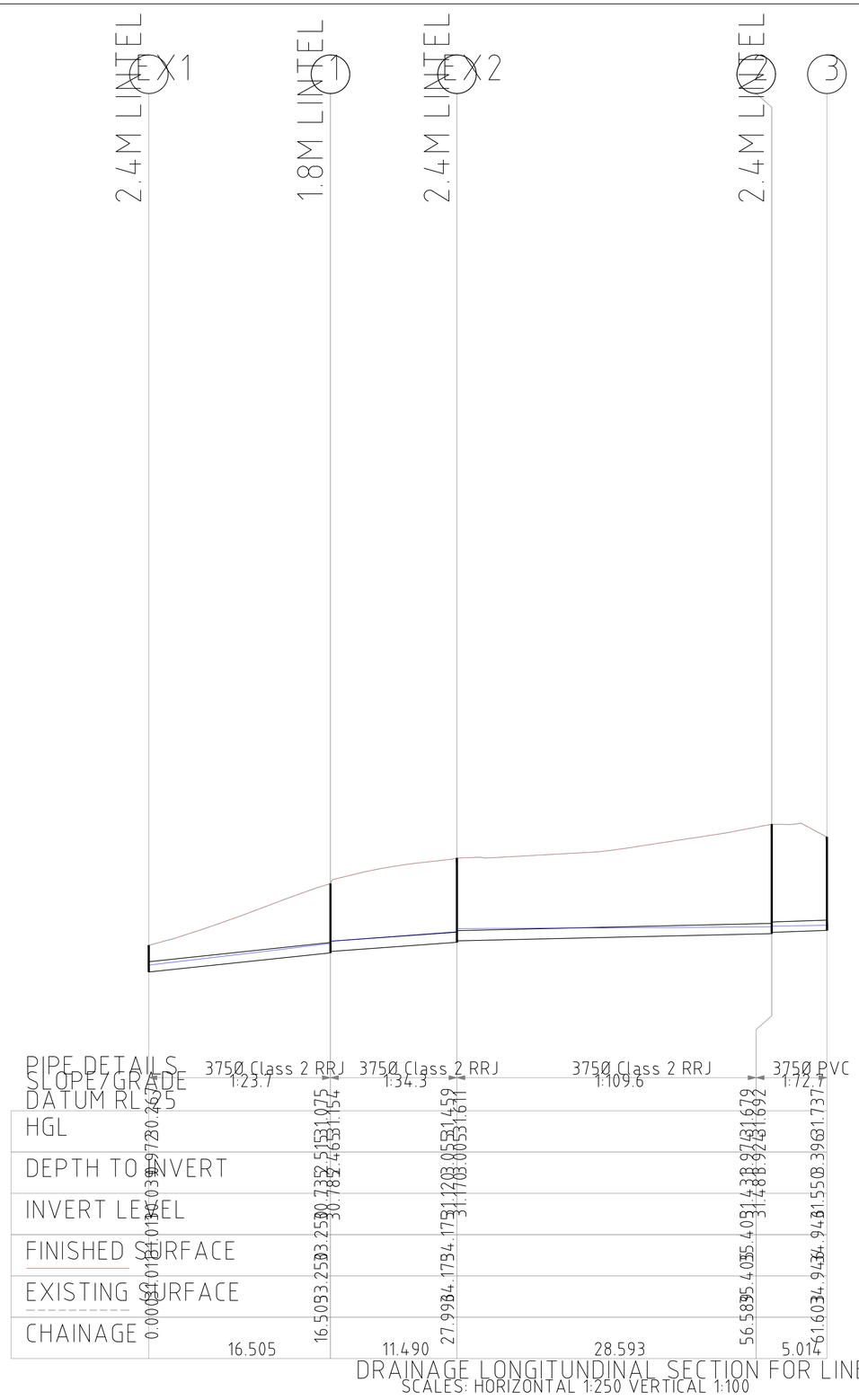

DRAINAGE LONGITUNDINAL SECTION FOR LINE 1
SCALES: HORIZONTAL 1:250 VERTICAL 1:100

REV	DESCRIPTION	DATE	DRAWN	SURVEY	CHECK	APPROVED
A	FOR DEVELOPMENT APPLICATION	10.05.22	N.H	M.H	M.H	MJS

SCALES:
0 2 4 8 12
Full Size 1:200 ; Half Size 1:400
Scale (m)
0 0.5 1 2 3
Full Size 1:50 ; Half Size 1:100
Scale (m)
DO NOT SCALE FROM DRAWING

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PROJECT:
13-17 PACIFIC DRIVE

DRAWING TITLE:
ROAD DRAINAGE LONG SECTION

ORIGINAL SIZE:	LAND DYNAMICS JOB No.:	DRAWING No.:	REV:
A1	5115	0003	A

CAD FILE: W:\5115 - 13-17 PACIFIC DRIVE\P - PLANS - DRAWINGS\5115_CONCEPT SERVICING PLAN REV I.DWG PLOTTED BY: NICK PLOT DATE: 14/06/2022 3:37:11 PM

REV	DESCRIPTION	DATE	DRAWN	SURVEY	CHECK	APPROVED
A	FOR DEVELOPMENT APPLICATION	10.05.22	N.H	MH	M.H	MJS

SCALES: Full Size 1:200 ; Half Size 1:400 Scale (m)

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PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

PROJECT: 13-17 PACIFIC DRIVE
DRAWING TITLE: CATCHMENT PLAN

ORIGINAL SIZE:	LAND DYNAMICS JOB No.:	DRAWING No.:	REV:
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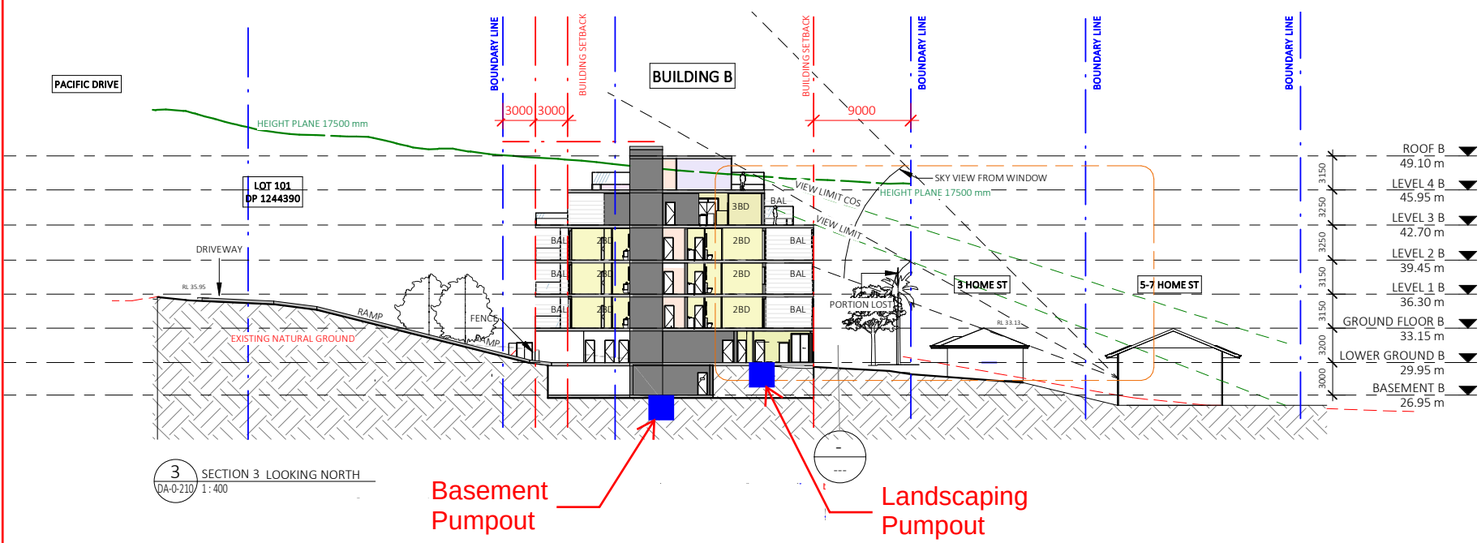
CAD FILE: W:\5115 - 13-17 PACIFIC DRIVE\P - PLANS - DRAWINGS\5115_CONCEPT SERVICING PLAN REV I.DWG PLOTTED BY: NICK PLOT DATE: 14/06/2022 3:37:16 PM

Appendix C – NAS Hydraulic Consulting SW Pump System Layout

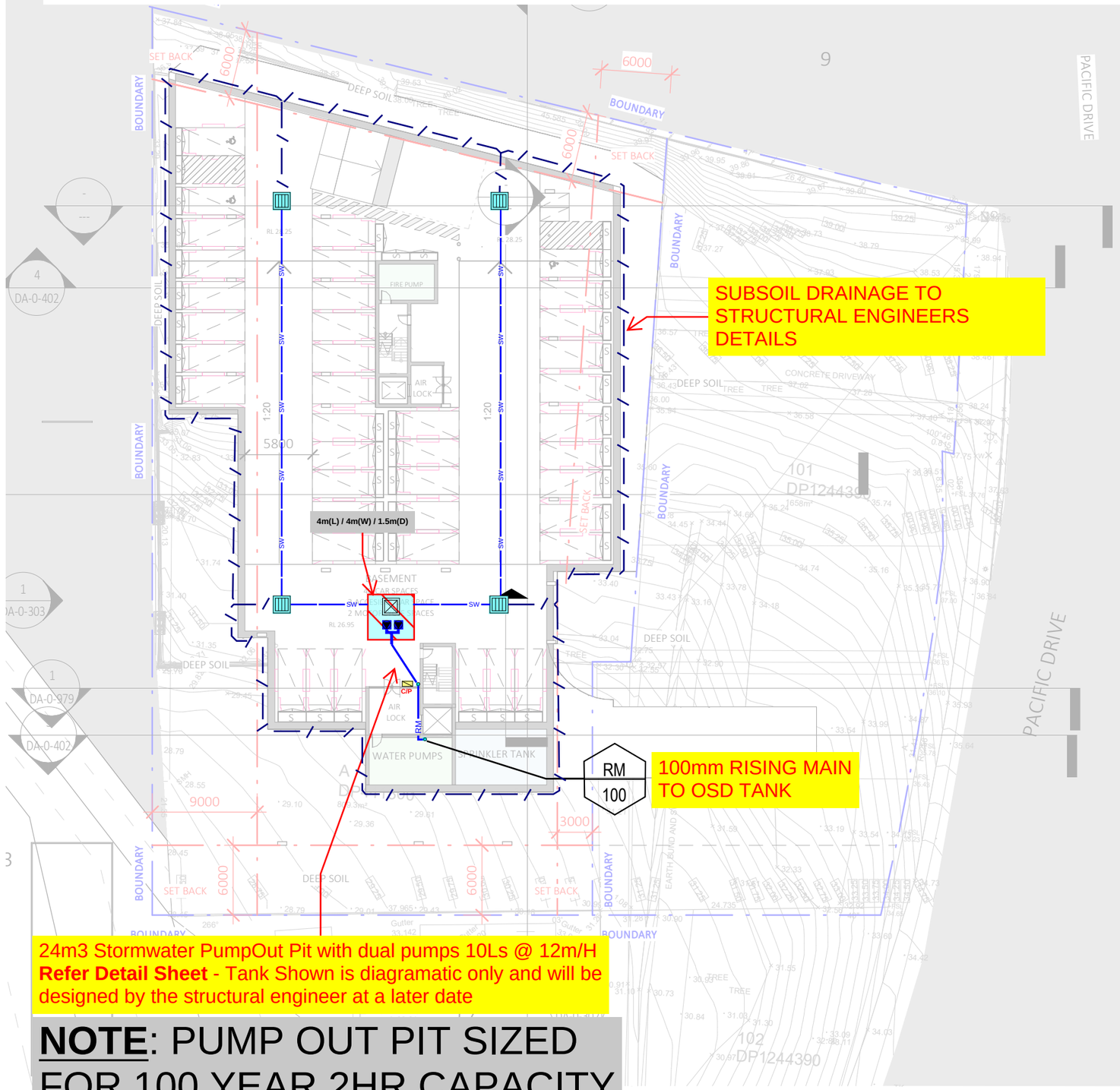
10-16 Pacific Drive, Port Maquarie
Basement and Landscaping Area
Stormwater PumpOut Concept Design



NAS Hydraulic Consulting PTY LTD	PROJECT NUMBER:
	DATE: 9.06.2022
	MARKUP: StormwaterConcept-BasementVer6June2022.pdf

LOWER GROUND FLOOR STORMWATER CONCEPT PLAN PAGE 1 OF 5

5.29.2 Design
The Stormwater Management Plan submitted with any Development Application incorporating a basement must include detail of how the proposed basement will be drained. Where minor surface areas drain to the basement, such as from the access driveway, a pump out system is permitted with discharge directed to the OSD storage tank(s) (where installed as part of the development). **Where subsurface waters are permitted to be pumped from the basement, discharge must be connected directly to Councils piped drainage system.**
An integrated Structural and Geotechnical Engineering report addressing the design of the proposed basement must be submitted with the Development Application. The design must address the following issues at a minimum:
• The basement must be of fully 'tanked' construction and be entirely waterproofed.
• The existing subsurface flow regime in the vicinity of the development must not be significantly altered as a result of the development.
• No adverse impact on surrounding properties.
• Recommendations regarding method of excavation and construction, vibration emissions and identifying risks to existing structures or those on adjoining or nearby property.
A pump-out system for stormwater disposal must be designed in accordance with the following criteria:
• The proposed pump system must consist of two (2) pumps, connected in parallel, with each pump being capable of emptying the holding tank at a rate equal to the rate of inflow for the one hour duration, 100 year Average Recurrence Interval (ARI) storm event. The holding tank must be capable of holding one hour's runoff from a one-hour duration 20 year ARI storm event.
• An overflow, flashing light and audible alarm is to be provided to warn of pump failure.
• Where OSD facilities are required, the pump system must discharge to the OSD storage tank.
• A maintenance regime for the pump system must be provided, including provision for regular maintenance and servicing at least every 6 months.



NOTE: PUMP OUT PIT SIZED FOR 100 YEAR 2HR CAPACITY

REV	DESCRIPTION	DATE	ISSUED	CHECKED
	E FOR REVIEW	31/03/2022	AC	PO
	E FOR REVIEW	06/04/2022	AC	PO
	LIMINARY PANEL UPDATED	20/04/2022	AC	PO
	E FOR S34	26/04/2022	AC	PO

Dickson Rothschild Nominated Architects:

NAS Hydraulic Consulting PTY LTD

PROJECT NUMBER:
DATE: 9.06.2022
MARKUP: StormwaterConcept-BasementVer6June2022.pdf

PROJECT
Pacific Drive

DRAWING
BASEMENT PLAN

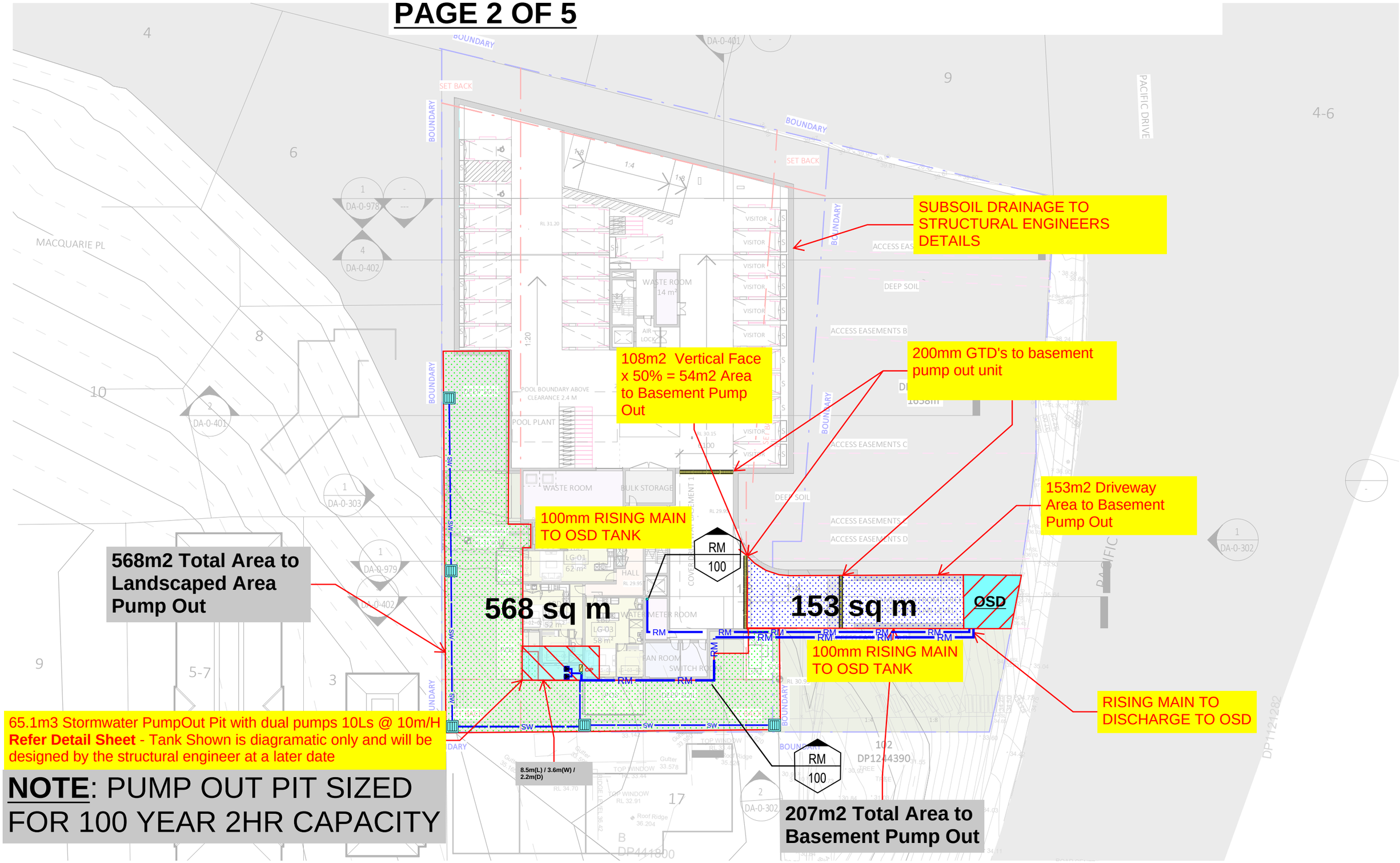
10-16 Pacific Drive, Port Maquarie
BASEMENT PUMP OUT DESIGN

PROJECT NO.	DRAWING NO.	REVISION	DATE
-020	DA-0-210	D	26/04/2022
SCALE @ A3		DRAWN	AUTHORISED
400		AC	PO

Project Status
F:\22-020 DA- (CEN)- 0 R22- Pacific Drive V5_acorreaFRESQ.rvt

PRINTED: 5/05/2022 10:06:18 a.m.

GROUND FLOOR STORMWATER CONCEPT PLAN
PAGE 2 OF 5



Dickson Rothschild

Nominated Architects:

NAS Hydraulic Consulting PTY LTD

PROJECT NUMBER:

DATE: 9.06.2022

MARKUP: StormwaterConcept-BasementVer6June2022.pdf

REV	DESCRIPTION	DATE	ISSUED	CHECKED
	E FOR REVIEW	31/03/2022	AC	PO
	E FOR REVIEW	06/04/2022	AC	PO
	LIMINARY PANEL UPDATED	20/04/2022	AC	PO
	E FOR S34	26/04/2022	AC	PO
	ED FOR BASIX	03/05/2022	PB	PO

PROJECT: Pacific Drive

10-16 Pacific Drive, Port Maquarie
BASEMENT PUMP OUT DESIGN

Project Status

F:\22-020 DA- (CEN)- 0 R22- Pacific Drive V5_acorreaFRESQ.rvt

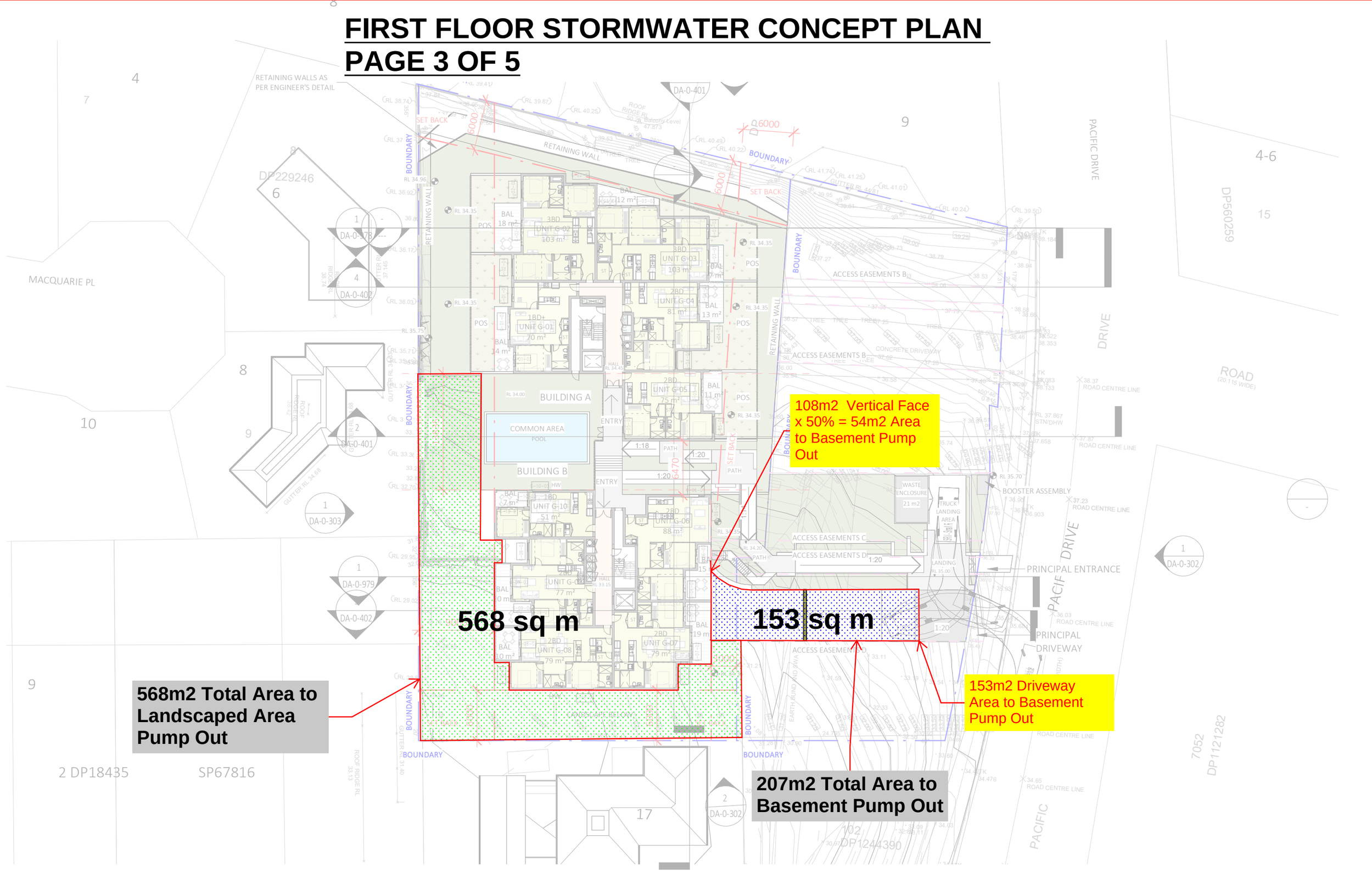
DRAWING: LOWER GROUND PLAN

PROJECT NO.	DRAWING NO.	REVISION	DATE
22-020	DA-0-211	E	03/05/2022

SCALE @ A3: 1 : 400 | DRAWN: AC | AUTHORISED: PO

PRINTED: 5/05/2022 10:06:20 a.m.

FIRST FLOOR STORMWATER CONCEPT PLAN
PAGE 3 OF 5



Dickson Rothschild | Nominated Architects:

REV	DESCRIPTION	DATE	ISSUED	CHECKED
	E FOR REVIEW	31/03/2022	AC	PO
	E FOR REVIEW	06/04/2022	AC	PO
	LIMINARY PANEL UPDATED	20/04/2022	AC	PO
	E FOR S34	26/04/2022	AC	PO
	ED FOR BASIX	03/05/2022	PB	PO

NAS Hydraulic Consulting PTY LTD

PROJECT NUMBER:

DATE: 9.06.2022

MARKUP: StormwaterConcept-BasementVer6June2022.pdf

PROJECT
Pacific Drive

10-16 Pacific Drive, Port Maquarie
BASEMENT PUMP OUT DESIGN

Project Status

F:\22-020 DA- (CEN)- 0 R22- Pacific Drive V5_acorreaFRESQ.rvt

DRAWING
GROUND FLOOR PLAN

PROJECT NO.	DRAWING NO.	REVISION	DATE
22-020	DA-0-212	E	03/05/2022
SCALE @ A3		DRAWN	AUTHORISED
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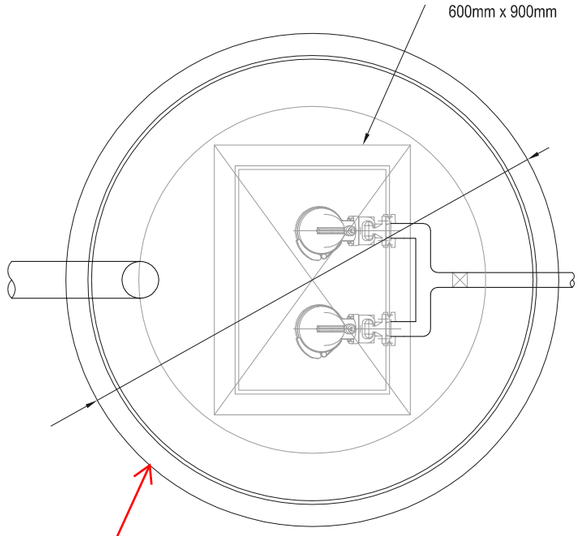
PRINTED: 5/05/2022 10:06:23 a.m.

BASEMENT STORMWATER CONCEPT PLAN PAGE 4 OF 5

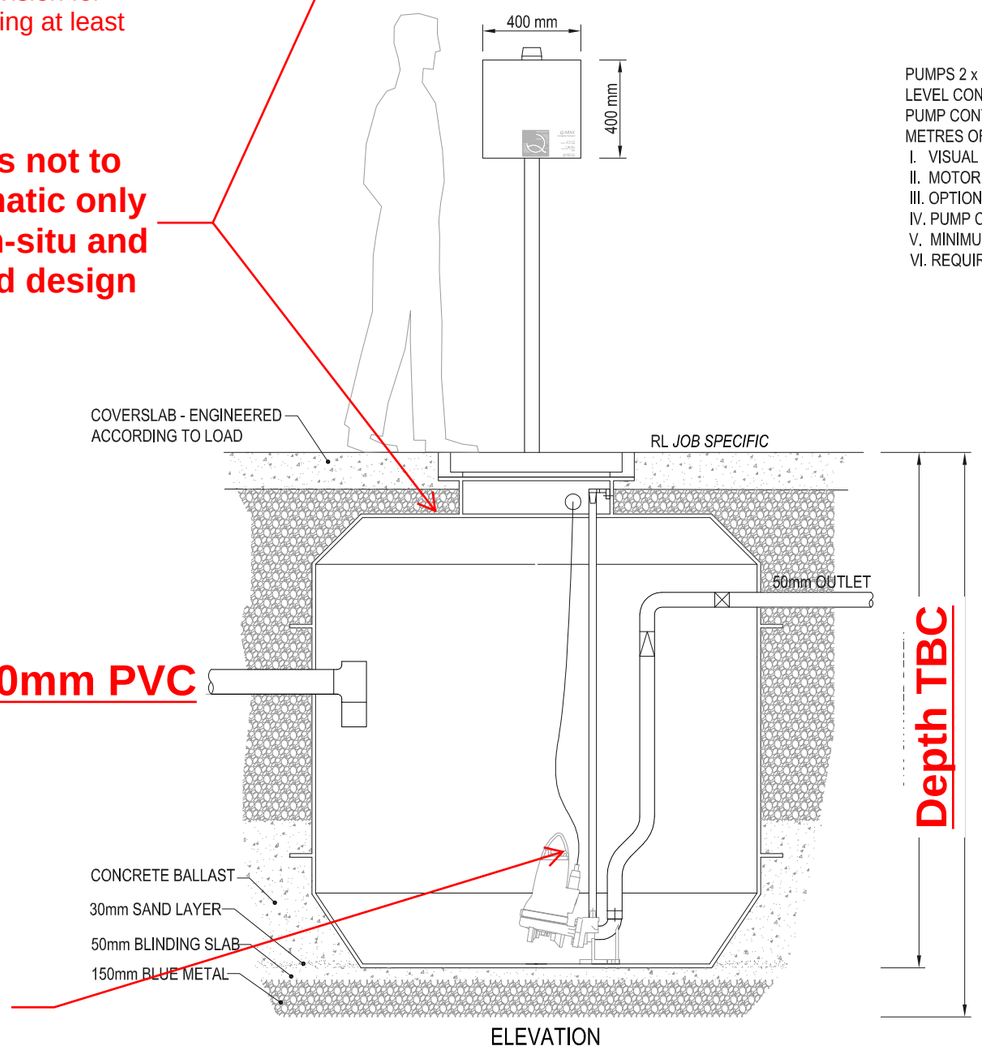
A pump-out system for stormwater disposal must be designed in accordance with the following criteria:

- The proposed pump system must consist of two (2) pumps, connected in parallel, with each pump being capable of emptying the holding tank at a rate equal to the rate of inflow for the one hour duration, 100 year Average Recurrence Interval (ARI) storm event. The holding tank must be capable of holding one hour's runoff from a one-hour duration 20 year ARI storm event.
- An overflow, flashing light and audible alarm is to be provided to warn of pump failure.
- Where OSD facilities are required, the pump system must discharge to the OSD storage tank.
- A maintenance regime for the pump system must be provided, including provision for regular maintenance and servicing at least every 6 months.

Tank Detail shown is not to scale and diagrammatic only
Tank is to be cast in-situ and is subject to detailed design



PLAN VIEW



ELEVATION

Dual Pumps 10L's @ 12m/H Duty Assist with direct connection to the OSD Tank

STORMWATER PUMP STATION - 24m3

CALCULATION - HOLDING TANK CAPACITY

Based on Appendix L of AS/NZS 3500.3.2

Contributing area (A)	=	207	m2	
ARI	=	100	yr (1% AEP)	
Storm period (T)	=	120	min =	2.0 hr
Rainfall intensity (I)	=	63.7	mm/h =	0.0637 m/h
Coefficient of runoff (C)	=	0.9		0.0396
Council	=	Port Macquarie		0.03564

Peak discharge calculated using the rational method

Flow per unit of area = C x I	=	57.33 L/h/m2 =	0.05733 m3/h/m2
Storage volume = C x I x T x A	=	**23.7 m3**	Using Peer review sizing

PUMPS 2 x GRUNDFOS OR EQUIVALENT.
LEVEL CONTROLS - FLOAT SWITCHES
PUMP CONTROLLER - Q-MAX LOGIKOS M7, DUAL ALTERNATING CONTROLLER, WALL MOUNTED WITHIN 5 METRES OF PUMPWELL, WITH:

I. VISUAL & AUDIBLE ALARMS.
II. MOTOR PROTECTION.
III. OPTIONAL BMS OUTPUTS.
IV. PUMP COMPLIANCE PLATE FIXED TO INNER DOOR.
V. MINIMUM CONDUIT SIZE 50mm.
VI. REQUIRES SITE WIRING

10-16 Pacific Drive, Port Maquarie
BASEMENT PUMP OUT DESIGN

CALCULATION - PUMP CAPACITY - PER PUMP

Based on Appendix L of AS/NZS 3500.3.2

Contributing area (A)	=	207	m2	
ARI	=	100	yr (1% AEP)	
Storm period (T)	=	120	min =	2.0 hr
		63.7	mm/hr	
Council	=	Port Macquarie		

Flow per stormwater pump	=	**5.0 L's**	3.7 L's Using formula

Dual Pumps required each capable of the above flow rate - Providing a minimum combined flow capacity of 10L's

NAS Hydraulic Consulting PTY LTD

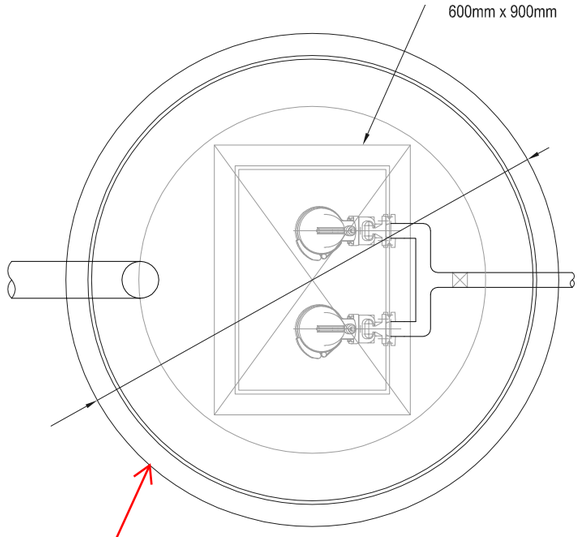
PROJECT NUMBER:
DATE: 9.06.2022
MARKUP: StormwaterConcept-BasementVer6June2022.pdf

LANDSCAPING AREA STORMWATER CONCEPT PLAN PAGE 5 OF 5

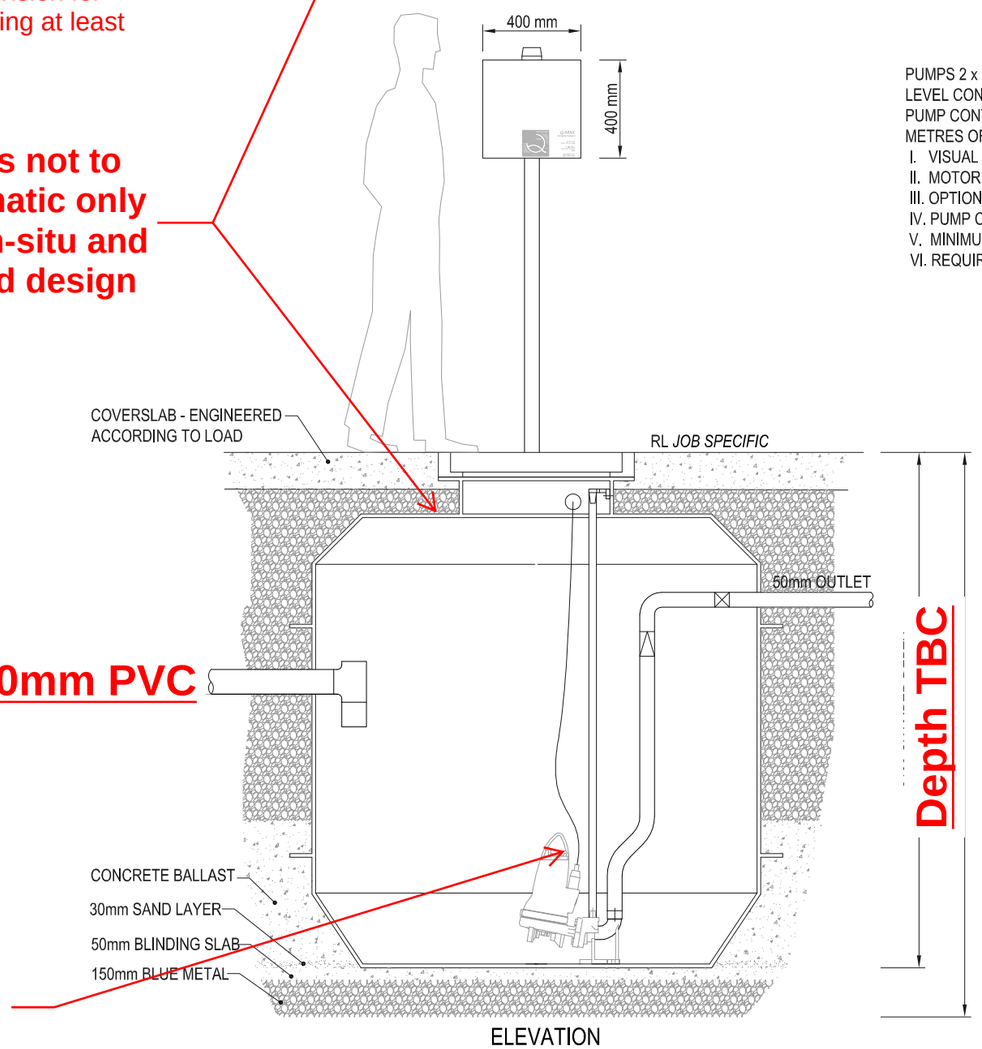
A pump-out system for stormwater disposal must be designed in accordance with the following criteria:

- The proposed pump system must consist of two (2) pumps, connected in parallel, with each pump being capable of emptying the holding tank at a rate equal to the rate of inflow for the one hour duration, 100 year Average Recurrence Interval (ARI) storm event. The holding tank must be capable of holding one hour's runoff from a one-hour duration 20 year ARI storm event.
- An overflow, flashing light and audible alarm is to be provided to warn of pump failure.
- Where OSD facilities are required, the pump system must discharge to the OSD storage tank.
- A maintenance regime for the pump system must be provided, including provision for regular maintenance and servicing at least every 6 months.

Tank Detail shown is not to scale and diagrammatic only
Tank is to be cast in-situ and is subject to detailed design



PLAN VIEW



ELEVATION

Dual Pumps 10L's @ 10m/H Duty Assist with direct connection to the OSD Tank

STORMWATER PUMP STATION - 65.1m3

CALCULATION - HOLDING TANK CAPACITY

Based on Appendix L of AS/NZS 3500.3.2

Contributing area (A)	=	568	m2	
ARI	=	100	yr (1% AEP)	
Storm period (T)	=	120	min =	2.0 hr
Rainfall intensity (I)	=	63.7	mm/h =	0.0637 m/h
Coefficient of runoff (C)	=	0.9		0.0396
Council	=	Port Macquarie		0.03564

Peak discharge calculated using the rational method

Flow per unit of area = C x I	=	57.33 L/h/m2 =	0.05733 m3/h/m2
Storage volume = C x I x T x A	=	**65.1 m3**	Using Peer review sizing

PUMPS 2 x GRUNDFOS OR EQUIVALENT.
LEVEL CONTROLS - FLOAT SWITCHES
PUMP CONTROLLER - Q-MAX LOGIKOS M7, DUAL ALTERNATING CONTROLLER, WALL MOUNTED WITHIN 5 METRES OF PUMPWELL, WITH:

I. VISUAL & AUDIBLE ALARMS.
II. MOTOR PROTECTION.
III. OPTIONAL BMS OUTPUTS.
IV. PUMP COMPLIANCE PLATE FIXED TO INNER DOOR.
V. MINIMUM CONDUIT SIZE 50mm.
VI. REQUIRES SITE WIRING

10-16 Pacific Drive, Port Maquarie
BASEMENT PUMP OUT DESIGN

CALCULATION - PUMP CAPACITY - PER PUMP

Based on Appendix L of AS/NZS 3500.3.2

Contributing area (A)	=	568	m2	
ARI	=	100	yr (1% AEP)	
Storm period (T)	=	120	min =	2.0 hr
		63.7	mm/hr	
Council	=	Port Macquarie		

Flow per stormwater pump	=	**10 L's**	10 L's Using formula

Dual Pumps required each capable of the above flow rate - Providing a minimum combined flow capacity of 15L's

NAS Hydraulic Consulting PTY LTD

PROJECT NUMBER:
DATE: 9.06.2022
MARKUP: StormwaterConcept-BasementVer6June2022.pdf

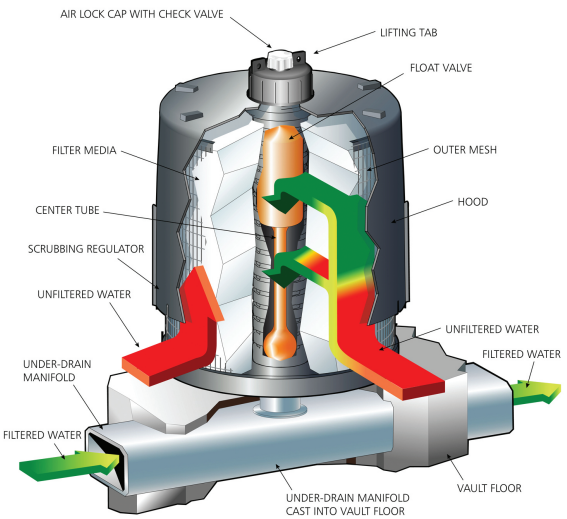
Appendix D – OceanProtect Product Information

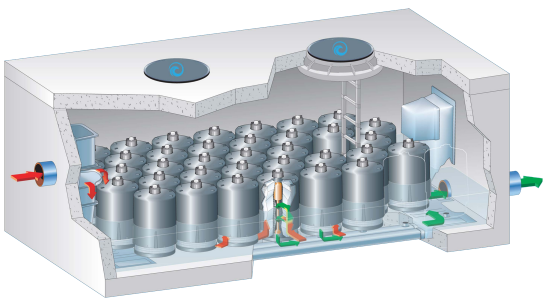
The Stormwater Management StormFilter®

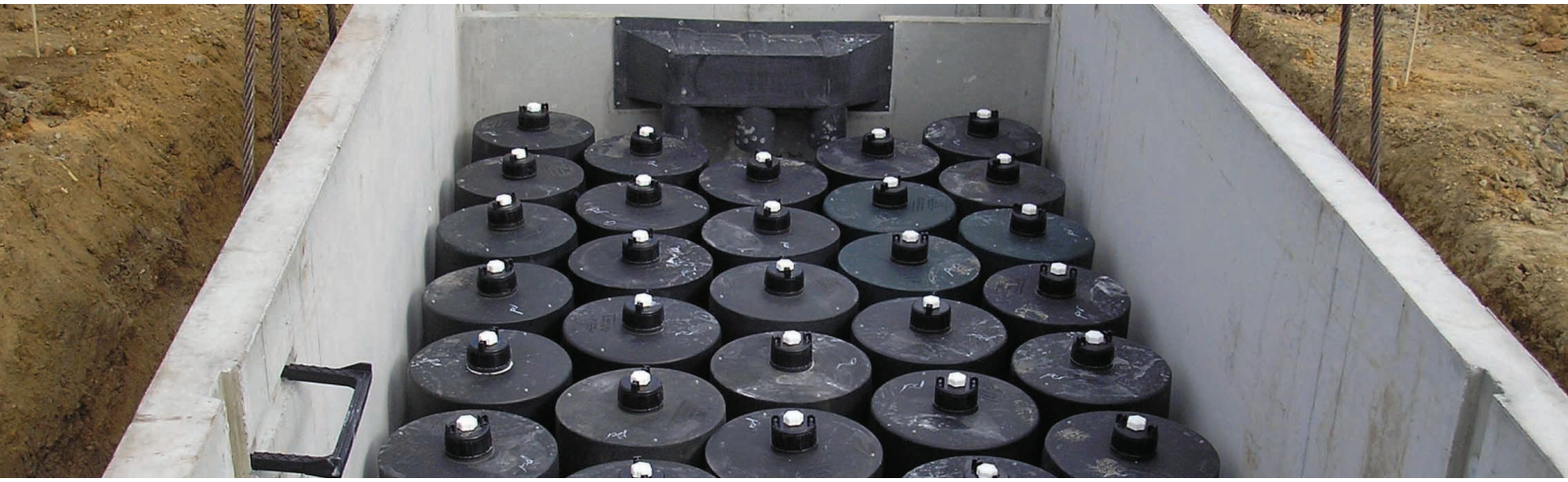
The Stormwater Management StormFilter® is a best management practice (BMP) designed to meet stringent regulatory requirements. It removes the most challenging target pollutants – including fine solids, soluble heavy metals, oil, and total nutrients (inc. soluble) – using a variety of media. For more than two decades, StormFilter has helped clients meet their regulatory needs and through product enhancements the design continues to be refined for ease of use.

How does it work?

- During a storm, runoff passes through the filtration media and starts filling the cartridge centre 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 bed ensuring even distribution of pollutants and prolonged media longevity
- After the storm, 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 bay floor. This unique surface-cleaning mechanism prevents surface blinding and further extends cartridge life







Features

- Siphon actuated, high surface area media cartridges
- Multiple cartridge heights
- Multiple media options
- Multiple configurations
- We encase our under-drain pipe work in a concrete false floor to minimise trip hazards during maintenance and the help eliminate standing water around the under-drains between rain events

Benefits

- Stormwater is drawn evenly through the filter media providing efficient, effective stormwater treatment
- Flexibility in arrangement and hydraulics to meet your sites needs
- Target specific pollutants including TSS, nutrients, heavy metals and hydrocarbons
- Lightweight, reusable cartridges
- Fewer maintenance events and reduced long-term ownership costs

Configurations and Applications

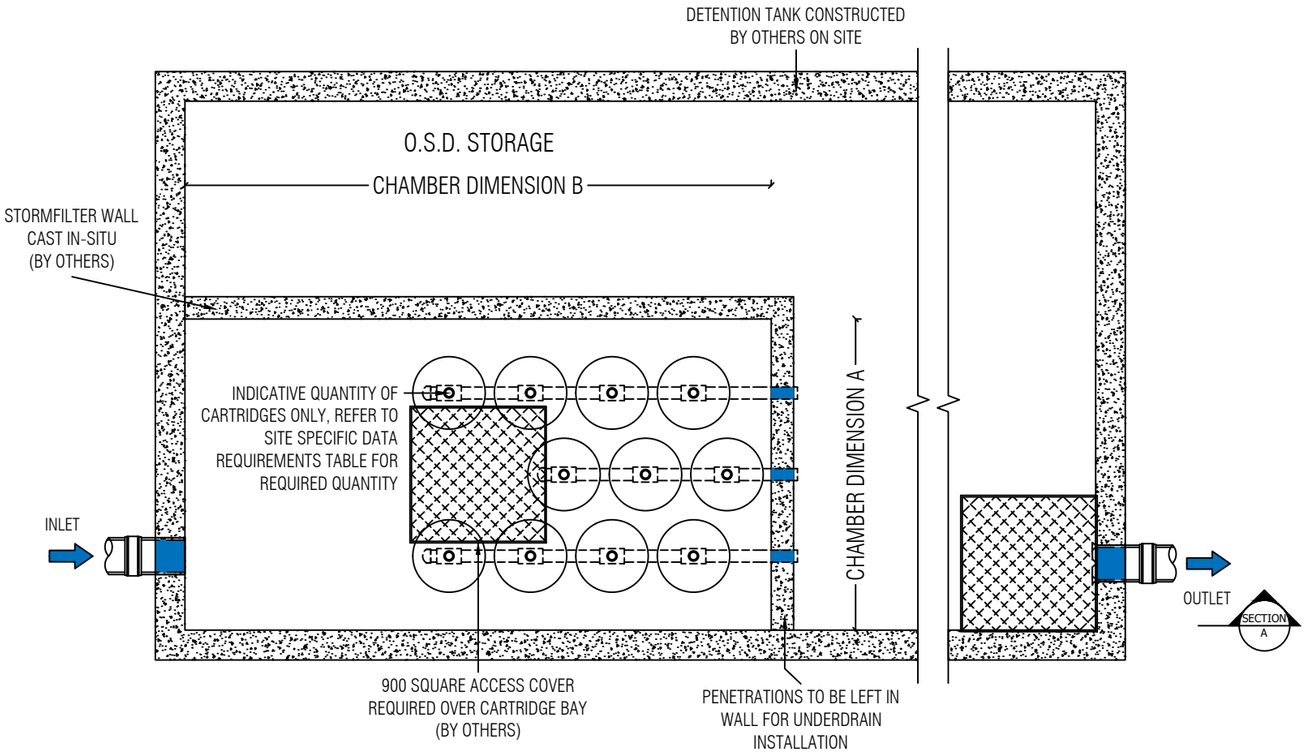
The StormFilter is available in a wide variety of configurations: precast concrete pits and tanks, custom above ground HDPE/ aluminium tanks, or incorporated into on-site detention structures. When combined with the multiple cartridge heights and media options, the StormFilter's design flexibility makes it suitable for a wide range of applications such as:

- Commercial, Industrial and Residential development, infill and redevelopment and stormwater quality retrofit applications
- Special projects: Highways, airports, seaports and military installations
- Pre-treatment for Water Sensitive Urban Design (WSUD), infiltration and rainwater harvesting and reuse systems

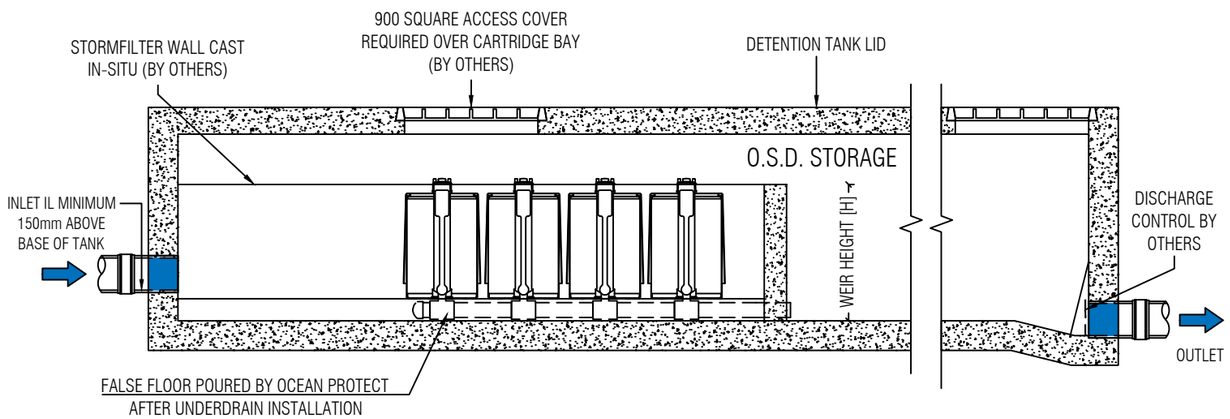
Maintenance

Every manufactured filtration device will eventually need routine maintenance. The question is how often and how much it will cost. Proper evaluation of long-term maintenance costs should be a consideration when selecting a manufactured treatment device. The StormFilter has been optimised to reduce long-term maintenance costs with proven, repeatable performance in the laboratory and in the field.

NOT FOR CONSTRUCTION



PLAN LAYOUT

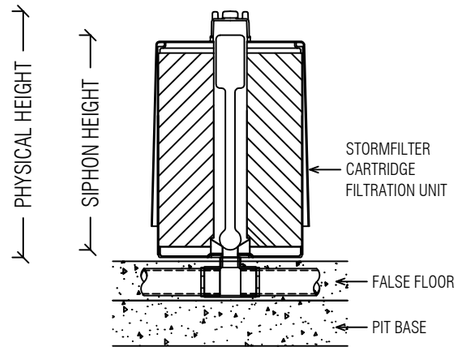


SECTION A

STORMFILTER DESIGN TABLE

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

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



STORMFILTER CARTRIDGE DETAIL

SITE SPECIFIC DATA REQUIREMENTS

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

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

GENERAL NOTES

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

INSTALLATION NOTES

1. UNDERDRAIN AND FALSE FLOOR INSTALLED BY OCEAN PROTECT.

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

OCEAN PROTECT
STORMFILTER SYSTEM
DETENTION TANK ARRANGEMENT
SPECIFICATION DRAWING

LAST MODIFIED: 07-03-19

Appendix E – Comments Response Schedule

Bewsher Review of Stormwater & Groundwater Issues - dated 30/04/22		
Comment No.	**Comment Details**	**Land Dynamics Australia Response 25/05/2022**
	Groundwater	
6	The existing groundwater assessment provided within the *Geotechnical Investigation* is brief and inadequate.	The groundwater report was prepared by EIAustralia. Additional reporting will be provided.
7	It has focussed on protection to the basement and has not considered the sub-surface water problems currently being experienced within the downslope properties.	Noted and addressed in follow up geotechnical report (by EIAustralia)
8	The proposed building construction will intercept and alter the existing sub-surface water flows. These need to be properly managed within the Application having regard to downslope water problems.	The EIAustralia report indicates that groundwater was not encountered on this site for the depths of the investigation. There is comment around sub-surface flows however. These will be intercepted by the proposed structure and subsurface drainage installed. This will be directed to the proposed stormwater pump station in the south west corner of the site. Additional sub-surface drainage will be installed on the western boundary and directed to the same pump station.
9	The additional groundwater investigations need to clearly demonstrate that the development of the Site will not have an unacceptable impact on groundwater systems and subsurface natural drainage patterns, and preferably, will have a positive benefit to the downslope properties.	Noted and addressed in follow up geotechnical report (by EIAustralia)
	Stormwater Disposal Across Council Land	
10	The Applicant's stormwater disposal concept involves piping across the Council Land as shown on the *Concept Servicing Plan, Rev G* .	Not applicable with updated concept
11	The *Owner's Consent* provided by the Council in 2017 related to work on the Council Land that was proposed at that time. The development proposal is now very different and it is not clear that the Council consents to an Application which now includes stormwater disposal across their land.	Not applicable with updated concept
12	Owner's consent from the Council is required for the stormwater works on the Council Land (and for other items such as landscaping that are now proposed on the Council Land).	Not applicable with updated concept
13	It is unclear where stormwater overflows are to be discharged. These are flows across the surface of the ground that exceed the capacity of the underground pipe system due to intense rainfall and/or blockage of stormwater pits and pipes.	Not applicable with updated concept
14	The stormwater disposal arrangements within the Council Land, including for future maintenance of the proposed system (both underground and above ground), need to be protected by easements or other legal arrangements. Details of the Applicant's proposals for these matters need to be provided.	Not applicable with updated concept
	Stormwater Arrangements within the Site	
15	The Applicant's stormwater quantity management proposals are discussed in Section 4.0 of the Stormwater Management Concept Plan (SMCP). However there are no stormwater drainage plans and there are no stormwater drainage calculations to show how this can be achieved. This is contrary to normal drainage practice. These details must be provided before consent can be granted.	Noted. Stormwater Management Plan (SWMP) has been updated to reflect change in concept. All models have been supplied with latest version of report. Models provide sufficient clarity for reviewer to understand the proposed system without the need for published calculations to be included on concept plans
	OSD Tank	
16	The Applicant proposes a 64m3 on-site stormwater detention (OSD) tank immediately inside the northern boundary of the Site as shown on the Concept Servicing Plan. Calculations to support the size of the OSD tank need to be provided.	DRAINS model supplied
17	The OSD tank is located in a tightly constrained area that is proposed to be heavily vegetated and is in close proximity to various retaining walls.	Tank location has been moved to under the access ramp
18	Further details including sections need to be provided to demonstrate that it is practical to construct the OSD tank in this location and achieve the landscaping intent. These sections need to show dimensions, thicknesses, clearances to the retaining walls including their footings, etc, in this highly constrained area of the Site.	Tank location has been moved to under the access ramp. Updated drawings with additional details sufficient for DA assessment have been included for the new location
	Assumptions about external catchments	
19	The SMCP states that there are "*no external catchments which affect the proposed site* ". Further details to substantiate this statement need to be provided.	The SWMP has been updated with additional clarification on external catchments. Refer Section 4.1 of report

20	It is understood that the Applicant proposes that the verge be re-graded to ensure that water is directed to Pacific Drive. Details of this redirection of water need to be provided.	Verge is to be re-graded so that verge is compliant with Port Macquarie Hastings Council (PMHC) standard verge cross falls (refer standard drawing ASD 207). This will direct stormwater within verge area to the road, not into the development lot
21	The Application also relies upon existing fences along the southern boundaries of Lots A and B of DP157217 to intercept and divert runoff to the Pacific Drive roadway that would otherwise drain onto the Site. Details need to be provided to demonstrate how the Applicant proposes that these arrangements remain in place for perpetuity.	Further clarification is provided in Section 4.1 of updated SWMP
	Practicality of draining site areas to the OSD tank	
22	By reference to Section 4.1 and Figure 4.1 of the SMCP, it appears the Applicant proposes that all of the Site runoff, other than the runoff falling on the red-hatched area of Figure 4.1, is to be drained to the OSD tank.	All areas of the development will drain to the OSD tank. This included the access ramp and bypass pervious areas of the site which will drain via two proposed pump stations
23	Plans showing how it is practical to achieve this drainage need to be provided.	A concept drain plan has been provided showing an approximate gravity pipeline arrangement with minimum 1% longitudinal fall to confirm this is feasible
24	Drainage from the upper levels of Building B to the OSD tank would not appear to be possible without creating aerial piping arrangements which may impact on the character of the buildings (and which haven't currently been shown on any of the architectural plans).	Updated OSD tank location to address this concern
	Drainage of external areas	
25	Areas within the Site and outside the building envelope which have sufficient fall to the stormwater pipe outlet should be provided with pits and pipes to facilitate such drainage.	Refer updated concept drainage plan
26	Details need to be provided.	Refer updated concept drainage plan
	Drains Modelling	
27	When satisfactory design and documentation of the stormwater drainage arrangements have been prepared and included within the Application, the system should be evaluated within the DRAINS software package and details provided for review.	Original design was prepared in DRAINS as outlined in original report. Models have been supplied with latest revision of report
28	Copies of the DRAINS files (with embedded results) are to be provided for review. Clear documentation (and sub catchment maps) for each catchment within DRAINS need to be provided.	Provided with latest revision of report. Catchments shown on concept drainage plans
29	The OSD tank is to be included within DRAINS.	DRAINS model supplied
30	Both existing and developed scenarios are to be simulated.	DRAINS model supplied
31	Allowance for blockage consistent with ARR 2019 is also to be included.	Allowance for blockage not required under AS3500, and internal pit/pipe design is considered conceptual only to prove sufficient fall to OSD tank as per Bewsher comment 25. External public infrastructure proposed does include blockage factors to ARR2019 and PMHC Auspec requirements, although this is considered a detailed design consideration, not a DA requirement
32	The modelling and its accompanying documentation must demonstrate compliance with Council's stormwater standards.	Drains model in accordance with PMHC Auspec requirements
33	Any portions of the Site which are not proposed to be connected to the stormwater pipe outlet need to be clearly defined and justified. Simulation of the runoff from these areas also needs to the included within the DRAINS model.	Updated concept plan with additional stormwater pump station now has all areas of site discharged via the PMHC stormwater system
34	Consistent with normal engineering practice, consideration is to be given to storms more severe than 1% AEP and the potential impact of the Application on neighbouring properties during these events.	Additional clarification has been provided within Section 4.10 of the updated SWMP
	Wall on Western Boundary	
35	The proposals for the wall on the western boundary of the Site need to be clarified. This wall currently impacts both surface and sub-surface drainage flows.	Surface and sub-surface drainage in areas adjacent to western boundary to be directed to new stormwater pump station. An emergency overflow will be provided via the fenceline sitting proud of the finished surface level on this boundary to allow surcharging to escape via natural overland flow path under gravity to the south west of the site through adjacent private property
36	The impact of the Application on these surface and sub-surface flows needs to be assessed having regard to the proposals for the wall.	As above, a new pump station will capture and convey flows to PMHC stormwater network. Note that the catchment area is significantly reduced with the proposed development, and with the installation of the pump station, it is envisaged that this issue is resolved
	Surface and Sub-Surface Flows Arriving at South-West corner of site	

37	Significant surface and sub-surface flows currently collect at the south-western corner of the Site and adversely affect the adjacent private land, most noticeably No 3 Home Street.	As above, a new pump station will capture and convey flows to PMHC stormwater network. Note that the catchment area is significantly reduced with the proposed development, and with the installation of the pump station, it is envisaged that this issue is resolved
38	The impact of the Application of these flows should be considered (including any beneficial impacts).	As above, a new pump station will capture and convey flows to PMHC stormwater network. Note that the catchment area is significantly reduced with the proposed development, and with the installation of the pump station, it is envisaged that this issue is resolved
39	Opportunities to reduce or eliminate these outflows from the Site onto the adjacent private property should be considered by the Applicant (e.g. pit and pump).	As above, a new pump station will capture and convey flows to PMHC stormwater network. Note that the catchment area is significantly reduced with the proposed development, and with the installation of the pump station, it is envisaged that this issue is resolved
	Basement Pump Out System	
40	There is confusion within the existing documentation of the proposed pump out system provided to us. This is because the NAS Hydraulic Consulting documentation referred to within the SMCP has not been provided but rather plans apparently prepared by Dickson Rothschild have been provided.	Provided sketch has been updated to NAS title block.
41	This confusion needs to be resolved.	Provided sketch has been updated to NAS title block.
	Water Quality Management and Music Modelling	
42	When the water quantity arrangements for the Site have been amended, the water quality proposals will also need to be updated.	MUSIC Models provided and SWMP provides additional information on proposed treatment devices for full compliance with PMHC Auspec requirements
43	Revised MUSIC modelling will need to be prepared to demonstrate that the stormwater arrangements for the Site conform to Council's water quality requirements.	MUSIC Models provided and SWMP provides additional information on proposed treatment devices for full compliance with PMHC Auspec requirements

LAURUS PROJECTS PTY LTD V PORT-MACQUARIE-HASTINGS COUNCIL & NORTHERN REGIONAL PLANNING PANEL (2021/349871) - Expert feedback on plans received 13 May 2022

	Comment Details	**Land Dynamics Australia Response 25/05/2022**
	Groundwater	
12	Please provide an itemised response to paragraphs 6 through 43 of our letter of 30 April 2022. This should describe how the matters have been addressed and reference the documents where the new material can be found. If any matters are not addressed the reasons should be provided. If any matters are proposed to be addressed by conditions, these should be identified and described.	Will be included as an addendum to updated report
13	Groundwater: The geotechnical report has not been updated. The covering letter appended to the front of the report appears to be in response to earlier comments provided by the Council and does not refer to our letter of 30 April.	The groundwater report was prepared by EIAustralia. Additional reporting will be provided.
14	The area of the site that is not proposed to be collected and piped to Pacific Drive is too large given the intensive development of the site that is proposed. Additional measures need to be included to collect and dispose of the stormwater runoff. These include acquisition of the stormwater easement through adjacent properties or the provision of a collection sump and pumps.	Provision of a stormwater sump and pump out system has been included in the south-west corner of the site and described in the updated report
15	The passage of overland flows including those resulting from blockage and/or extreme rainfall events, has not been described. The location of these overland flow paths, the magnitude of flows, the impact on off-site properties and the consideration of alternative practical options to minimise impacts to third parties, need to be provided.	Description of overland flow has been indicated on the stormwater layout plan and described in the report
16	Details of the Applicant's proposal for the western boundary wall/fence need to be provided. The existing fence is causing concentration of flows onto Home Street properties and involves a diversion of the natural catchments. This issue has to be addressed by the Applicant.	Subsoil drainage will be constructed as part of the retaining wall construction and be directed to south-west corner pump out system