Stormwater Engineering Report:

FORESTWAY SHOPPING CENTRE
22 FOREST WAY FRENCHES FOREST NSW

Prepared for:
Revelop Building & Developments Pty Ltd

Development Application Submission
Revision 1

September 2023

Job No.: 21J51

Report Amendment Register

Rev No.	Section & Page No.	Issue/Amendment	Author	Project Engineer	Reviewer	Date
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1 INTRODUCTION

1.1 General

This Engineering Report has been prepared to supplement the Development Application (DA) to Northern Beaches Council (Council) for the proposed redevelopment of the Forestway Shopping Centre. The report has been prepared on behalf of Revelop Building & Developments Pty Ltd.

The site is currently in operation and consists of a supermarket and various specialty tenancies along the western side of the site and a multi storey carpark along the eastern side of the site.

This report will outline the Civil Engineering proposal and in particular the stormwater management strategy developed for managing stormwater runoff from the proposed development and that the proposed concepts meet Council's specifications and requirements.

1.2 Site Description

The address of the Forestway Shopping Centre is 22 Forest Way Frenches Forest (DP1209801), see Figure 1 below. It is located within the Northern Beaches Local Government Area (LGA) and covers an area of approximately 2.041ha. The site is enclosed by Forest Way to the east, Russell Avenue to the North, Grace Ave to the west and Frenchs Forest Public School to the south. Customer parking to the multistorey carpark is via Forest Way and Russel Avenue and the on-grade carpark is accessed via Grace Ave.

A review of the survey conducted by Realserve shows the site generally falls towards the north eastern corner of the site.

Figure 1: Forestway Shopping Centre locality plan (Six Maps)

1.3 Proposed Development

The proposed development involves upgrading the multi storey carpark to include an additional basement level and an extension to the shopping center. The basement level will extend towards the north and extend under the extended section of the shopping centre. Refer to enclosed civil drawings and the architectural plans for details.

2 STORMWATER MANAGEMENT PLAN

2.1 General Stormwater

Drainage connection points from the existing building roof will be largely maintained with the exception of some minor drainage lines that will need diversion and reconnection.

The drainage system for the extension and multi-levelled carpark upgrade will be designed to collect all concentrated flows from impermeable surfaces such as roof areas and parking areas.

Another aspect of the stormwater system is to ensure that the design takes into account water sensitive urban design (WSUD) measures. The stormwater network has been designed such that it incorporates proprietary pit baskets and secondary treatment devices as a means of treating stormwater before it leaves the site to ensure there is no adverse impact on the downstream drainage system.

Water quality and quantity will be calculated only for the proposed areas (refer to Appendix A for catchment calculations).

2.2 Stormwater Quantity

The Northern Beaches Council's Water Management for Development Policy 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.'

As such, On-site Stormwater Detention (OSD) tanks were designed to ensure the proposed development site discharge was reduced to the undeveloped flow rates. Due to spatial configurations/restrictions within the site, a combined total of three OSDs are proposed. Two of which are located in the multi-levelled carpark which will drain into Forest Way and the third OSD located within the Mini Major which will drain into Grace Ave.

The stormwater systems were modelled using the DRAINS software using the ARR 2019 storms and procedures for an Initial Loss/Continual Loss model. The site discharge rates for the 5, 20 and 100yr ARI storm events into Forest Way and Grace Ave are shown in Table 1 and 2 respectively.

The two OSDs located in the carpark have a combined area of 70m^2 and a volume of 212m^3. Refer to Appendix B for more details of these OSD tanks.

ARI (yr)	Pre (L/s)	Post(L/s)
5	153	153
20	248	248
100	358	348

Table 1: Site discharge rates to Forest Way

The OSD located within the Mini Major has an area of 39.6m^2 and a minimum volume of 71.3m^3.

ARI (yr)	Pre (L/s)	Post(L/s)
5	53	53
20	85	67
100	123	82

Table 2: Site discharge rates to Grace Ave

2.3 Stormwater Quality

Urban developments have the potential to increase gross pollutants, sediments, hydrocarbons and nutrient concentrations in stormwater runoff. To limit the impact on the downstream water quality, water quality measures at the source and end of line-treatments will be provided. This section describes the specific implementation of these measures for the proposed development.

As per Northern Beaches Council's Water Management Policy, water quality treatment will be required. The required pollutant reduction target rates are shown in Table 3.

Pollutant	Pollutant Reduction rates
Total Phosphorus (TP)	65%
Total Nitrogen (TN)	45%
Total Suspended Solid (TSS)	85%

Table 3: Stormwater quality requirements

It is proposed to provide pit baskets such as Ocean Protect Ocean Guards or an approved equivalent for all inlet pipes draining into the OSD. These pit baskets will assist in the water quality treatment for the site by capturing a large portion or gross pollutants, large sediment particles and organic matter that may also contain nutrients.

Secondary treatment devices such as Ocean Protect storm filter PSORB catridges will also be provided within the OSD tanks to assists in the removal of phosphorus and nitrogen. Refer to Appendix C for MUSIC modelling.

The software MUSIC has been used to model the site. The stormwater treatment results are presented in Table 4 below. A total of 7 Ocean Protect Ocean Guards and 24 x 690mm PSORBS stormfilter catridges are required to achieve the required pollutant target removal rates.

Pollutant	Achieved Pollutant Reduction rates
Total Phosphorus (TP)	72.4%
Total Nitrogen (TN)	52.4%
Total Suspended Solid (TSS)	85.2%

Table 4: Achieved pollutant removal rates

3 CONCLUSION

The design of the carparks, circulation ramps and access driveway provide a safe and efficient shopping centre which is sympathetic to the needs of the users and greatly improves on the existing safety of the car park.

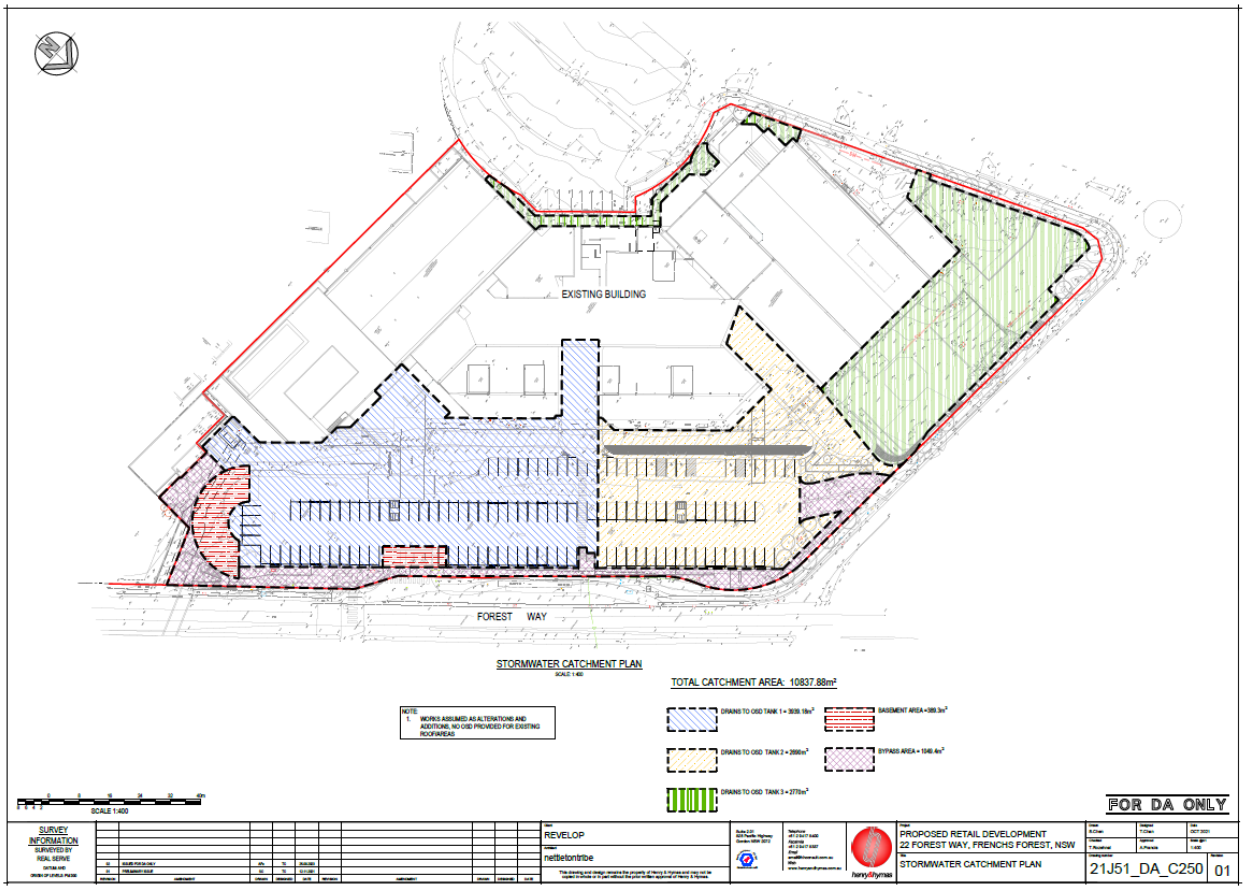
Appropriate stormwater management practices will be implemented that minimise the impact of development on the existing stormwater system in terms of water quality whilst ensuring safe and efficient conveyance of runoff and conveyance through the site safely.

Whilst it is inevitable that the development will have an impact on the existing landform and stormwater runoff characteristics due to earthworks, change of land form and changes in impervious areas; by providing a safe and efficient design, and implementing appropriate measures during construction and operation of the development, it can be ensured that there will be minimal impact on the existing environment as a result of the proposed development.

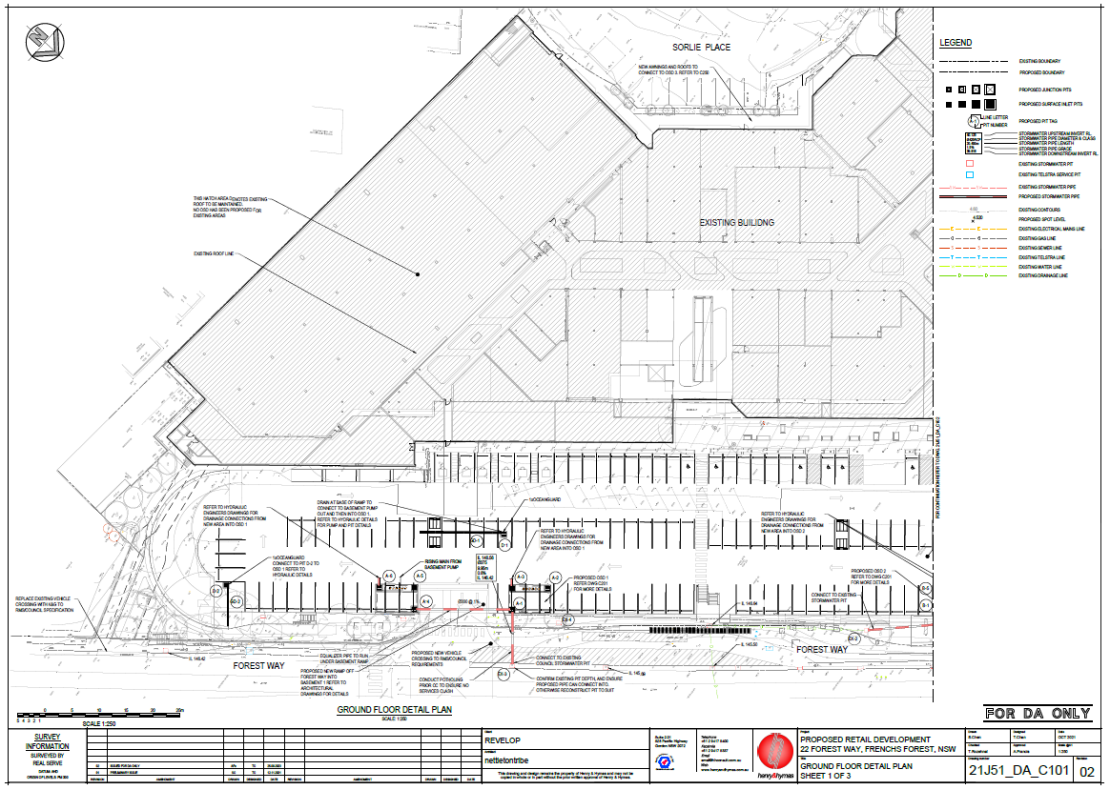
4 References

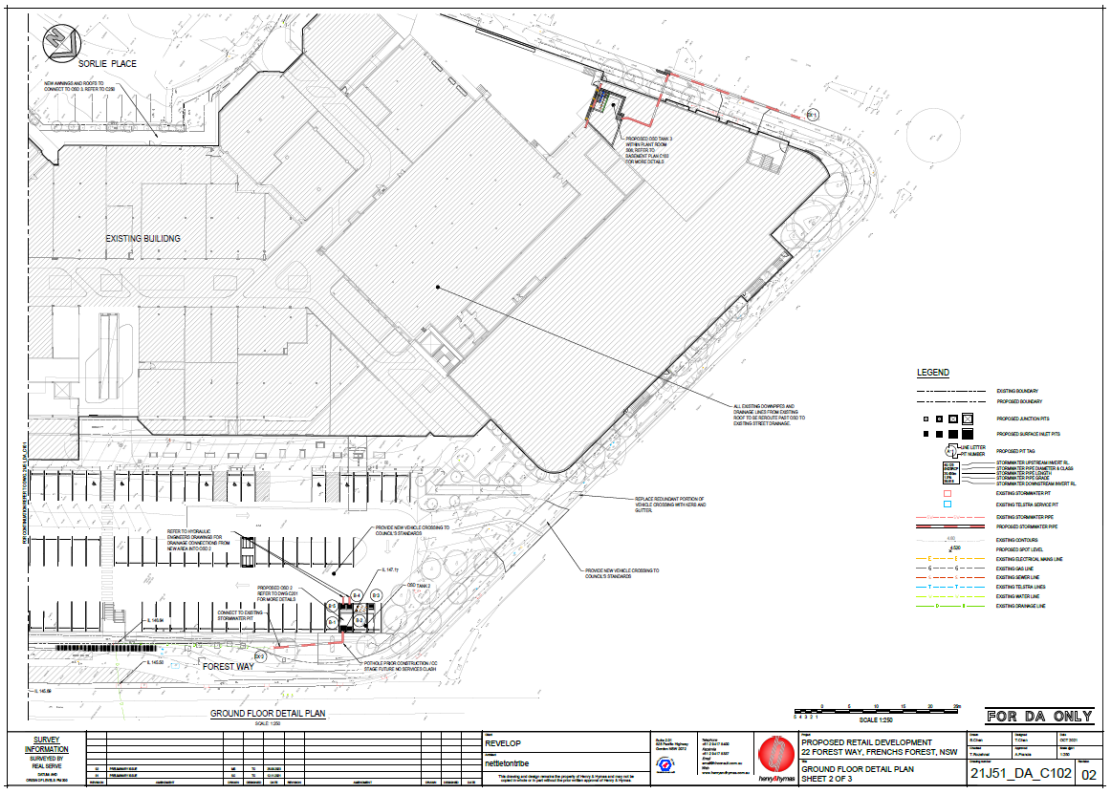
- Landcom - "Soils and Construction Volume 1 – 4th Edition", March 2004
- Institution of Engineers, Australia - "Australian Rainfall and Runoff 3rd Edition", 2019
- Northern Beaches Council - Water Management for Development Policy

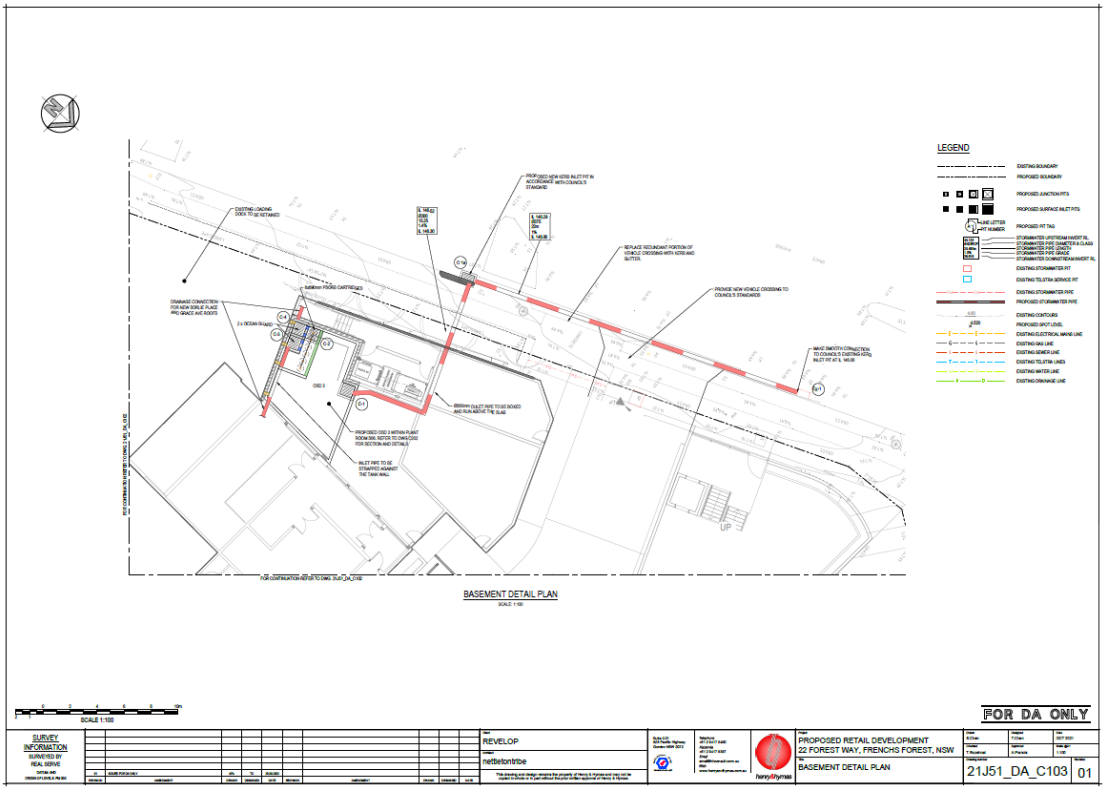
APPENDIX A: STORMWATER CATCHMENT PLAN


EXISTING BUILDING
FOREST WAY
STORMWATER CATCHMENT PLAN
TOTAL CATCHMENT AREA: 10837.88m²
NOTE
1. WORKS ASSUMED AS ALTERATIONS AND ADDITIONS, NO OSD PROVIDED FOR EXISTING ROOFAREAS
DRAINS TO OSD TANK 1 = 3036.18m²
BASEMENT AREA = 389.3m²
DRAINS TO OSD TANK 2 = 2666m²
BYPASS AREA = 1048.4m²
DRAINS TO OSD TANK 3 = 2770m²
SCALE 1:400
FOR DA ONLY
SURVEY INFORMATION SURVEYED BY REAL SERVE
REVELOP
nettletontribe
PROPOSED RETAIL DEVELOPMENT
22 FOREST WAY, FRENCHS FOREST, NSW
STORMWATER CATCHMENT PLAN
21J51_DA_C250
01

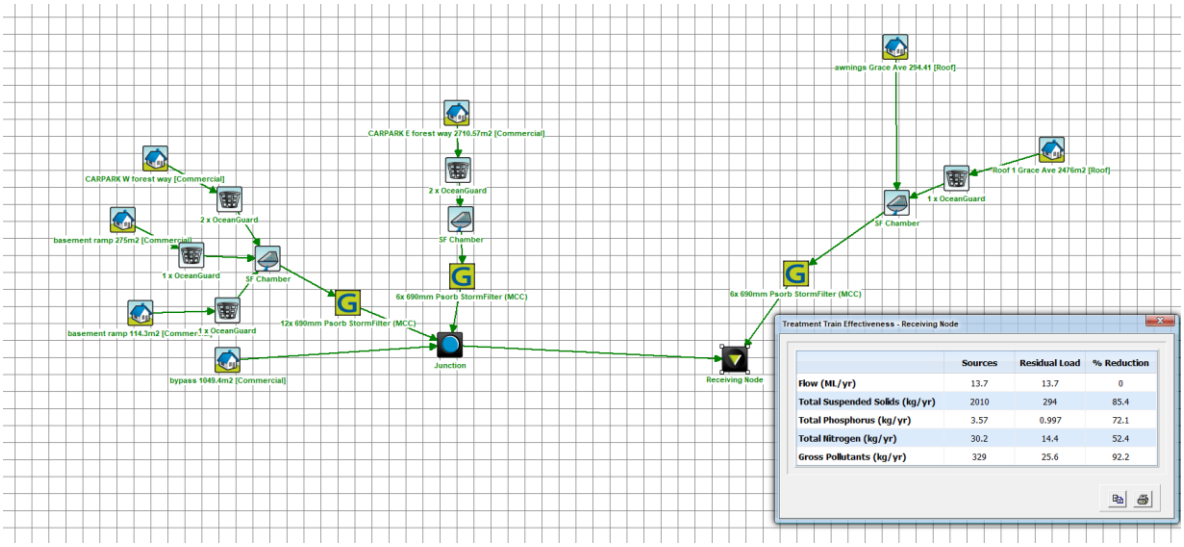
APPENDIX B: CIVIL PLANS


SORLIE PLACE
EXISTING BUILDING
FOREST WAY
FOREST WAY
LEGEND
GROUND FLOOR DETAIL PLAN
SCALE 1:250
FOR DA ONLY
SURVEY INFORMATION
SURVEYED BY REAL SERVE
REVELOP
nettletontribe
PROPOSED RETAIL DEVELOPMENT
22 FOREST WAY, FRENCHS FOREST, NSW
GROUND FLOOR DETAIL PLAN
SHEET 1 OF 3
21J51_DA_C101
02


SORLIE PLACE
EXISTING BUILIDNG
FOREST WAY
GROUND FLOOR DETAIL PLAN
LEGEND
FOR DA ONLY
PROPOSED RETAIL DEVELOPMENT
22 FOREST WAY, FRENCHS FOREST, NSW
GROUND FLOOR DETAIL PLAN
SHEET 2 OF 3
21J51_DA_C102
02


LEGEND
BASEMENT DETAIL PLAN
FOR DA ONLY
PROPOSED RETAIL DEVELOPMENT
22 FOREST WAY, FRENCHS FOREST, NSW
BASEMENT DETAIL PLAN
21J51_DA_C103
01
REVELOP
nettletontribe
henryhymas

APPENDIX C: MUSIC MODEL


awnings Grace Ave 294.41 [Roof]
CARPARK E forest way 2710.57m2 [Commercial]
roof 1 Grace Ave 2476m2 [Roof]
CARPARK W forest way [Commercial]
2 x OceanGuard
1 x OceanGuard
SF Chamber
basement ramp 275m2 [Commercial]
6x 690mm Psorb StormFilter (MCC)
1 x OceanGuard
SF Chamber
12x 690mm Psorb StormFilter (MCC)
basement ramp 114.3m2 [Commer
1 x OceanGuard
Junction
bypass 1049.4m2 [Commercial]
Receiving Node
Treatment Train Effectiveness - Receiving Node
Sources
Residual Load
% Reduction
Flow (ML/yr) 13.7 13.7 0
Total Suspended Solids (kg/yr) 2010 294 85.4
Total Phosphorus (kg/yr) 3.57 0.997 72.1
Total Nitrogen (kg/yr) 30.2 14.4 52.4
Gross Pollutants (kg/yr) 329 25.6 92.2