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Friday, 12th August 2016

Spartohori Pty Ltd
Mr Gregory Politis
Unit 4, Level 1
47 Bolton Street
Newcastle NSW 2300

Dear Gregory,

Re: 12 Stewart Avenue, Newcastle West – Concept Stormwater Management Plan

It is understood Council have requested additional information regarding the civil design and documentation for the proposed multi-story commercial development within Lot 20 DP1217043, Stewart Avenue, Newcastle West. The information Council have requested and Northrop's response are summarised as follows.

1. ***Council Comment:*** *Calculations are to be provided to demonstrate that the proposed development permissible site discharge is equal to the pre-developed discharge;*

   Northrop Response: The original DA submission issued to Council provided a deemed to comply storage volume for stormwater detention in accordance with Newcastle City Council (NCC) Development Control Plan (DCP) 2012, with special consideration given to Section 7.06 Stormwater and also the Stormwater and Water Efficiency for Development Technical Manual (2015). The expectation of this provision is that detailed detention modelling would be undertaken at CC stage of the development in order to ensure that the post development runoff for the site is not increased from that of the predevelopment rates. Notwithstanding the above, Northrop have undertaken additional detention modelling to demonstrate that the pre-developed site discharge is maintained. A summary of the calculations is provided below:

   Site storage for the development will be provided in accordance with Figure 1 from Section 7.06 of the NCC DCP. Required site storage has been calculated as follows;

Total Site Area	= 2,369 m^2
Impervious Area	= 2,369 m^2 (100%)
Required Storage	= 2,369 (m^2) x 0.025 (m)
	= 60 m^3

   It is proposed that this storage volume will be provided via a proposed 39m3 detention tank and 21m^3 rainwater re-use tank located below ground for the development.

Reuse Rainwater Tank Volume	= 21 m^3
Detention Tank Volume	= 39 m^3
Total Proposed Storage	= 60 m^3

   Runoff from the roof will be captured and conveyed to the proposed reuse rainwater tank via down pipes. Runoff will then be used internally for toilet flushing and externally for irrigation. Overflow

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from the reuse tank as well as runoff from the proposed green-wall and level 5 terrace is proposed to flow directly into the detention tank.

The detention tank shall be designed to limit post development runoff to pre-development flow rates, with all runoff from the site being discharged to the existing stormwater drainage system located in Stewart Avenue. The pre-developed and post-developed flow rates have been modelled using the DRAINS hydraulic software and are shown in Table 1 below. The DRAINS model can be provided upon request.

Table 1 – Pre-developed and Post-developed flow rates

Design Storm	Pre-Developed Peak Flow – 100% Developed site (L/s)	Pre-Developed Peak Flow - Undeveloped site (L/s)	Post Developed Peak Flow (L/s)
0.2EY	91	58	57
10% AEP	102	67	62
5% AEP	117	79	68
2% AEP	130	92	72
1% AEP	145	103	102

As demonstrated above, the proposed onsite detention facility will limit post development runoff to pre-developed levels assuming that the pre-developed site is greenfield.

2. ***Council Comment:*** *The designers are to confirm if the existing drainage pipe system on the street (Stewart Avenue) has capacity to discharge stormwater from the development;*

   Northrop Response: Topographic site survey along with a visual inspection confirms that the existing pre-developed site currently drains to the existing drainage infrastructure located in Stewart Avenue. It is understood that this is the legal point of discharge for the site, and is hence being maintained.

   It is also noted that the predeveloped site (i.e. prior to demolition) was 100% impervious and did not incorporate any known form of detention facilities to reduce the peak runoff. The proposed development will reduce the current site runoff by between 30 – 45%, and as such will reduce the existing load on the Stewart Avenue drainage system, increasing its current capacity. As such, we do not believe it is necessary to investigate the capacity of Councils existing downstream infrastructure.

   Calculations showing the 100% developed and post developed site runoff have been shown in the item 1 response above.

3. ***Council Comment:*** *Rainwater Tanks are to be provided to reuse stormwater in the proposed toilets and ground floors of the commercial buildings. The landscaped areas including the proposed green walls can be connected to the rainwater tanks for reuse.*

   Northrop Response: Rainwater tanks have been incorporated into the design, and included on the design plans NL150030/C01DA – C04DA revision B

4. ***Council Comment:*** *Adequate drainage will need to be provided for the green walls.*

   Northrop Response: Irrigation runoff from the proposed green wall is to be collected via a grated trench drain at the base of the wall, and conveyed to the proposed detention basin via an underground pipe network. The location of the proposed network will depend on the final tank and downpipe locations and will be detailed with the CC documentation.

5. ***Council Comment:*** *A surcharge pit and non-return valves should be considered for the OSD. This will prevent backflow in case of blockages to the street drainage.*

Northrop Response: To prevent backflow from the detention tank spilling into the reuse tank a non-return valve is proposed between the reuse rainwater tank and the detention tank. Similarly, a non-return valve is also proposed between the detention tank and the outlet to the street to prevent stormwater from the street flowing back into the proposed detention tank.

A surcharge pit has been proposed for the detention tank as shown in the attached Concept Stormwater Management Plan drawing C02DA [B]. The pit has been designed to surcharge during the major design storm event. It is important to note that the final tank configuration and location will be determined at CC stage and will be reliant upon its interaction with structural components for the development. The final configuration is to maintain the proposed pre-developed peak flows released from the site as well as maintaining the required storage volume of $60m^3$.

I trust the above meets Council's requirements; however, if you would like to discuss the development further, then please do not hesitate to contact the undersigned on 4943 1777.

Yours sincerely,

Laurence Gitzel
BEng (Environmental)
Civil Engineer

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ATTACHMENTS