

# Civil/Stormwater Report

## Forest Way Shopping Centre

Prepared for Point Polaris September 2018

181210

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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

## 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 19,600m<sup>2</sup> 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 2,900m<sup>2</sup> roof top garden area. The proposed development shown in Figure 2.





Figure 2– Proposed development

Source: Point Polaris

### 1.3 Relevant Documents

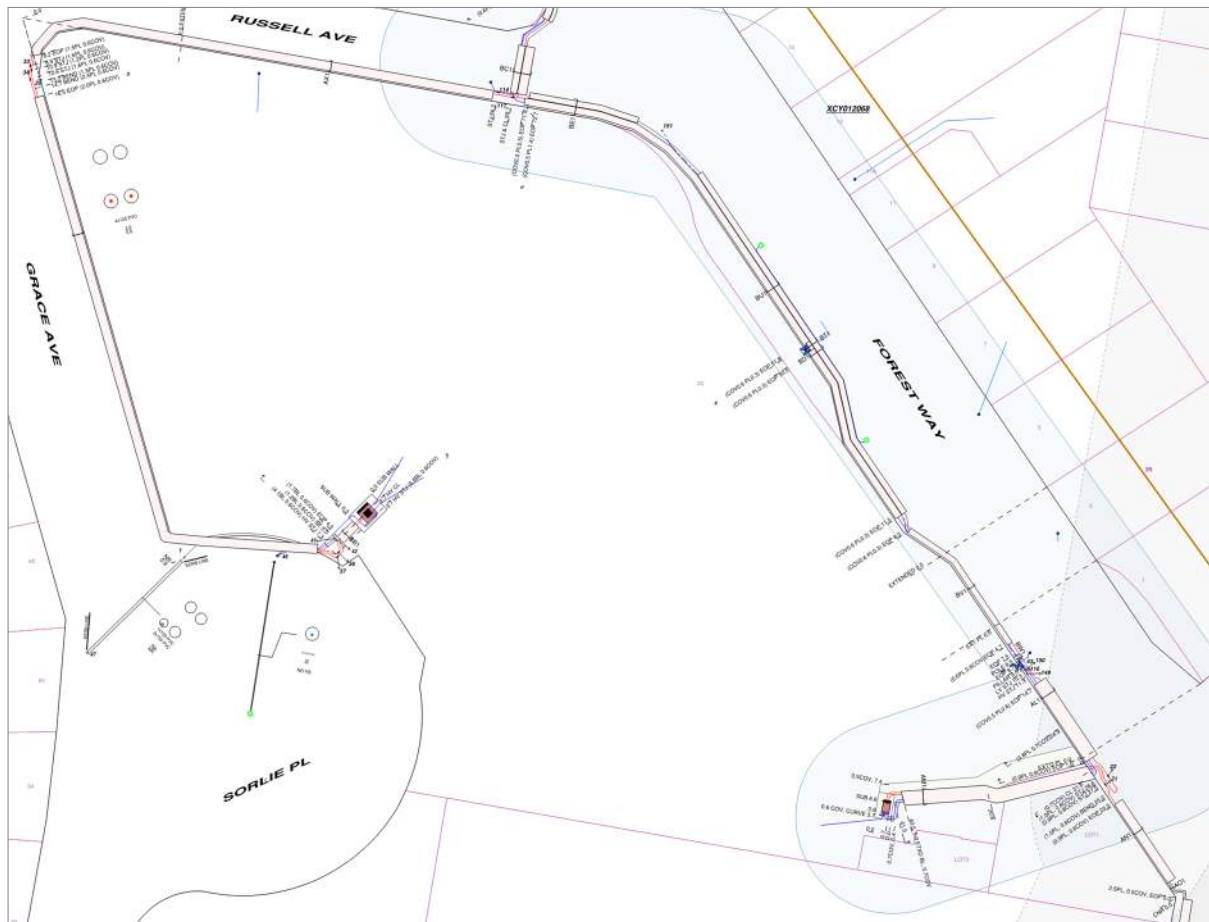
The following documents were reviewed to identify Councils DCP requirements:

- 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

## 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



The main water services run along Forest Way as shown in Figure 5.



**Figure 5: Water Services near the site**

Source: Sydney Water DBYD report



## 3.0 Civil and Stormwater

### 3.1 Catchment

The total site area is 19,600m<sup>2</sup>. 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 <sup>2</sup> )	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%
<b>Total</b>	<b>19,600</b>	<b>0%</b>	<b>100%</b>	<b>93%</b>

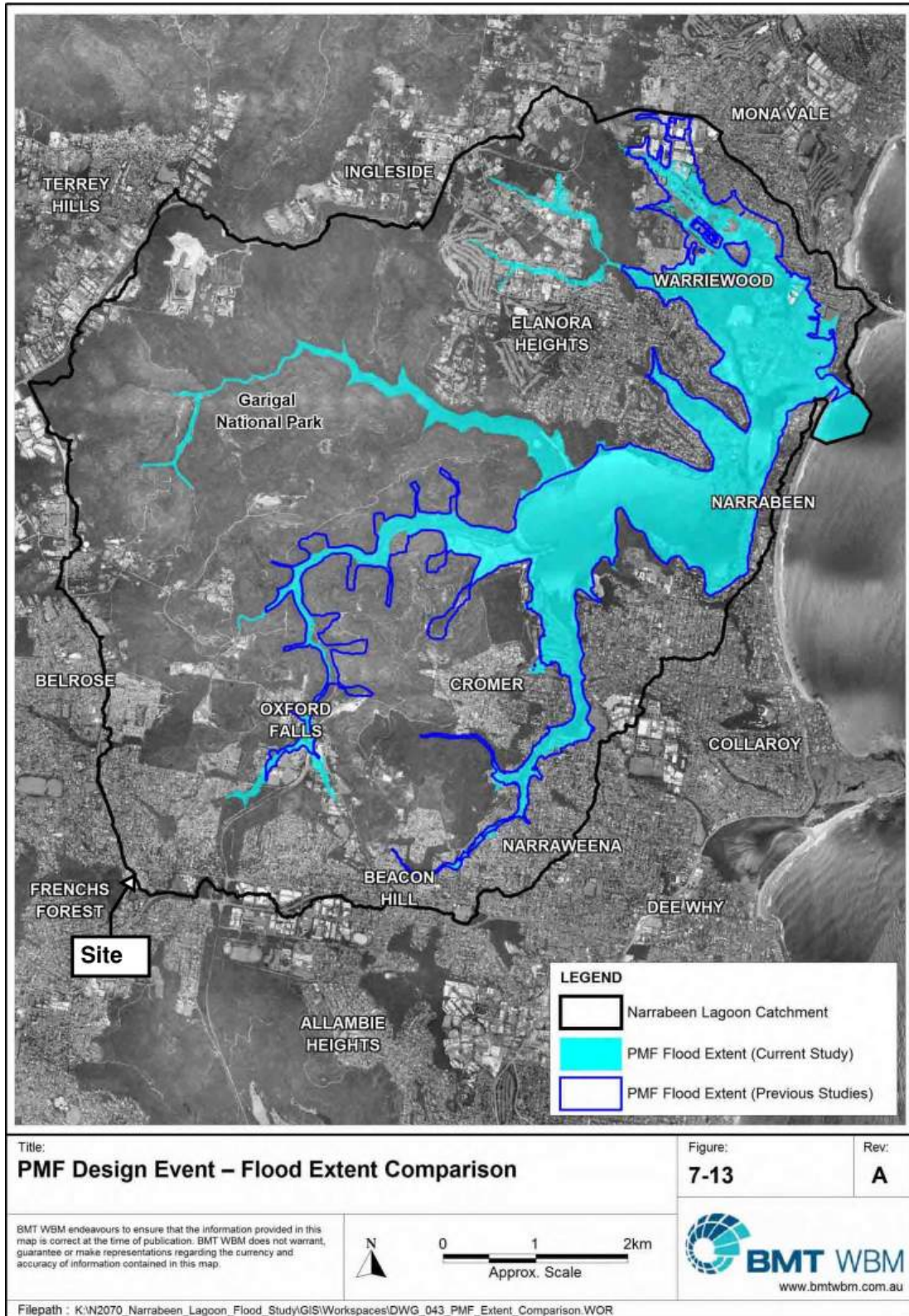


Figure 6: Catchment Plan



### 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 443m<sup>3</sup> 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)
<b>20% AEP</b>	354	806	350
<b>5% AEP</b>	603	1,105	442
<b>1% AEP</b>	735	1,462	530

#### 3.3.1 Forest Way Catchment

The 11,000m<sup>2</sup> Forest Way catchment was modelled in Drains software. A 264m<sup>3</sup> OSD with a 294mm 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)
<b>20% AEP</b>	200	455	197
<b>5% AEP</b>	340	623	247
<b>1% AEP</b>	415	825	294

#### 3.3.2 Grace Ave Catchment

The 3,000m<sup>2</sup> Grace Ave catchment was modelled in Drains software. A 63m<sup>3</sup> OSD with a 157mm 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	124	54
5% AEP	93	170	69
1% AEP	113	225	83

### 3.3.3 Sorlie Place Catchment

The 5,500m<sup>2</sup> Sorlie Place catchment was modelled in drain software. A 116m<sup>3</sup> OSD with a 212mm 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	227	99
5% AEP	170	312	126
1% AEP	207	412	153

## 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 <sup>1</sup>
Total Nitrogen	45% reduction in the post development mean annual load <sup>1</sup>
Total Suspended Solids	85% reduction in the post development mean annual load <sup>1</sup>
Gross Pollutants	90% reduction in the post development mean annual load <sup>1</sup> (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:**

<sup>1</sup>The 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:

- 264m<sup>3</sup> On-site detention tank
- Spel Hydrosystem 2500/17 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	14.5	0	NA
Total Suspended Solids (kg/yr)	2700	318	88%	85%
Total Phosphorus (kg/yr)	4.21	0.789	81.2%	65%
Total Nitrogen (kg/yr)	31.9	17.5	45.5%	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:

- 63m<sup>3</sup> 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	3.78	0	NA
Total Suspended Solids (kg/yr)	686	86.3	87.4%	85%
Total Phosphorus (kg/yr)	1.11	0.208	81.4%	65%
Total Nitrogen (kg/yr)	8.25	4.53	45.1%	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:

- 115m<sup>3</sup> 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	6.93	0	NA
Total Suspended Solids (kg/yr)	1280	153	88%	85%
Total Phosphorus (kg/yr)	2.0	0.364	81.8%	65%
Total Nitrogen (kg/yr)	15.5	8.48	45.5%	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 443m<sup>3</sup> of on-site detention is required split over the three discharge points to meet the above.
- Stormwater quality targets can be met with 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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