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Coastplan Consulting

Mr. Tony Tuxworth

PO Box 6179

Kincumber, NSW 2251

Dear Tony,

Re: The Pines - 8 Hearn's Lake Road, Woolgoolga
DGR Ref: 08_0005
Stormwater Runoff Summary

We understand the Department of Planning have requested that additional information be provided regarding the stormwater runoff from the proposed development site. Please see below for our comments.

The subject development site has an area of approximately 1.84 hectares. The natural topography of the subject site falls towards Double Crossing Creek and Hearn's Lake towards the south of the subject site.

The proposed development of the subject site includes the construction of approximately 60 new re-locatable home sites and the associated roads and infrastructure. The proposed infrastructure includes a pit and pipe stormwater system to cater for the surface runoff which will discharge into a gravel trench to cater for the water quality requirements of the stormwater runoff. The details of this system are further discussed in a report prepared by Northrop Consulting Engineers for Part 3A Assessment (*Ref: NL080035E01*).

We have undertaken an analysis of the stormwater runoff from the subject site with consideration to both the peak discharge and total volumetric discharge. The analysis considers both the development site as an isolated catchment and the catchment for Hearn's Lake as a whole.

An analysis of the isolated subject catchment was undertaken using the *Mittelstadt and Pilgrim* revision of the *Probabilistic Rational Method* to calculate the peak discharge from the subject catchment for both the pre-development and post-development scenarios.

This analysis indicated the peak discharge expected from the subject catchment would be in the order of 0.80m³/s under the pre-development scenario and 0.89m³/s under the post-development scenario for the 1 in 20 ARI storm event. These peak discharges were experienced during a storm event with a time of concentration of 10 minutes. Based on the above calculations we would expect a peak discharge increase in the order of 0.09m³/s from the post-development site when compared to the site in its natural state during the 1 in 20 year ARI storm event.

A report was prepared by Patterson Britton & Partners Pty Ltd (*now Worley Parsons*) which discussed the Hydrology and Hydraulics of the entire catchment for Hearn's Lake. This report titled "*Sandy Beach North Residential Development: Flood Impact Assessment*" was

reviewed to ascertain the potential impacts on the Hearn's Lake catchment as a whole. This report indicated that the entire catchment for Hearn's Lake is approximately 650 hectares and that the catchment has a critical storm duration of 120 minutes. It further indicated that the peak discharge of the catchment as a whole was in the order of $102.2\text{m}^3/\text{s}$ at the Double Crossing Creek entrance to Hearn's Lake near the southern boundary of the subject site.

In order to ascertain the impact the subject site is likely to have on the Hearn's Lake catchment as a whole, further calculations utilizing the methods outlined above was used to calculate the peak discharges from the site during a storm with a duration of 120 minutes. These calculations indicated the subject site was likely to have a peak discharge of $0.22\text{m}^3/\text{s}$ from the pre-development scenario and $0.25\text{m}^3/\text{s}$ from the post-development scenario during the 120 minute, 1 in 20 year ARI storm event. This indicates an increase in the peak discharge in the order of $0.03\text{m}^3/\text{s}$ would be expected due to the development of the subject site.

When considered on a catchment wide scale this is an increase in the order of 0.03% for the entire catchment discharging from Double Crossing Creek into Hearn's Lake.

A volumetric analysis of the 1 in 20 year ARI, 120 minute duration storm was undertaken using the *Triangular Hydrograph* method. This analysis was undertaken for both the pre-development and post-development scenarios. The calculations indicated that the total runoff from the subject site would be in the order of 1584m^3 during the pre-development scenario and 1800m^3 during the post-development scenario. This represents an increase in the total runoff from the site of 216m^3 due to the development.

The *Patterson Britton & Partners* report mentioned above indicates that Hearn's Lake has a surface area of approximately 15 hectares. Based on this surface area, the increased runoff volume, as calculated above, would lead to an increase of approximately 1.4mm in the water surface level of Hearn's Lake.

The results outlined above indicate that the development of the subject site will have a very small impact on the stormwater runoff from a peak discharge and volumetric perspective. When considered at a whole catchment scale this increase in stormwater runoff is considered insignificant. It is considered that the very small increase in runoff from the site is extremely unlikely to lead to an increase in the risk of damage to property or the environment surrounding Hearn's Lake.

Further to the above, the proposed design of the development includes the construction of a swale and gravel trench near the stormwater outlet from the site. The primary purpose of this swale and gravel trench is to provide a stormwater runoff quality function. In achieving this function the swale and trench capture and detain stormwater runoff from the site. A volume calculation based on the preliminary design of this swale and trench indicates they will have a detention volume in the order of 117m^3 . When this volume is taken into account, it further reduces the increased runoff volume from the site to approximately 99m^3 . This equates to an increase in Hearn's Lakes water surface level of approximately 0.66mm.

The content of this report has predominantly focused on the effects on the catchment during the 1 in 20 year ARI storm. The effects of the 1 in 100 year ARI event were also investigated as part of this study. It was discovered the development led to a greater increase in the peak discharge and volume from the site during the 1 in 20 year than the 1 in 100 year ARI storm. 1 in 20 years was therefore considered to be the critical recurrence interval.

