Dangar Island League Inc.
PO Dangar Island, NSW 2083

Major Projects Assessment
NSW Department of Planning & Infrastructure
GPO BOX 39
Sydney
NSW 2001

10 November 2011

Submission regarding: Brooklyn and Dangar Island Sewerage Scheme

Application Number: MP 09_0134 MOD 3
Location: Brooklyn
Proponent: Sydney Water Corporation
Council Area: Hornsby

Statement of Objection:

The Dangar Island League, the organisation that represents the residents of Dangar Island, **strongly objects** to the request by Sydney Water Corporation to modify the discharge licence conditions for the Brooklyn Sewerage Treatment Plant. The Dangar Island League objects on the following grounds:

1. The Brooklyn Sewerage Treatment Plant is a very new plant that under Sydney Water management has major engineering operational problems. Sydney Water has decided not to address the operational problems in the plant but rather to ignore them and seek an increase in licence discharge limits. This is unacceptable
   Engineering solutions to the operational problems at the Brooklyn Plant have been identified and successfully trialled by Sydney Water. The trial installation of a tertiary phosphorous filter at the plant has proved to be operationally and financially attractive, achieving significant cost savings and operational improvement, while at the same time meeting all conditions of the current discharge licence.
   The current operational problems at the Brooklyn Sewerage Treatment Plant should be solved with a tertiary filter engineering solution that is available. The operational problems in the plant should not be used as the excuse to achieve modification of Condition 63 and dump extra chemicals and nutrients into the Hawkesbury River.

2. The requested modification of Condition 63 will result in a significant increase in the discharge of phosphorous, nitrogen and ammonia into the Hawkesbury River, essentially turning the river into a tertiary sewerage treatment plant. The addition of these chemicals into the river will be detrimental to the environment and especially to the local industries such as oyster farming, fishing and prawning. The Hawkesbury River is also a major recreational water area and the high ammonia discharge concentrations proposed in the application for modification exceed the guidelines for recreational waters.

3. Modifying Condition 63 would set an unfortunate and ugly precedent for the future operation of chemical plants in NSW.
Should the Department of Planning & Infrastructure agree to the modification of Condition 63 then any poorly performing chemical plant operator in NSW could use the modification as a precedent to apply for the relaxing of discharge limits rather than fixing operational problems in their plant.

   Modifying Condition 63 would be the first retrograde step in terms of environmental water management made in NSW for over a decade. A shame on the Authorities of NSW.

The operational problems at the Brooklyn Sewerage Treatment Plant

The Brooklyn STP is a very new, purpose built plant established to serve the environmentally sensitive Lower Hawkesbury Region. The plant commenced operation in 2007.

The operation of the plant has been highly problematic. In order to meet the current discharge licence limit, Sydney Water has not been able run the plant efficiently and current performance is substantially below original design specifications. The performance gap is in excess of a 50% loss of plant efficiency.

Chemical usage:	50-100% in excess of original design specifications. Ferric Chloride usage four times greater than other comparable plants
Electricity usage:	50 – 60% over original design specifications
Membrane life:	3 years (only) against original design expectation of 10 years

On all key operational efficiency measures, the Brooklyn Sewerage Treatment Plant has significantly failed to come even close to the original design specifications.

The reasons for the operational failure of the Brooklyn Sewerage Treatment Plant

Sydney Water has never publically admitted the reasons why the operational efficiency of the Brooklyn plant is so far off the original design specifications. However there are some very clear indicators.

The design for a Membrane Bio-Reactor (MBR) plant, such as that purchased for Brooklyn, originally called for a dual chemical process using aluminium sulphate and ferric chloride which in turn required multiple chemical dosing points. As stated in section 3.1.2 of the Application for Modification, Sydney Water decided to change the design of the plant and eliminated the use of aluminium sulphate relying on ferric chloride only and implemented single point chemical dosing instead of the multiple point dosing. This is an engineering failure.

Single point dosing is highly inefficient and results in the need to dose with excessive quantities of ferric chloride which in turn fouls membranes and drives higher electricity usage. This inefficiency of single point dosing was confirmed to me by Sydney Water Engineers during a visit to the plant on 5th October 2011. This is the second major engineering failure by Sydney Water in the management, design and construction of the Brooklyn Plant.

The second key change that Sydney Water made to the original Brooklyn MBR design was to unravel the original MBR electronic "black box" control system and reprogram it to fit the Sydney Water in house remote electronic control system. The operational efficiency of this modification is unknown as Sydney Water denied a request by the author of this submission to visit the control room for the Brooklyn Sewerage Treatment Plant.
However, technical data specifically relating to the Brooklyn Sewerage Treatment Plant, recently published by Sydney Water Engineers, shows a marked conflict with the current Application for Modification to the Department of Planning and Infrastructure. This suggests that the engineers who implement and manage the remote electronic control systems of the Brooklyn Sewerage Treatment Plant are out of line and in conflict with the actual performance of the plant.
As late as 2010, in a major industry presentation, a technical paper titled "Automating & Remotely Controlling Brooklyn STP" by Sydney Water authors Cheryl Marvell, Colum Kearney and Robert Mandryk stated that the operational cost including chemicals, labour, operations and maintenance at the Brooklyn Plant were all below original design operating costs except for electricity that was approximately 10-15% above. Today one year later, the Application for Modification to the Department presents a very different picture with costs significantly blown out in all categories. Sydney Water now claims chemical usage is four times other plants, electricity usage is 50-60% over original design specification and membranes are failing prematurely. The data discrepancy is a concern and raises questions regarding the accuracy, performance of the electronic management system of the Brooklyn Plant and communication within Sydney Water.

The engineering solution to address the operational failure of the Brooklyn Sewerage Treatment Plant

Sydney Water has considered alternatives and modifications to the plant to solve the performance problems. Three such alternatives are very briefly outlined in the Application document in section 3.2 *Treatment Process Alternatives.*

The third option mentioned in the Application for Modification, *adding a tertiary phosphorous removal step utilising aluminium sulphate after the membranes by adding a tertiary filter,* has been very successfully trialled by Sydney Water. Based on the very positive performance results from the trial at the Brooklyn Plant, a tertiary filter must be installed to overcome the operational problems and bring plant performance in line with original design specifications.

Unfortunately Sydney Water has been remiss in the Application for Modification of Condition 63 document by only stating the upfront capital cost for the tertiary filter at approximately $1million. (This appears to be a cost overstatement). Sydney Water has failed to specify or quantify the cost performance advantages which are substantial.

In total, the savings to be gained are estimated to be in excess of $200,000 per annum. A NPV analysis of this project has been completed by Sydney Water and is claimed to be very attractive. This was confirmed by Sydney Water engineers during my tour of the Brooklyn plant on 5th October 2011. My request to gain access to the NPV analysis was rejected.
If an investment of $1million capital can be effectively paid back in 5 years whilst still meeting the design goals, it is extremely difficult to see why Sydney Water will not accept it. In most industries this sort of payback would be accepted.

The cost and performance advantages of installing a tertiary phosphorous filter are:

- The current discharge limits of Condition 63 are met
- Substantial net savings of chemical usage and hence cost.
  Ferric chloride, sodium hydroxide, citric acid and acetic acid usage is significantly decreased.
- Multiple dosing points achieve increased efficiency of phosphorous removal
- Electricity consumption is decreased to levels close to original design specification
- Much lower usage of ferric chloride (50% decrease) results in less fouling of the membranes and hence longer membrane life (closer to design life). A membrane change costs approximately $250,000. Increasing membrane life from currently 3 years to 10 years, the original expectation, yields a saving of $583,000 over ten years or $58,000 per annum.

During the inspection of the Brooklyn STP on 5th October 2011, Sydney Water engineers when questioned why Sydney Water did not install the tertiary filter, responded to the effect that: "***the tertiary phosphorous filter trial was very successful and would yield substantial savings but this option was not nearly as cost effective as changing the discharge limits***" thus allowing more phosphorous to flow into the Hawkesbury. This is a clear indication that Sydney Water can economically and practically meet the current Condition 63, it is just that there is no desire to do so.

Outstanding matters requiring a response.

A number of questions and requests for information have been made to Sydney Water Corporation and remain unanswered. Sydney Water formally informed me that as the Application for Modification is now subject to public submissions, all outstanding requests for information will no longer be attended to by the Corporation. We have been directed to put our requests for information that are outstanding and unanswered by Sydney Water Corporation, through the submissions process.

Following Sydney Water Corporation's instructions, I now request that the Department of Planning & Infrastructure source the outstanding information previously requested from Sydney Water. The questions below are extracted from emails that have been previously sent to Sydney Water Corporation and remain unanswered:

- Sydney Water states, in the Application for Modification of Condition 63, that using the third option of a tertiary filter ..."the net chemical consumption reduces considerably because ferric chloride and sodium hydroxide doses can be significantly cut". During the Brooklyn plant tour on 5th October I was told that ferric chloride consumption was halved but no mention was made of the quantum of saving regarding sodium hydroxide or acetic acid. Please confirm the quantum of saving of sodium hydroxide and acetic acid. Is this consumption of these chemicals also halved?

- In utilising the tertiary phosphorous filter, what is the consumption of aluminium sulphate and ionic polymer per litre of effluent treated? Also please identify the supplementary ionic polymer used?

- In the Application for Modification when you (Sydney Water) state "net chemical consumption reduces considerably," what is the percentage net saving in chemical usage?

- During the plant tour on 5th October I was told that the tertiary filter if implemented would significantly cut electricity usage and bring it back to original design levels. These electricity savings are also mentioned in the SW application to the Department of P&I. At the Community Consultation meeting on 22nd July Sydney Water stated that currently electricity usage at the plant was 50 – 60% higher than original design estimates. Therefore is it correct that the current electricity usage will be halved if the tertiary filter were to be implemented? Please clarify the electricity consumption saving delivered by the tertiary filter option.

- During the plant tour on 5th October I was told that the ".. option three" tertiary filter was a financially viable option but not as worthwhile in cost saving terms as getting the discharge limits changed. It seems obvious that the tertiary filter is an important cost saving initiative for the plant regardless if discharge limits are lifted or not. The advantages are clear in that decreasing ferric chloride usage significantly prolongs membrane life (I was told back to original design life). There is a significant net decrease in total chemical usage and significant electricity consumption savings. Everything Sydney Water is asking for! The tertiary filter process increases the number of dosing points which increases overall plant performance. The obvious question I ask is: **Does Sydney Water intend to implement option three regardless of the outcome of the application to Modify Condition 63?**

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I previously requested the NPV information for the tertiary phosphorous filter trial project from Sydney Water. I have been informed that the NPV analysis has been completed. The request was refused by Sydney Water on the basis that *"detailed operational and cost information are commercially confidential and have been provided to DP&I as part of their assessment process."* I am not able to find this NPV information in the documents publically exhibited by the Department of P&I regarding this application. Please advise me if I am able to obtain this information that is supposed to have been provided to the Department by Sydney Water?

Declaration: The Dangar Island League has not made any political donations in the previous two years.

Yours sincerely,

Bronek Karcz

Vice President - Dangar Island League