NSW GOVERNMENT | Office of Environment & Heritage

#22

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Our reference: DOC11/48699
Contact: Jennifer Sage
9995 6856

Ms Lisa Chan
Infrastructure Projects
Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Dear Ms Chan,

I refer to your letter dated 19 October 2011 requesting comments on Sydney Water Corporation's application to modify Condition 63 of the approval for the Brooklyn and Dangar Island Sewerage Scheme. Sydney Water's application seeks to relax the effluent quality limits for discharges from the Sewerage Scheme.

In 2003, the Environment Protection Authority (EPA), formerly the Environment Protection and Regulation Division of the Office of Environment and Heritage, provided input into the planning assessment of the Sewerage Scheme, including advice on the setting of post-commissioning (operational) concentration limits for effluent discharged from the Sewerage Treatment System (STS). These limits were based on the EPAs expectations of the performance of a modern membrane treatment plant and the information provided by Sydney Water in the Environmental Impact Statement for the Scheme. The Environment Protection Licence for the Brooklyn STS states that the EPA will set load limits for the system after the commissioning phase.

Sydney Water has extended the commissioning phase of the STS on a number of occasions due to a combination of slow connections from the Gosford local government area, the need to repair bioreactors in the sewage treatment plant (STP) and a subsequent need to extend the optimisation period. Higher nutrient concentration limits applied during this commissioning phase.

Sydney Water is now applying to increase the nutrient concentration limits that apply during the post-commissioning (operational) phase of the STS as it cannot meet the currently approved operational limits without incurring high operational costs for chemical dosing and membrane replacement. Sydney Water has assessed a number of design alterations at the treatment plant. A tertiary filter was trialled at the plant and was able to meet the currently approved post-commissioning limits however Sydney Water does not consider this a viable option due to installation costs of approximately $1 million.

The EPA notes that Sydney Water has concluded that the environmental impact of the higher concentrations in the discharged effluent would be environmentally acceptable as the local water quality would remain within the ANZECC (2000) ambient nutrient bench marks. However after reviewing the report the EPA considers that the modelling which forms the foundation of this conclusion warrants further work to ensure it is rigorous. While the EPA is not claiming that the general conclusions are wrong it is appropriate that the report be well founded and accurate. Attachment A identifies in more detail the issues that warrant review.

Of key concern to the EPA however is the impact of the additional nutrient loads on the current cumulative nutrient loads in the Hawkesbury Nepean River as a whole. Over the last decade the government has made strenuous efforts to reduce both the point and diffuse loads of nutrients to the river. It is of vital

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interest to the EPA to ensure that the environmental benefits associated with these efforts is not eroded. Approval of the proposed higher limits would result in the order of an additional 2.1 tonnes of total phosphorus and 3.9 tonnes of total nitrogen being discharged to the estuary each year (Attachment A includes further information relevant to this point).

Over the last year the EPA has been working with Sydney Water to develop a catchment nutrient load limit for the Sydney Water STSs that discharge to the Hawkesbury-Nepean catchment. The EPA has informed Sydney Water that while new long term load limits are negotiated, the current nutrient discharge requirements will continue to apply but any new proposals will require offsetting.

The EPA would only support Sydney Water's proposed increase to the discharge concentration limits if the change was complemented by amending the Brooklyn STS to include a nutrient load limit. The load limit would reflect the loads that would be achieved at the lower concentration limits. Sydney Water would be required to offset the difference between this load limit and the actual nutrient load discharged from the plant. The appropriate offset ratio and details of implementation will need to be negotiated with Sydney Water.

After completing the additional work suggested and considering the options open to it (for example the installation of a tertiary filter), should Sydney Water wish to pursue the option of higher concentration limits complemented by a load limit, the EPA would support the proposed nutrient limit increases on the basis outlined above.

Should you wish to discuss any matters raised in this letter, please contact Jennifer Sage on 9995 6856 or jennifer.sage@environment.nsw.gov.au.

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Yours sincerely

G Howard 24/11/11

GISELLE HOWARD
Director Metropolitan
Environment Protection Authority

Attachment A
Brooklyn and Dangar Island Sewerage Scheme MP09_0134 Modification Request

1. Aspects of the Environmental Assessment Report that require further work

Assessment of aluminium sulphate dosing

The Environment Protection Authority (EPA) notes that the original design of the sewage treatment plant (STP) specified dosing with aluminium sulphate for the chemical removal of phosphorus. While reasons are given for the change to ferric chloride dosing, the EPA considers that Sydney Water should re-examine whether the plant can be modified to enable aluminium sulphate dosing. Should this be a feasible option, Sydney Water should then assess the impact that this treatment process would have on membrane life, nutrient levels in effluent and operational costs to Sydney Water and the community. Aluminium sulphate can work effectively at higher pH levels than ferric chloride and therefore may have less impact on nitrification processes.

Assessment of impacts of additional nutrient loads to the Hawkesbury River

Sydney Water has assessed the impacts of nutrients at the edge of the dilution zone, but has not addressed the impacts of increased nutrient loads. Nutrient loads are an important consideration for rivers and estuaries, with implications on the amount of biomass that may be generated in response to the increased nutrient loads.

The EPA has estimated that approval of the proposed post-commissioning limits would result in 2.1 tonnes of total phosphorus and 3.9 tonnes of total nitrogen to be discharged to the estuary each year (calculated by multiplying the proposed change in 90 percentile concentrations by the maximum daily volume permitted by the environment protection licence for Brooklyn STS). The EPA considers that both the exact increases in the additional loads need to be calculated and also the impacts on the estuary assessed to inform decision making around any offsetting proposal.

To provide some context to the magnitude of these loads, the recent NutrientSmart Farms project (part of the Hawkesbury Nepean River Recovery Program co-ordinated by the Department of Primary Industries) reduced diffuse agricultural nutrient loads in the Hawkesbury-Nepean catchment by 13 tonnes/year of total phosphorus and 48 tonnes/year of total nitrogen. The increase in nutrients discharged by the Brooklyn STS proposed by Sydney Water represent 16% and 8% of the reductions made in phosphorus and nitrogen by the NutrientSmart Farms program, respectively. While impacts from the two sources do not have the same environmental equivalence, the significance of the loads should be assessed.

2. Aspects of near field numerical modelling that require further work

Maximum flow rate

The Near-Field Numerical Modelling provided as Appendix 1 of the Assessment Report indicates that the effluent discharged between January 2009 and December 2010 was intermittent with no flow through the plant half of the time. It is unclear whether the water quality modelling is based on this data. Assuming that it is, Sydney Water should confirm whether this flow and discharge pattern is expected to change with new connections and/or growth.

The EPA considers that the water quality modelling should be repeated using the maximum effluent volume that will be discharged from the sewage treatment system (STS) to allow assessment of the full extent of potential impacts. Alternatively, the EPA will consider setting volume limits on Sydney Water's environment protection licence for the Brooklyn STS that reflect the volumes used in the water quality modelling that form the basis of determining whether the impacts are acceptable.

Ammonia

In the Assessment Report and Near-Field Modelling Report, Sydney Water has used a variety of terms to describe "ammonia" and this has been inconsistent throughout the reports. Subsequently, it is not clear which form of ammonia has been used in the water quality modelling. Sources of ambiguity include –

- Table 3 of Appendix 1 of the Near-Field Numerical Modelling Report (page A1-viii) incorrectly states that the estuarine water guideline of15 µg/L is for un-ionised ammonia. This guideline value is a total ammonia N value.
- In Figures 11 to 14 of Appendix 1 of the Near-Field Numerical Modelling Report and Figures 8 and 9 of the Assessment Report, the ANZECC guideline value used to assess compliance is 15 µg/L. This is a total ammonia N value and there is no reference in any of these figures to "Ammonia (un-ionised)" or variations thereof. So it is not clear why Table 2, Sections 2.3.2 to 2.3.4 of the Near-Field Numerical Modelling Report and Section 7.2 of the Assessment Report present information on compliance with "ammonia (unionised)" and "unionised ammonia", or why there is a need for the model assumption on page A1-ii, Appendix 1 that deals with "unionised ammonia".
- Table 4 in the Assessment Report refers to compliance with "ammonia" guideiines but the more detailed material in the Near Field Numerical Modelling Report on which this is based actually refers to compliance with guidelines for "ammonia (unionised)".

Despite these ambiguities the EPA considers that dilution estimates and modelling for total nitrogen and total phosphorus correctly indicate that no toxic effects from the discharge of total ammonia N would be expected.

Background concentrations

It appears that the water quality modelling ignores the background concentrations, i.e. it assumes that the effluent is diluted by estuarine water with zero nutrient concentrations. If background levels of nutrients were incorporated into the models, there may be an increased frequency of exceedance.

While the modelling is otherwise robust and the general approach could prove useful in the future, the EPA considers that the reports should be corrected to clarify these issues.
