

Civil/Stormwater Report

Forest Way Shopping Centre

Prepared for Point Polaris February 2020

181210

**Structural
Civil
Traffic
Facade
Consulting
Engineers**

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Revision Register

Rev	Date	Prepared By	Approved By	Remarks
1	28/05/2018	NvdH	SB	Draft
2	24/09/2018	TH	SB	Final
3	21/2/2020	SB	SB	Response to Council Comments

1.0 Introduction

Taylor Thomson Whitting have been engaged by Point Polaris to complete the civil design for the proposed development Forest Way Shopping Centre in Forestville. The development includes the redevelopment and expansion of the existing shopping centre.

1.1 The Site

The existing site is 19,600m² and shown in Figure 1.



Figure 1: Locality Plan

Source: Nearmap image date 20/01/2018

The site is located within the Northern Beaches local government area (LGA). The site was formerly located in the Warringah LGA prior to the merger of Warringah, Pittwater and Manly to form the Northern Beaches LGA.

1.2 Proposed Development

The proposed development includes the redevelopment refurbishment and extension of the existing shopping centre. The proposal included new basement parking and 2 levels of retail and commercial premises. The proposed development also includes a 2,900m² roof top garden area. The proposed development shown in Figure 2.

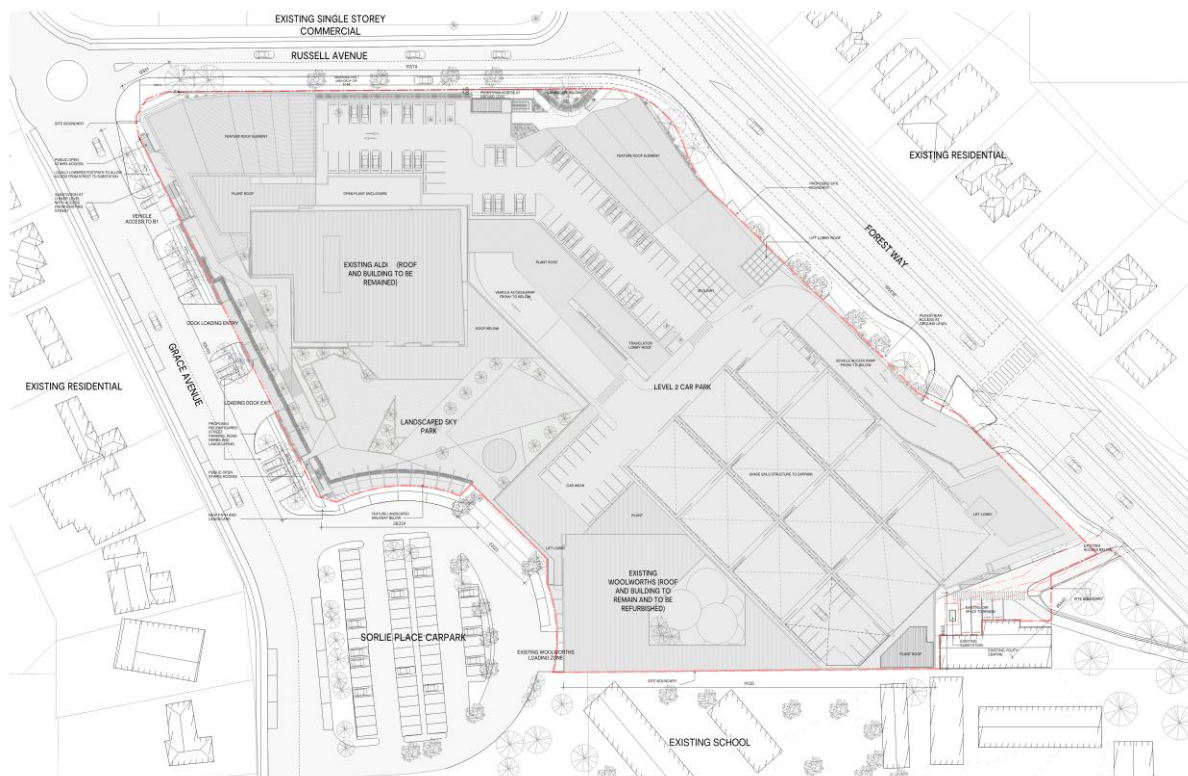


Figure 2– Proposed development

Source: Buchan

1.3 Relevant Documents

The following documents were reviewed to identify Councils DCP requirements:

- Northern Beaches Local Environment Plan
- PL 850 Water Management Policy
- Warringah Development Control Plan 2011.
- Warringah Council On-site Stormwater Detention Technical Specification
- Warringah Council Water Sensitive Design Policy
- Warringah Council Water Management referral response
- Warringah Council Development Engineering referral response

1.4 Response to Water Management referral comments



Water Management Referral Response

Application Number:	DA2018/1924
To:	David Auster
Land to be developed (Address):	Lot 20 DP 1209801 , Forest Way FRENCHS FOREST NSW 2086

Reasons for referral

Council's Water Management Officers are required to consider the likely impacts.

Officer comments

The application has been assessed under
Warringah DCP 2011 C4 – Stormwater
Warringah DCP 2011 C5 – Erosion and Sedimentation
Warringah Council PL 850 Water Management Policy
Northern Beaches Council Public Domain Design Guidelines

The proposed method for treating stormwater runoff is the use of SPEL hydrosystems. While these effectively treat all flows up to the designed bypass, they are not considered water sensitive urban design and do not meet the objectives of Northern Beaches Council for significant developments such as this.

The subject site is located in an area marked as Phase 3 of the Frenchs Forest Precinct Development. A significant objective of this precinct is the incorporation of water sensitive urban design elements into building design. This is also a significant objective of Council's current Water Management Policy. Council's policy includes the following principles:

"Integrate water sensitive urban design measures into the built form to maximise amenity"

"Encourage the reuse of water and alternative water sources"

"Align development controls with the objectives of the Water Sensitive Warringah Strategic Plan".

SPEL Hydrosystem filters do not reduce the quantity of runoff, and therefore do not minimise the impacts of increased flows or extended periods of flows (due to detention facilities). By using green infrastructure such as bio-filtration, permeable paving and green walls to treat stormwater runoff, additional water will infiltrate and evaporate, thus reducing the quantity of runoff and therefore reducing erosion of the downstream catchment. The proposal includes the use of green walls, however they have missed an opportunity for treatment by irrigating them with the potable water supply.

Council's Public Domain Guidelines B.1.14-18 Street Trees, WSUD and Landscape Treatments recommend that street tree surrounds be designed to incorporate WSUD to receive water runoff, WSUD treatments be incorporated in public spaces, and planted or turf verge treatments used to reduce paved surfaces and provide separation between the footpath and roadway (to reduce runoff to the gutter). There is sufficient landscaped areas around the perimeter of the development to incorporate these recommendations. Plantings in bio-filters do not need to be specifically directed at water treatment; there are many suitable native ornamentals that may be considered (see <https://waterbydesign.com.au/wsud-plant-database/bioretenion-plants>).

The applicant must:

1. Provide a MUSIC model for the development (.sqz file)

DA2018/1924

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2. Revise the stormwater treatment strategy to incorporate additional green infrastructure (WSUD) elements rather than relying entirely on filter devices. Using the proposed green walls to reuse stormwater, and incorporating tree pits, infiltration strips and permeable paving is strongly encouraged.

The proposal is therefore unsupported.

Note: Should you have any concerns with the referral comments above, please discuss these with the Responsible Officer.

Recommended Water Management Conditions:

Nil.

We have reviewed council's comments and we seek to comply with the intent via the following;

Addition of rainwater reuse storages prior to each of the detention storages for reuse on the proposed landscape planting area and proposed green walls in place of potable water supply.

This will reduce the stormwater runoff volume from the development, comply with the detention requirements and comply with council's water quality targets.

The rainwater storage volumes are as follows;

Catchment	On site Detention Storage	Rainwater Storage
Forestway	264 cum	88 cum
Grace Avenue	63 cum	31.5 cum
Sorlie Place	116 cum	38.6 cum

The irrigation reuse of the site green space and the road reserve nature strip where agreed will provide the runoff volume reduction required and the associated reduction in erosion risk and downstream flood risk.

1.5 Response to Engineering referral comments



Engineering Referral Response

Application Number:	DA2018/1924
To:	David Auster
Land to be developed (Address):	Lot 20 DP 1209801 , Forest Way FRENCHS FOREST NSW 2086

Reasons for referral

This application seeks consent for the following:

- New Dwellings or
- Applications that require OSD where additional impervious area exceeds 50m2 or
- Alterations to existing or new driveways or
- Where proposals affect or are adjacent to Council drainage infrastructure incl. watercourses and drainage channels or
- Torrens, Stratum and Community Title Subdivisions or
- All new Commercial and Industrial and RFB Development with the exception of signage or
- Works/uses in flood affected areas

And as such, Council's development engineers are required to consider the likely impacts on drainage regimes.

Officer comments

Comments 31/12/19

There has been no further stormwater drainage information submitted as requested previously. The application is not supported by Development Engineering. Please see previous referral comments .

Comments 24/5/19

There has been no further stormwater drainage information submitted as requested previously. The application is not supported by Development Engineering.

ADDITIONAL INFO RECEIVED - SEE TRIM

The proposed alterations to the existing shopping centre are not supported because of the following reasons:

The applicant has not provided the minimum information as required by clause 3.1.3 of Councils "On site detention technical specification" which includes detailed stormwater drainage plans and the DRAINS model so Council can review the determination of the post development flows.

As also advised at the Pre lodgement meeting :



The condition of the western Council downstream drainage networks are to be condition assessed by CCTV and engineers report. Where the structural condition of these lines are poor they will need to be replaced or relined in accordance with Councils technical specifications. Gross pollutant traps are to be incorporated into the stormwater drainage design in accordance with Councils stormwater management policy.

Site works/excavation of the car parking basements.

In accordance with the Sydney Coastal councils "Ground water management handbook" the basement will need to be fully tanked if groundwater is encountered. Any proposed dewatering of the site is to comply with the handbook and Northern Beaches Council requirements.

The proposal is therefore unsupported.

Note: Should you have any concerns with the referral comments above, please discuss these with the Responsible Officer.

Recommended Engineering Conditions:

Nil.

The following report and calcs and attached drawings represent the intended detention, water quality and reuse system for the Forestway Shopping centre development prepared as part of the DA submission for your review.

We are happy to carry out CCTV inspect of councils existing infrastructure to confirm the pipe conditions and to assess any assets in poor condition affected by the proposed development.

The basement drainage condition will be further assessed with additional geotechnical testing post consent.

2.0 Co-ordination with Existing Services

A Dial Before You Dig (DBYD) search was completed for the site. Existing services are shown to pass around the perimeter of the site. The DBYD reports do not show any services that traverse the property. Services that enter the site all appear to only service the existing shopping centre and terminate within the site. There were no major services noted that require relocation. All service locations need to be confirmed by survey.

Two substations are noted on the dial before you dig plans within the site as shown in Figure 3.

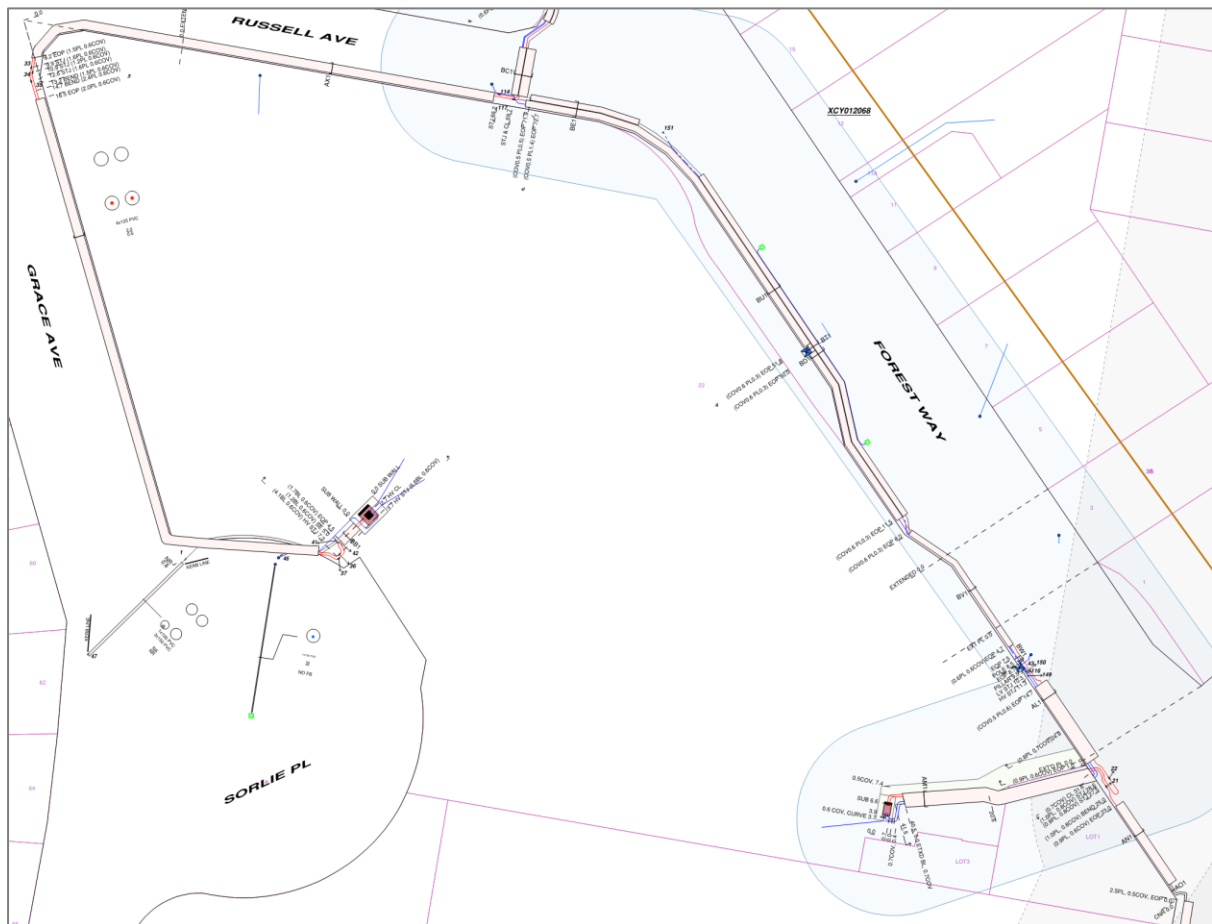


Figure 3: Electrical Services near the site

Source: Ausgrid DBYD report

Source: Jemena DBYD report

Source: Sydney Water DBYD report

3.0 Civil and Stormwater

3.1 Catchment

The total site area is 19,600m². The site is divided into three catchments named for their discharge point, Forest Way, Grace Ave and Sorlie Place. The details for the three catchments are shown in Table 1 and Figure 6. The percentage of the site that is considered in impervious will be reduced post development by the inclusion of a roof top garden area.

Table 1 Catchment Details

Catchment	Area (m ²)	undeveloped impervious	Current impervious	Post Development impervious
Forest Way	11,000	0%	100%	97%
Grace Ave	3,000	0%	100%	90%
Sorlie Place	5,500	0%	100%	90%
Total	19,600	0%	100%	93%

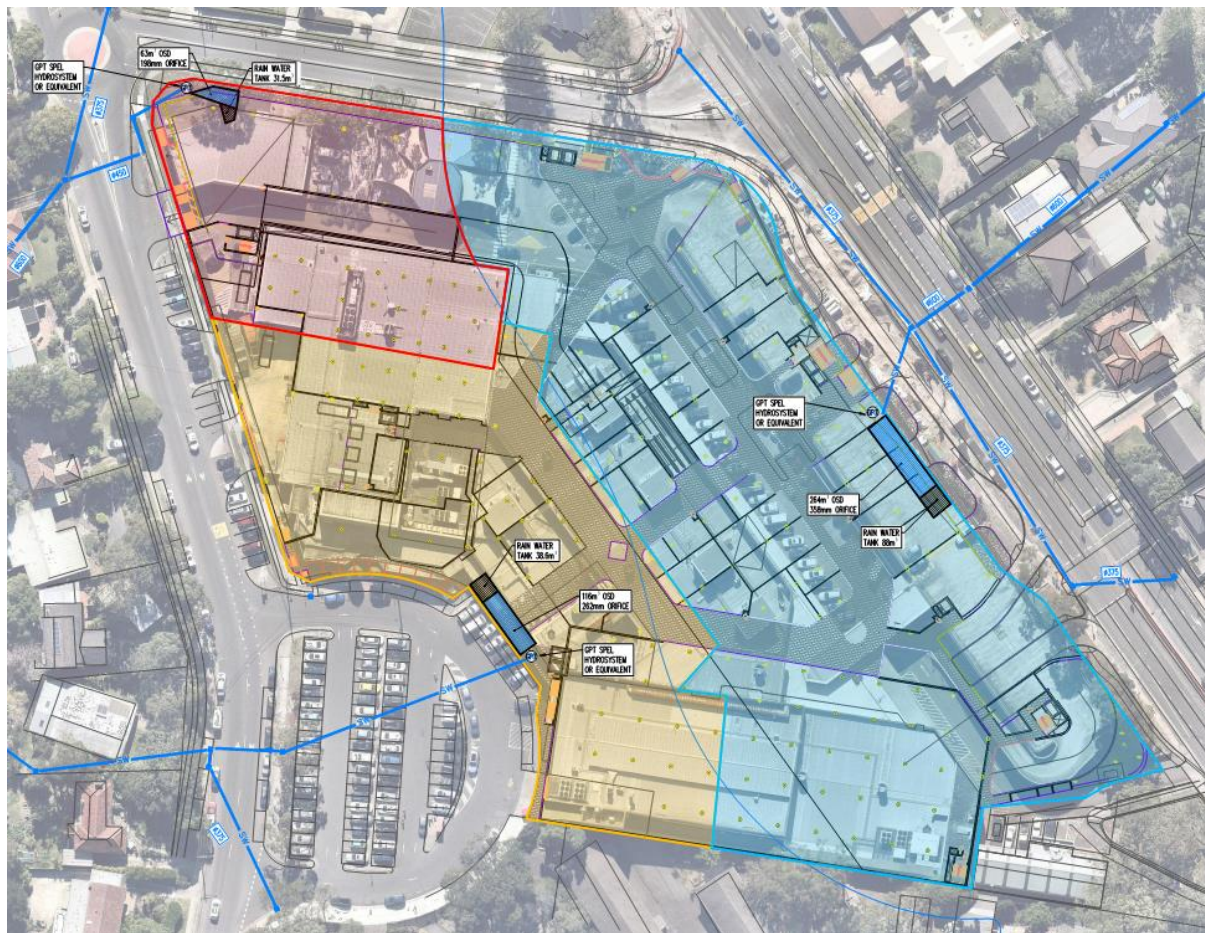


Figure 6: Catchment Plan

3.2 Flooding

The site is located at the headwaters of two mainstream catchments Middle Creek and Carrol Creek. Middle Creek flows to the east and into Narrabeen Lagoon. Carrol Creek flows to the West and into Middle Harbour. The site is not subject to mainstream flooding.

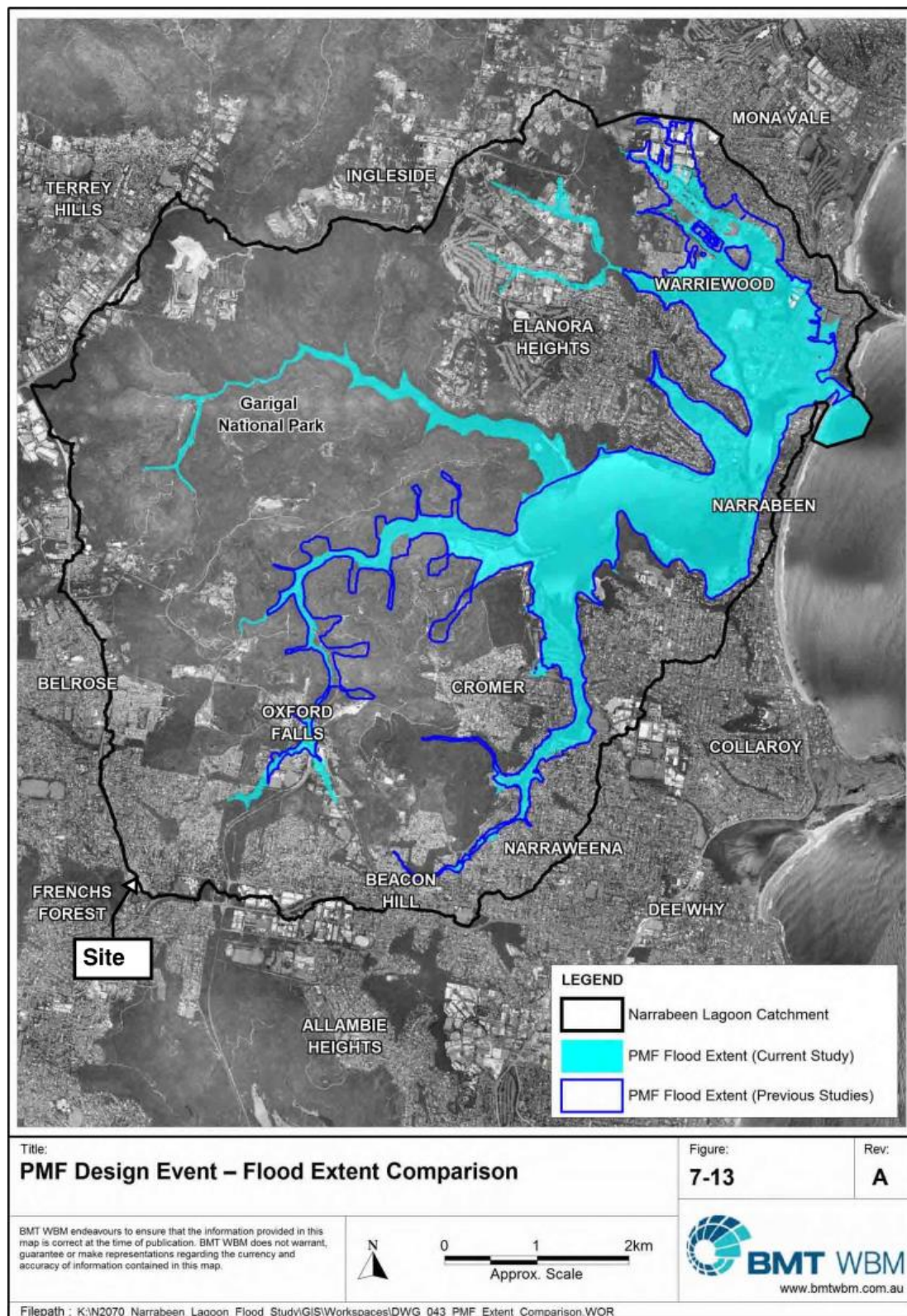


Figure 7 Narrabeen Lagoon PMF Extents

Source: Narrabeen Lagoon Flood Study, by BMT WBM, commissioned by Warringah Council.

3.3 Stormwater Quantity

The Warringah On-site Stormwater Detention Technical Specification notes:

For all developments except single residential dwelling developments the PSD is to be calculated on the maximum allowable impervious fraction of 0%. That is, discharge off the site is to be restricted to the “state of nature” condition.

The aim for the development was to reduce the current peak discharge with a target reduction to the undeveloped peak rates. In order to achieve these targets on-site detention is proposed in combination with a roof garden area are proposed.

The catchments and stormwater systems were modelled in Drains software using the current ARR 2016 storms and procedures for an initial and continuing loss model.

The proposed solution for the development includes 443m³ of OSD. For the total site this reduces the peak discharge for the site by approximately over 50% for all storms compared to its current state. Peak discharge is reduced to levels below the undeveloped and 100% pervious state. These results are shown in Table 2. Results for the three catchments are shown in the sections below.

Table 2 – Total site Discharge rates

Storm Event	Undeveloped peak flow rate (l/s)	Current peak flow rate (l/s)	Post development peak flow rate (l/s)
20% AEP	354	758	354
5% AEP	603	1,038	450
1% AEP	735	1,374	544

3.3.1 Forest Way Catchment

The 11,000m² Forest Way catchment was modelled in Drains software. A 264m³ OSD with a 358mm orifice plate was designed to limit the peak site discharge. The peak discharge rates are shown in Table 3

Table 3 – Forest Way Discharge rates

Storm Event	Undeveloped peak flow rate (l/s)	Current peak flow rate (l/s)	Post development peak flow rate (l/s)
20% AEP	200	441	200
5% AEP	340	605	254
1% AEP	415	800	307

3.3.2 Grace Ave Catchment

The 3,000m² Grace Ave catchment was modelled in Drains software. A 63m³ OSD with a 198mm orifice plate was designed to limit the peak site discharge. The peak discharge rates are shown in Table 4.

Table 4 – Grace Avenue Discharge rates

Storm Event	Undeveloped peak flow rate (l/s)	Current peak flow rate (l/s)	Post development peak flow rate (l/s)
20% AEP	54	112	54
5% AEP	93	153	68
1% AEP	113	203	82

3.3.3 Sorlie Place Catchment

The 5,500m² Sorlie Place catchment was modelled in drain software. A 116m³ OSD with a 262mm orifice plate was designed to limit the peak site discharge. The peak discharge rates are shown in Table 4.

Table 5 – Sorlie Place Discharge rates

Storm Event	Undeveloped peak flow rate (l/s)	Current peak flow rate (l/s)	Post development peak flow rate (l/s)
20% AEP	100	205	100
5% AEP	170	280	128
1% AEP	207	371	155

3.4 Stormwater Quality

The proposed development site will require the installation of water quality treatment devices. The water quality targets set by Norther Beaches Council's Water Management Policy, extract below

Table 4 – General Stormwater Quality Requirements

Pollutant	Performance Requirements
Total Phosphorous	65% reduction in the post development mean annual load ¹
Total Nitrogen	45% reduction in the post development mean annual load ¹
Total Suspended Solids	85% reduction in the post development mean annual load ¹
Gross Pollutants	90% reduction in the post development mean annual load ¹ (for pollutants greater than 5mm in diameter)
pH	6.5 - 8.5
Hydrology	The post-development peak discharge must not exceed the pre-development peak discharge for flows up to the 2 year ARI

Note:

¹The percentage reduction in the post development mean annual loads are relative to the loads from the proposed development without treatment applied.

The proposed development can meet the required water quality targets for all discharge points. The MUSIC model results and treatment train results for each catchment as described in the sections below.

3.4.1 Forest Way Catchment

MUSIC modelling has been completed for the Forest Way Catchment proposed development. The treatment system consisted of:

- 88m³ Rainwater reuse tank with a reuse rate of 112kL/year for irrigation purposes
- 264m³ On-site detention tank
- Spel Hydrosystem 2500/13 with a 52 l/s high-flow bypass

The stormwater treatment results are presented in the Table 6.

Table 6 – Forest Way Catchment MUSIC Results

Pollutant	Source	Residual	Reduction	Target
Flow (ML/yr)	14.5	14.4	1.3%	NA
Total Suspended Solids (kg/yr)	2650	295	88.9%	85%
Total Phosphorus (kg/yr)	4.22	0.779	81.5%	65%
Total Nitrogen (kg/yr)	31.3	16.8	46.3%	45%
Gross Pollutants (kg/yr)	354	0	~99%	90%

All targets have been met with the proposed stormwater treatment system.

3.4.2 Grace Ave Catchment

MUSIC modelling has been completed for the Grace Ave Catchment proposed development. The treatment system consisted of:

- 31.5m³ Rainwater reuse tank with a reuse rate of 112kL/year for irrigation purposes
- 63m³ On-site detention tank
- Spel Hydrosystem 1500/4 with a 16 l/s high-flow bypass

Table 7 – Grace Ave MUSIC Results

Pollutant	Source	Residual	Reduction	Target
Flow (ML/yr)	3.78	3.65	3.5%	NA
Total Suspended Solids (kg/yr)	707	72.9	89.7%	85%
Total Phosphorus (kg/yr)	1.15	0.188	83.6%	65%
Total Nitrogen (kg/yr)	8.25	4.25	48.4%	45%
Gross Pollutants (kg/yr)	93.2	0	~99%	90%

All targets have been met with the proposed stormwater treatment system.

3.4.3 Sorlie Place Catchment

MUSIC modelling has been completed for the Sorlie Place Catchment proposed development. The treatment system consisted of:

- 38.6m³ Rainwater reuse tank with a reuse rate of 112kL/year for irrigation purposes
- 116m³ On-site detention tank
- Spel Hydrosystem 2200/7 with 28 l/s high-flow bypass

Table 8 – Sorlie MUSIC Results

Pollutant	Source	Residual	Reduction	Target
Flow (ML/yr)	6.93	6.79	2%	NA
Total Suspended Solids (kg/yr)	1290	143	88.9%	85%
Total Phosphorus (kg/yr)	2.04	0.365	82.1%	65%
Total Nitrogen (kg/yr)	15.5	7.96	47.3%	45%
Gross Pollutants (kg/yr)	171	0	~99%	90%

All targets have been met with the proposed stormwater treatment system.

3.5 Stormwater Design

Stormwater will be collected by a combination of gutters, downpipe and pits discharging into the OSD tanks. The preliminary design is shown in Figure 8.

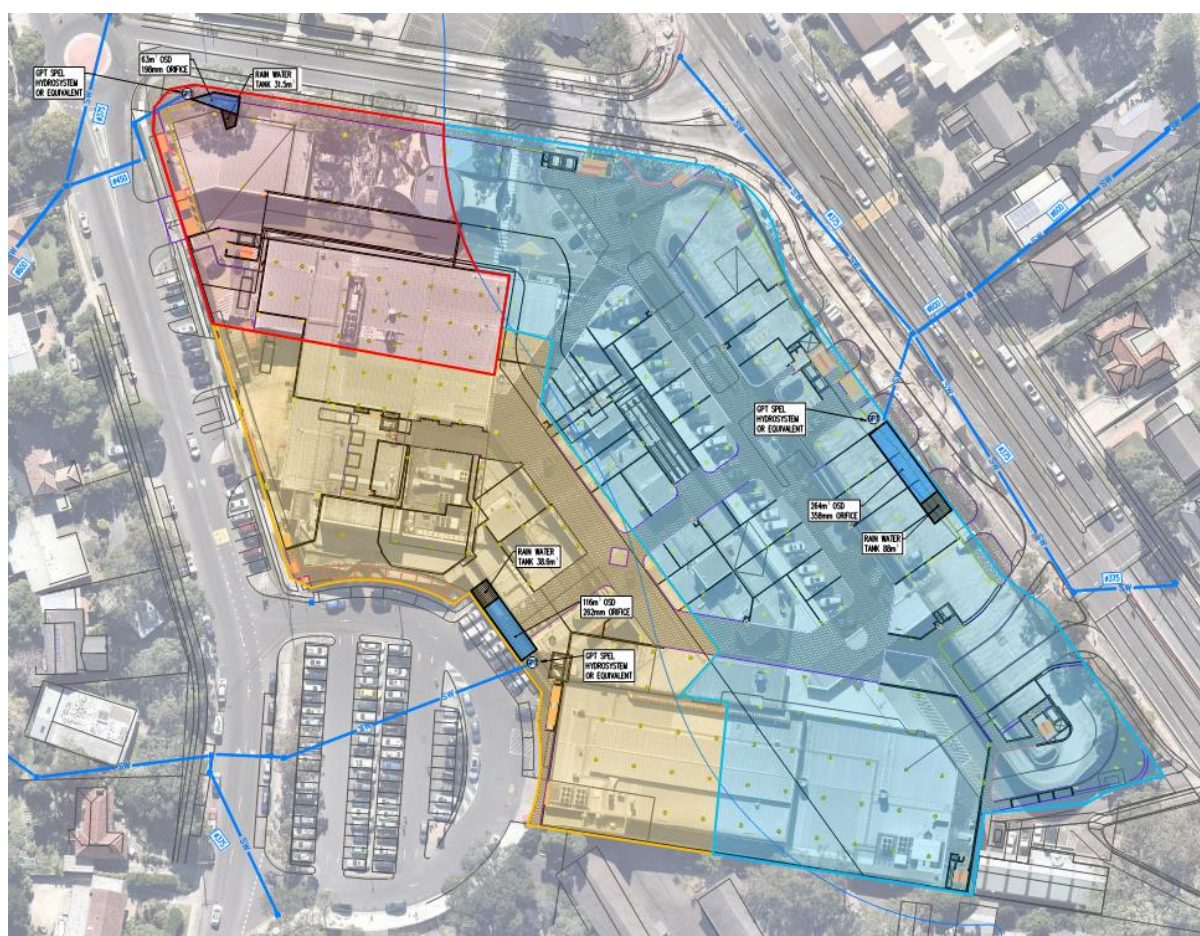


Figure 8: Preliminary Stormwater Design

3.5.1 Discharge Point

The three proposed discharge points to councils inground system are shown below in Figure 9, Figure 10 and Figure 11.



Figure 9: Proposed Discharge point on Forest Way.



Figure 10 Proposed Discharge point on Grace Ave



Figure 11 Proposed Discharge point on Sorlie Place

4.0 Recommendations and Conclusion

The following recommendation and conclusions are made:

- The proposed stormwater plan will reduce the peak discharge by 60% from its current level. Post development discharge will be less than a 0% impervious undeveloped state.
- A total of 443m³ of on-site detention is required split over the three discharge points to meet the above.
- Stormwater quality targets can be met with rainwater reuse tanks, on-site detention and Spel Hydrosystem units or an equivalent.
- Stormwater discharge will be to existing stormwater pits located on Forest Way, Grace Ave and Sorlie Place.

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