NORTHROP

CIVIL

Concept Stormwater Management Plan

for

Service Station 1 Franklin St, Goulburn

for PC Infrastructure Pty Ltd

Level 1, 215 Pacific Highway
Charlestown NSW 2290
02 4943 1777
newcastle@northrop.com.au
ABN 81 094 433 100

16 November 2022

NL221542

PC Infrastructure Pty Ltd
Andrew Caspar
270 The Parade
Kensington SA 5068

Dear Andrew

Re: Service Station 1 Franklin St, Goulburn

Northrop Consulting Engineers have been engaged to prepare a concept stormwater management plan for the proposed Service Station at 1 Franklin St, Goulburn NSW 2580 (Lot 1 DP1220973), herein referred to as 'the site'. The information provided below should be read in conjunction with the Civil DA Engineering Package (NL221542/DA-C0 drawing set).

Stormwater Management Philosophy

This plan has been produced in accordance with Goulburn Mulwaree Council (GMC) Development Control Plan (DCP) 2009 (specifically Chapter 7), GMC Stormwater Drainage Design Handbook (2020) and relevant Australian Standards.

The site is currently an undeveloped lot of a recently constructed subdivision. The subdivision contains nine lots including a drainage reserve lot where there is currently a sediment dam and wetland utilised to treat runoff from the subdivision development. The subdivision development also included the construction of multiple new roads and associated drainage infrastructure. The proposed service station site is located at the southern extent of the subdivision at the corner of Crookwell Road and Mary Mounts Road. The site has approximately 1.6% grade falling toward the eastern corner of the site adjacent to the roundabout on Mary Mounts Road.

The site is bordered by Mary's Mount Road to the south, Crookwell Road to the west, Franklin Street to the east and a lot currently under development to the north. The proposed development seeks to provide an internal site drainage network. It is proposed that connection to the existing stormwater network is via the existing stub pipe near the eastern corner of the site that appears to have been constructed as part of the subdivision works to provide a connection for future development on the site. The site location is indicated by the blue marker on **Figure 1**.

		Date
Prepared by	HBL	16/11/2022
Checked by	RS	16/11/2022
Admin	LC	16/11/2022

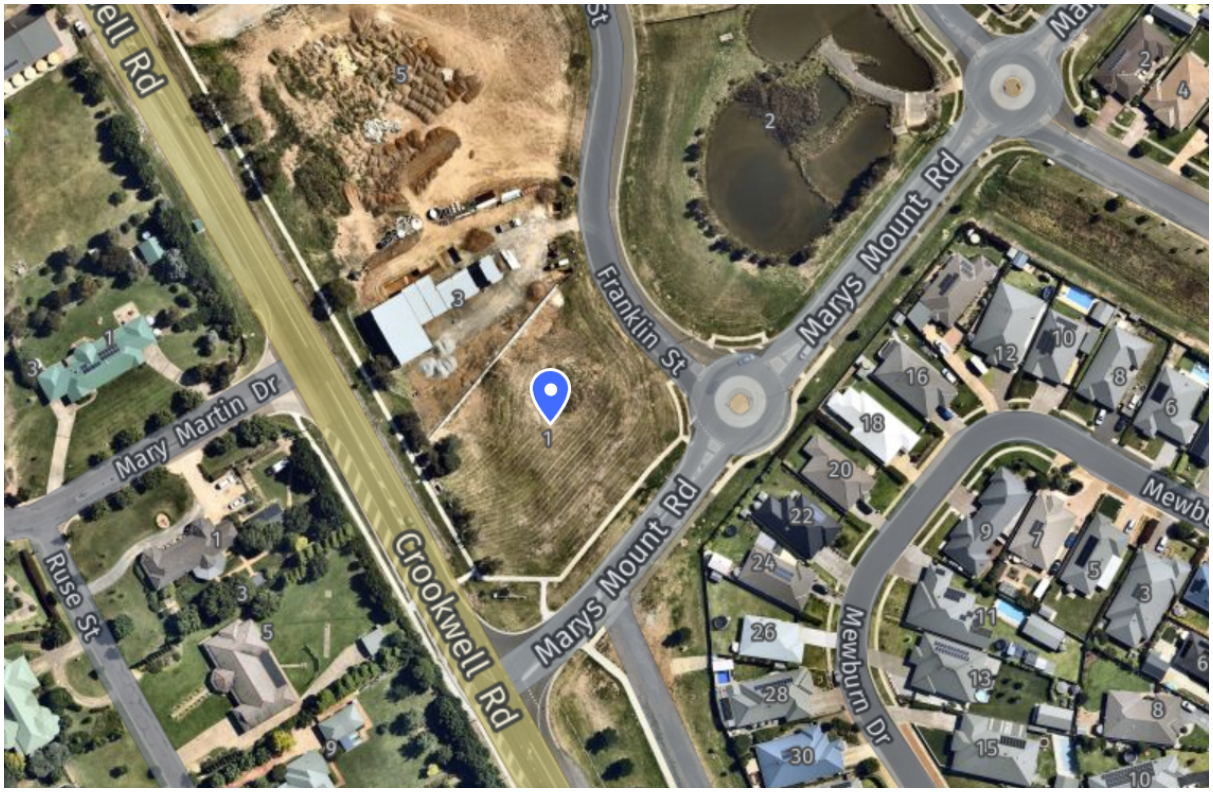

Figure 1 -Site Location

Site areas are summarised in **Table 1**.

Table 1 – Site Areas

	PRE-DEVELOPED	POST-DEVELOPED
Site Area (m^2)	3,797	3,797
Impervious Area (m^2)	0	2,765
% Impervious	0	73
Roof Area (m^2)	0	587

The stormwater management philosophy for the development was developed to satisfy DCP requirements, as described further in this report. The philosophy of stormwater management on-site is summarised as follows:

- Runoff from the control building will be conveyed to a 10kL rainwater tank to be reticulated for re-use internally and externally for irrigation of landscaped areas. The fuel canopy roof plus any control building roof area that cannot practically be conveyed to the rainwater tank will be conveyed via gutter and downpipe to the nearest stormwater pit.
- Stormwater runoff from the site surface is to be generally graded to pits located around the site, where stormwater pits capture runoff and convey flows to downstream management via a below ground pipe network. All stormwater pits are proposed to be fitted with proprietary pit inserts to capture gross pollutants.

- The site's grade will closely mimic the existing grade, falling from west to east. All runoff from the site is proposed to be graded to surface inlet pits and conveyed via an underground pipe system to a bio-retention basin in the site's eastern corner.
- Piped flow from the bio-retention basin will be conveyed to an underground tank for detention of flows to meet pre-development flowrates.
- Stormwater runoff from the under-canopy fuel area is to be collected by sump pits and conveyed to a containment tank to be stored for later disposal as per EPA Practice Note: Managing run-off from service station forecourts (2019).
- Site stormwater is proposed to discharge to Council's stormwater network via an existing 375mm diameter pipe running from a kerb inlet pit on Franklin St into the site, constructed as part of recent subdivision works.

Stormwater Quantity

The on-site detention system has been designed in accordance with Council's Stormwater Drainage Design Handbook. As specified by the handbook, a site with 73% impervious area must provide a storage volume of 133.8 m^3/ha equating to a required detention volume of 50.844m^3 (133.8 m^3/ha * 0.38 ha) for the proposed site. In accordance with the handbook, 50% of any on-site rainwater tank volume can contribute to the required detention storage, hence a minimum 46m^3 (50.844-10/2) of on-site detention storage is to be provided. The OSD tank is proposed to be located underneath the carparking modules adjacent to the proposed bio-retention basin.

To ensure post-development flow rates have been restricted to pre-development flow rates DRAINS modelling was undertaken to size a suitable outlet system. It is proposed that a dual orifice outlet system is utilised to restrict peak flow rates to existing levels in storm up to and including the 1% AEP event. Peak flow rates for a range of rainfall events calculated using DRAINS are displayed in **Table 2**.

Table 2 - Drains Model Results

AEP	PRE-DEVELOPMENT (m^3/s)	POST-DEVELOPMENT (m^3/s)
20%	0.020	0.020
10%	0.038	0.037
5%	0.050	0.048
1%	0.082	0.065

The permissible site discharge (PSD) specified by Council's drainage design handbook for the site is 0.80 m^3/s. Therefore, it is understood that the proposed OSD outlet system should be deemed an appropriate solution.

Stormwater Quality

To minimise any adverse impacts upon the ecology of the downstream watercourses, stormwater treatment devices have been incorporated into the design of the development. As the site is located within the Sydney Water drinking catchment, the stormwater quality system is required to meet Neutral or Beneficial Effect (NorBE) requirements. MUSIC modelling has been undertaken in accordance with Water NSW's "Using MUSIC in Sydney Drinking Water Catchment" (2019) to ensure the stormwater quality system achieved a NorBE.

In order to meet the stringent requirements of NorBE, a relatively complex water quality train was required. A bioretention basin has been proposed to provide effective removal of pollutants, in particular finer sediments and nutrients. The bio-retention basin has been proposed in the eastern corner of the site towards the natural low point of the site to maximise the area of the site drained to the basin. The proposed water quality train is summarised as follows:

- Proprietary pit inserts (SPEL Stormsacks) will provide primary treatment of the entire hardstand area, removing most gross pollutants.
- Runoff from all hardstand areas as well as both roof areas will be conveyed to the bioretention basin where concentrations of finer sediments and nutrients will be reduced.
- Runoff from the control building roof will be captured by a 10-kL rainwater re-use tank for re-use. Overflows from the tank and roof area that bypasses the tank will be conveyed to the nearest stormwater pit.

A schematic of the model can be found in **Figure 2**. The MUSIC model prepared by Northrop has been provided to Council as part of the DA submission.

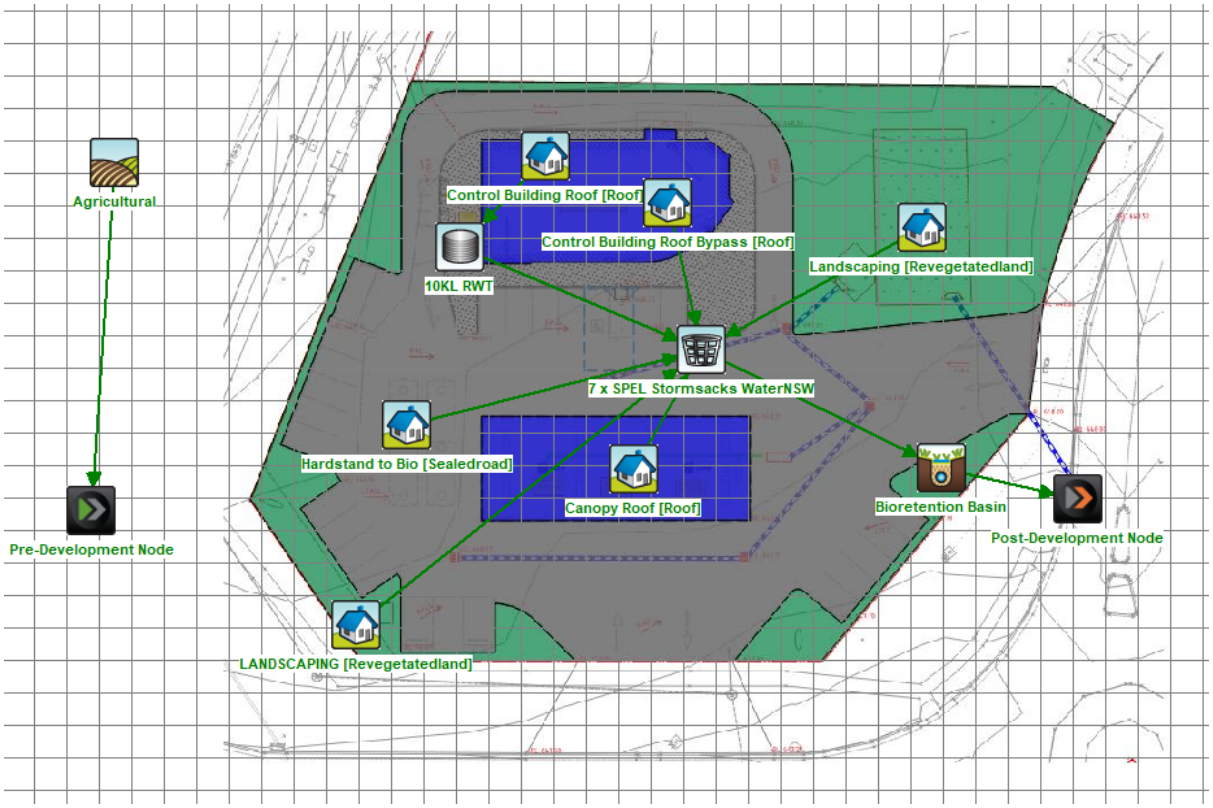

Figure 2 - Music Model Schematic

Results of this model are displayed in **Table 2** and **Figures 3, 4** and **5**.

Table 2 - Music Model Results

Scenario/ Catchment	Annual Pollutant loading (kg/yr)			
	TSS	TP	TN	GP
Pre-development (1)	92.5	0.247	1.63	0.481
Post-development (with measures) (2)	23.2	0.152	1.41	0
Difference (3) = (1)-(2)	69.3	0.095	0.22	0.481
% Improvement = (3)/(1) * 100	75%	38%	13%	100%
NorBE? (Y/N)	Y	Y	Y	Y

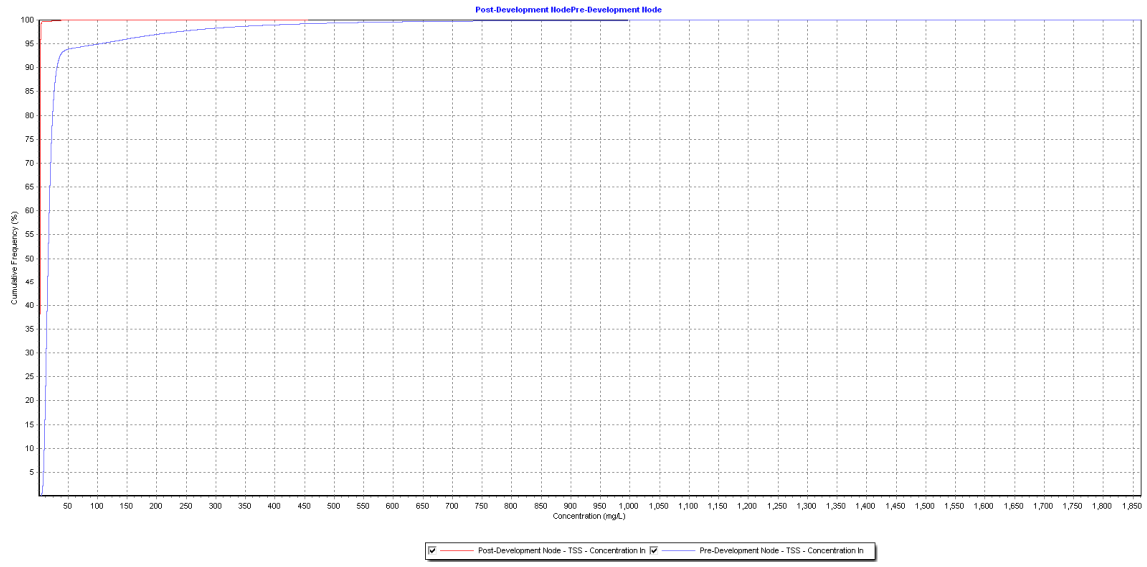

Figure 3 – Pre & Post-Development Cumulative Frequency Graph (TSS)

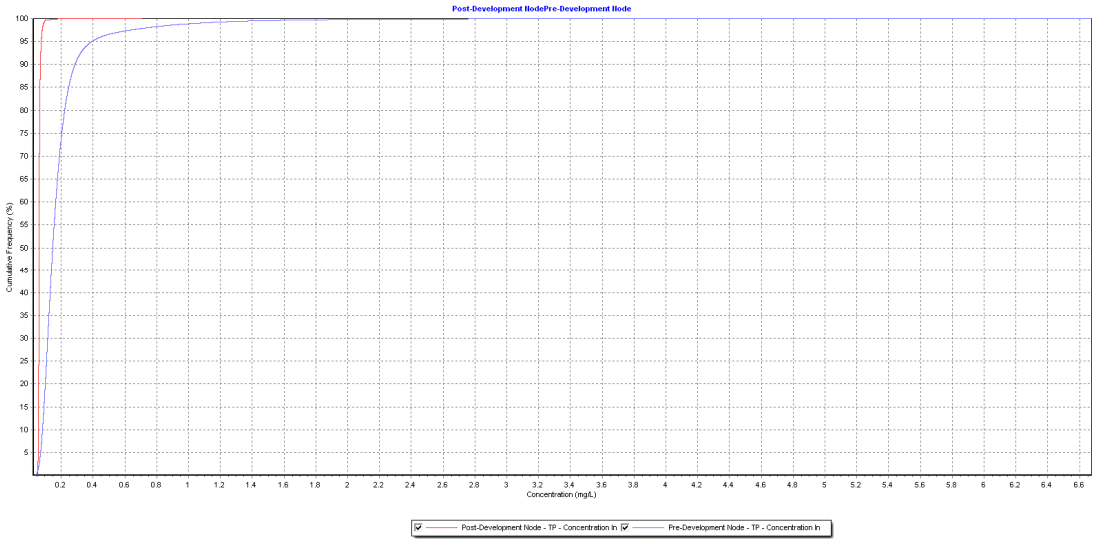

Figure 4 – Pre & Post-Development Cumulative Frequency Graph (TP)

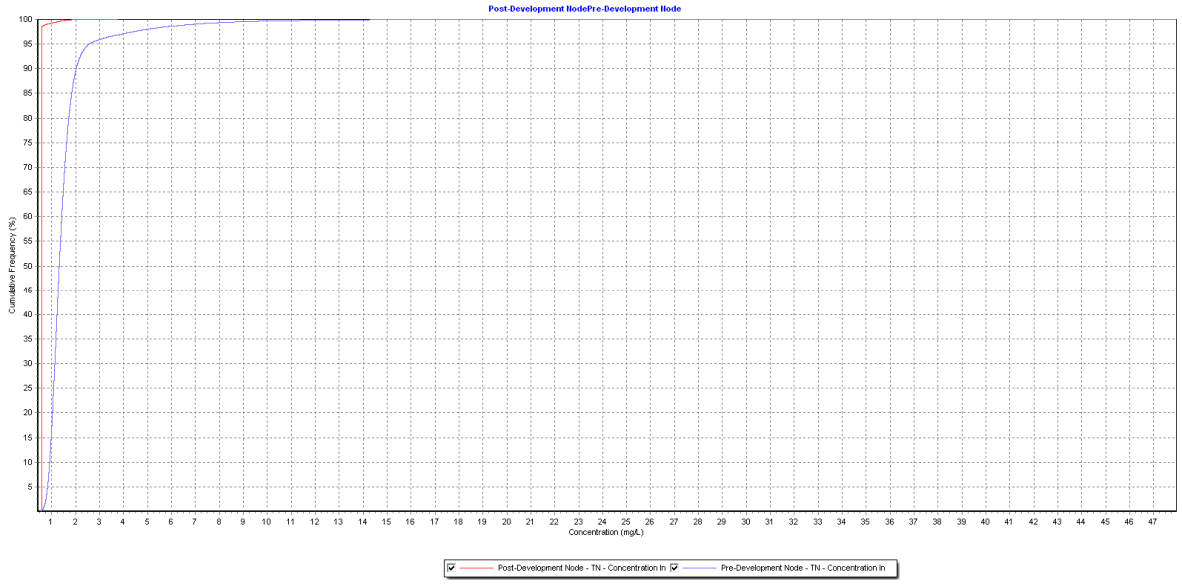

Figure 5 – Pre & Post-Development Cumulative Frequency Graph (TN)

As displayed in **Table 2** pollutant loads have been reduced to at least 10% lower than pre-development levels. **Figures 3, 4** and **5** display that pollutant concentrations have been reduced to lower than pre-development levels between the 50th and 98th frequency percentiles. Therefore, it is understood that a NorBE on water quality has been achieved for the proposed development.

Any runoff from fuel areas would be captured and treated in a containment tank, with treated flows removed off-site. This is not considered in the MUSIC model (i.e., it is over and above the MUSIC model treatment). Further, the site stormwater connects to the stormwater network for the subdivision which includes stormwater quality treatment (Gross Pollutant Trap and sediment basin/wetland) not considered in this model which would provide additional treatment off site.

Conclusion

The stormwater management plan prepared by Northrop ensures the NorBE requirement specified by Water NSW has been achieved by implementing on-site treatment devices described above. The proposed development seeks to formalise stormwater management for the site. On-site stormwater detention will restrict post-development flows to existing levels.

We trust this meets your requirements. Should you have any queries, please feel free to contact the undersigned on (02) 4943 1777 to discuss.

Yours Sincerely,

Rachel Stevenson
Civil Engineer
BEng (Civil & Environmental)

Hugh Blanchfield
Graduate Civil Engineer
BEng (Civil)