PENRITH CITY COUNCIL
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Our Ref: 3403346
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12 March 2012

Sam Haddad
Director General
Department of Planning and Infrastructure
23-33 Bridge Street
SYDNEY NSW 2000

Attention: Felicity Greenway

Dear Mr Haddad

Penrith Lakes – Section 75W Modification Application for the Continued Use of Lewis Lagoon

Thank you for the opportunity to provide comments in relation to the proposed modification application for the continued use of the waterbody known as 'Lewis Lagoon', as a water quality control pond.

Attached is a detailed submission in relation to the proposal. After reviewing the application and supporting documentation the following recommendations are provided:

1. The design of the pond should take into consideration matters addressed in the attached submission, and further details should be provided to demonstrate that the pond will function appropriately in the long term as a water quality control measure.
2. To adequately review potential site flooding issues, details should be provided for further assessment by Council's technical staff.
3. A suitable monitoring and maintenance plan is to be developed and implemented to ensure the continued water treatment functionality of the pond.

If you have any questions please contact Natasha Baker on (02) 4732 8122.

Yours sincerely

Paul Grimson
Manager Sustainability and Planning

Attachment:

Penrith City Council Comments - Penrith Lakes 75W Modification Application (Mod 7 to DA4)

A. POND DESIGN

i. Water volume

The length of time water is retained in a pond is a key variable in determining how effective the pond will be in trapping certain pollutants. The greater the retention time the greater the opportunity for sedimentation of particulate material and the action of other purification mechanisms. In Browns Consulting expert advice (dated 6 February 2012) details of the hydraulic residence time are provided and appear satisfactory, although it is noted these are 'estimated' and not actual results for Lewis Lagoon. It is also not clear if a further 20% volume was added to allow for sedimentation in calculating the size (2.4 ha) of the pond.

ii. Pond configuration

It is desirable that inlet structures be located as far from outlet structures as possible to maximise retention time and to ensure that the entire water body is utilised for pollution control. When the Wildlife Lake is fully constructed, it is important that the location of the outlet structure in Lewis Lagoon is considered relevant to the inlet locations (currently three inlets). The location of the current outlet (under Castlereagh Rd) is not likely to allow adequate retention times, particularly for flows entering from the east. It is also stated that high flows currently bypass directly into the Wildlife lake. Consideration should be given to ensure that the potential for treatment bypass is greatly reduced, with details provided on a suitable criteria for the magnitude of high flow events that need to bypass dependant on flooding considerations.

iii. Macrophytes

Macrophytes (either emergent or submergent) enhance the pollutant removal potential of ponds by filtering finer particles and taking up nutrients. They can also help to prevent scouring of the sediments during high flows. The expert advice document states that macrophyte growth 'appears' to be evident, but it is not clear whether the configuration and design of the pond incorporates sufficient shallow areas to encourage the growth of beds of emergent and submergent aquatic macrophytes. A review of recent aerial photography indicates the pond is mainly open water. As a general guide, between 10 and 30 percent of the total surface area of a pond should be set aside for macrophyte growth, particularly in the upper reaches. I think the current ratio of open water to fringing macrophyte vegetation is likely to lead to poorer water quality outcomes and a risk of algal blooms in the long term. Best practice design incorporates benching or bands of shallow and deep water macrophytes perpendicular to the direction of flow so as to guarantee contact time with the vegetation, and the associated biological treatment. In its current design, the pond is relying heavily on physical treatment. Large open water ponds with minimal biological treatment are much more prone to algal blooms, low dissolved oxygen and associated issues such as temperature inversions.

iv. Open Water zone

No details have been provided on the depth levels of the pond. To minimise the risk of temperature stratification, best practise suggests the maximum depth should not exceed 3 m.

v. Edge Treatment

The expert advice document states that vegetation along the batters provides nutrient uptake. In water treatment ponds natural soft edges should be used to encourage a variety of shoreline plants. The shore line edge is also to be free draining to discourage isolated pockets of water (potential breading area for mosquitos). The edge should be capable of withstanding wave action erosion. In the supporting documentation, no details were provided on the batter slopes. An edge side slope of 1 in 15 should be provided in areas where it is desirable to establish aquatic macrophytes to trap pollutants, provide bank stability, and provide habitat. This also provides for a gentle slope that doesn't pose a safety risk.

Recommendation: The design of the pond should take consideration of the above, and further details should be provided to demonstrate that the pond will function appropriately in the long term as a water quality control measure.

B. FLOODING CONSIDERATION

No details have been provided on how flooding considerations have been taken into account in the design of the pond. As the pond was initially designed and constructed for the Castlereagh Rd upgrade, any changes within the catchment that could have altered the drainage or flow paths subsequent to the road upgrade need to be taken into account in how the pond will function in the long term. Flood protection requirements for other adjacent land uses should also be considered where appropriate.

Recommendation: To adequately review potential site flooding issues, further details should be provided and the proposal should be referred to Council's Engineering Stormwater Supervisor for further assessment.

C. MAINTENANCE REQUIREMENTS

No details have been provided on the proposed maintenance and monitoring of the pond. Suitable access should be provided for maintenance machinery, and the pond design should incorporate an emergency drainage facility to enable the pond to be drained if required.

Recommendation: A suitable monitoring and maintenance plan is to be developed and implemented to ensure the continued water treatment functionality of the pond.