Hunter Water Corporation - Proposed Augmentation to the Cessnock Wastewater Treatment Works

Director General's Report Section 115C of the Environmental Planning and Assessment Act

May 2004

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DISCLAIMER

FOREWORD

Hunter Water Corporation, with the assistance of the then Environment Protection Authority and other organisations, developed an environmental improvement plan (EIP) for its inland wastewater treatment plants. The EIP was released in July 1996. It identified that in order to meet future population demands within the sewerage catchments, while at the same time providing a high level of protection for local waterways, Hunter Water Corporation would need to undertake major works for ten of the region's key inland treatment plants including the Cessnock Wastewater Treatment Works (WWTW).

Hunter Water Corporation decided that the existing Cessnock treatment plant, a trickling filter plant commissioned in 1932, cannot meet expected demand in its current state. Therefore, in order to address the outcomes of the EIP, it proposed that an advanced process treatment plant, with more capacity and capable of producing higher quality effluent, should be built.

An environmental impact statement (EIS) for the proposed new Cessnock WWTW was exhibited on 25 March 2002. The proposal had the following overall objectives:

- To provide wastewater treatment facilities to service current and future development in the Cessnock area, in a sustainable manner;
- To ensure there are no significant impacts on the surrounding environment including waterways that receive treated effluent; and
- To meet the requirements of the Environment Protection Authority's Pollution Reduction Program for Cessnock WWTW.

Investigations carried out by Hunter Water Corporation subsequent to the EIS exhibition identified that there were significant benefits, particularly in terms of process reliability, reduced greenhouse gas emissions, and reduced capital and operating costs, by refurbishing some units in the existing plant as well as incorporating newer technologies and equipment. Consequently an amended proposal was put forward by Hunter Water Corporation which achieved the same overall objectives and outcomes of the proposal exhibited in the EIS.

This report has been prepared in accordance with Section 115C of the *Environmental Planning and Assessment Act* which requires that the Minister obtain a report from the Director General of the Department of Infrastructure, Planning and Natural Resources prior to making a decision.

This report assesses the environmental impact statement, the issues raised in the representations made in response to its exhibition, the submission from Hunter Water Corporation in response to the representations, and other relevant matters pertaining to the potential environmental impacts of the proposal. It concludes that the proposal is likely to result in an improvement to the local environment particularly within Black Creek, the watercourse which receives the treated effluent.

The main strategic concerns related to ensuring the augmented plant does not pollute receiving waters. Overall the project will achieve an improved environmental outcome by meeting effluent quality standards for the expected population growth in the catchment.

The potential environmental impacts associated with the project can be mitigated by adopting further measures and safeguards referred to in this report and in the recommended conditions of approval.

The proposal is recommended for approval subject to the recommended conditions.

Jennifer Westacott
Director General
Department of Infrastructure, Planning and Natural Resources

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GLOSSARY OF TERMS

ADWF	Average Dry Weather Flow
DEC	Department of Environment and Conservation (formerly the Environment Protection Authority and the National Parks and Wildlife Service
DEC	Department of Environment and Conservation (formerly the Environment Protection Authority, and the National Parks and Wildlife Service)
Department, The	Department of Infrastructure, Planning and Natural Resources (formerly the Department of Planning, and the Department of Land and Water Conservation)
Director General, The	Director General of the Department of Infrastructure, Planning and Natural Resources (or delegate)
EIP	Environmental Improvement Program
EIS	environmental impact statement
EMP	environmental management plan
EPA	Environment Protection Authority (now part of the Department of Environment and Conservation)
EP&A Act	*Environmental Planning and Assessment Act 1979*
HWC	Hunter Water Corporation
Km	kilometre
ML/d	megalitres per day
Minister, The	Minister for Infrastructure and Planning
OU	Odour Unit
PRP	Pollution Reduction Program
RTA	Roads and Traffic Authority
SOC Act	*State Owned Corporations Act 1989*
SMS	Safety Management System
SPS	sewage pumping station
STP	sewage treatment plant
WWTW	Wastewater Treatment Works

EXECUTIVE SUMMARY

Background to the Proposal

The Cessnock Wastewater Treatment Works (WWTW), operated by the Hunter Water Corporation (HWC), is a trickling filter plant commissioned in 1932. It serves approximately 21 500 people in the areas of Cessnock, Aberdare, Bellbird, Pokolbin, and Nulkaba (see map at **Figure 1**). Cessnock WWTW has been upgraded several times to improve effluent quality by the addition of other process tanks, mechanical screens, and chemical phosphorous removal facilities. An artificial wetland was also construction to further polish the treated effluent prior to discharge.

HWC and the then Environment Protection Authority with assistance from other organisations, developed an environmental improvement plan (EIP) for HWC's inland wastewater treatment plants. The EIP outlined a number of investigations to be undertaken at Cessnock WWTW in order to determine a strategy for the long term future of the treatment plant. These investigations included plant capacity reviews and methods to remove algae from the final effluent and therefore improve effluent quality.

It concluded that in order for the Cessnock treatment plant to service future development in the catchment, while at the same time improve effluent quality, it would need to be augmented.

Need for the Proposal

The Cessnock WWTW currently meets Department of Environment and Conservation (DEC) licence limits. The studies undertaken for the EIP, however, showed that within a few years it is unlikely that the plant could continue to adequately treat dry weather flows, and effluent quality would deteriorate. Furthermore, the maturation ponds, which are used to both polish and disinfect the effluent, experience periodic algae blooms. This results in higher than normal levels of suspended solids being discharged to receiving waters.

The Proposal

Population projections undertaken on behalf of HWC indicate that baseline residential growth in the Cessnock catchment is generally low. However, there is a potential for planned large tourist facilities in the Pokolbin area to increase treatment plant capacity requirements should these proceed. HWC reasoned that a plant of approximately 26 000 EP will be required to meet catchment needs to 2019, the design horizon. However, should development proceed at a faster rate, a plant capacity of up to 30 000 EP could be required.

HWC exhibited its proposal for Cessnock between 25 March and 3 May 2002 which recommended decommissioning of the existing trickling filter plant and construction of a plant with a 32 000 EP capacity. It was planned to deliver this in two stages: Stage 1 providing a capacity of 26 000 EP; and Stage 2 providing a capacity to 32 000 EP.

Investigations undertaken subsequent to the exhibition identified that additional benefits could be obtained if certain processes in the existing plant were to be refurbished and newer technologies installed. These benefits included greater process reliability, less greenhouse gas emissions, and reduced capital and operating costs. Consequently HWC has amended its original proposal.

The amended proposal which HWC is now seeking approval for will include overhauling the biological filters, installing new clarifiers to increase processing capacity, enclosing a new inlet works, constructing soil bed filters to treat odours vented from the inlet works, and installing a new tertiary flotation process in conjunction with the maturation ponds to remove algal cells prior to discharge.

It is also now proposed to digest sludge wastes anaerobically and capture the waste methane for co-generation purposes (e.g. electricity and heat).

The amended process will meet the same effluent quality identified in the exhibited proposal. The treated effluent would also continue to be discharged into Black Creek.

Full treatment is proposed to be provided for flows up to 3 times average dry weather flow (3 x ADWF), with flows in excess of 3 x ADWF bypassing the screens, and discharging directly to the maturation ponds without passing through the primary clarifiers, trickling filters and secondary clarifier.

The maturation ponds would be used to store and treat wet weather flows up to, approximately, a 1 in 10 year storm event. The ponds would remove solids and nitrogen.

Disinfection is provided by the exposure of the effluent to natural UV radiation in the maturation ponds.

The estimated capital cost for the amended proposal is approximately $16.5 million.

Need, Justification and Benefits

The amended proposal will:

- meet the same effluent quality identified in the EIS;
- service expected population growth in the catchment;
- control bacterial levels at the discharge point in Black Creek to less than 150 faecal coliforms/100 mL (on a 50 percentile basis);
- significantly reduce phosphorus loads; and
- remove the high density concentrations of algal cells by the use of the proposed tertiary (air) flotation process which suspends the algae and then skims it off the surface.

Overall, the proposed improved sewage treatment process will achieve a reduction in the human health and ecosystem risks by improving the quality of effluent discharged to Black Creek.

EIS Exhibition

An EIS was exhibited from 25 March to 3 May 2002 inclusive. A total of 7 written representations were received, and two verbal comments as a result of the exhibition. Two representation expressed general support and the remainder did not raise any outright objections with the proposal proceeding. However there were various concerns with certain aspects of the proposal including:

- impacts of flow alteration in the receiving waters;
- a need to pursue reuse for excess flows;
- need to examine options to vary effluent flows to improve creek health; and
- cessation of flows to the maturation ponds (this is no longer an issue as it is now proposed to continue the use of the maturation ponds.).

Section 3 of this report provides an overview of the main issues raised in the representations.

Matters under the *Environment Protection and Biodiversity Conservation Act*

HWC undertook an assessment on whether the proposal would have any significant impact on any matters of national environmental significance as identified under the *Environment Protection and Biodiversity Conservation Act* (Commonwealth). On the basis of its assessment it did not consider it was necessary to refer the proposal to the Commonwealth Minister for the Environment.

Key Issues

The Director General's overall assessment of the proposal is provided in Sections 4 and 5 of this report. The key finding and conclusion is that HWC achieve an improved environmental outcome by meeting effluent quality standards for the expected population growth in the catchment.

Conclusions and Recommendations

The justification for the project has been adequately substantiated through a balance between the key environmental impacts of the proposal and the identified benefits.

It is anticipated that the preferred option put forward in the Cessnock WWTW proposal will be beneficial to the wider Cessnock community and result in improved water quality within Black Creek and reduced impact of operations at the WWTW.

It is concluded that the environmental impacts associated with the proposal could be managed to an acceptable level.

1 INTRODUCTION

1.1 Purpose of the Report

The purpose of this report is to review Hunter Water Corporation's (HWC) environmental impact statement (EIS) for the proposed Cessnock Wastewater Treatment Works (WWTW), the issues raised in representations made in response to the exhibition of the EIS, HWC's consideration of these representations, and changes made to the proposal by HWC subsequent to the exhibition of the EIS.

This report is prepared in accordance with Section 115C of the *Environmental Planning and Assessment Act 1979* (EP&A Act) which requires the Director General of the Department of Infrastructure, Planning and Natural Resources (Director General) to assess and report to the Minister for Infrastructure and Planning.

1.2 Statutory Provisions

HWC was a company State owned corporation under the *State Owned Corporations Act 1989 (*SOC Act*)* until 1 January, 1999. This allowed the then Minister for Urban Affairs and Planning (the Minister) to certify proposals as being of State or regional significance under Section 37A of the SOC Act, making them subject to Part 5 of the EP&A Act and enabling the Minister to determine if an EIS is required. If the Minister decides an EIS is required HWC must obtain the approval of the Minister under Division 4 of Part 5 of the EP&A Act before carrying out the development, and take on the functions of a determining authority under Part 5 of the EP&A Act.

The statutory processes changed when the *Water Legislation Amendment (Drinking Water and Corporate) Structure Act* was implemented. This Act disestablished the HWC as a Company State Owned Corporation and established it as a Statutory State Owned Corporation. Certification under the SOC Act only applies to Company State Owned Corporations.

However a transitional regulation (*Hunter Water [Transitional] Regulation 1999*) was gazetted in August, 1999 under the *Hunter Water Act 1994*. The object of this transitional regulation was to ensure that Section 37A of the SOC Act continues to apply to certain HWC developments, being those where a proposal to carry out the development existed before the business undertaking of Hunter Water Corporation Ltd. (as a Company State Owned Corporation) was transferred to Hunter Water Corporation (as a Statutory State Owned Corporation).

The proposed Cessnock WWTW is explicitly listed in the transitional regulation as a development that remains subject to Section 37A of the SOC Act. In addition, the Minister under a Statement of Application for Hunter Water Corporation issued on 24 April 1996 directed that all new sewage treatment plants were automatically certified.

The Cessnock proposal is considered a new sewage treatment plant since new treatment facilities are being installed to provide an enhanced treatment capability and some of the existing treatment processes are being upgraded to perform new functions.

On 3 August 1998, the then Minister also considered that the proposal was likely to significantly affect the environment and required that an EIS be prepared.

An assessment report on the proposal must be prepared by the Director General before the Minister may make a decision. The Director General's report, together with the Minister's decision, is to be made publicly available.

1.3 Preparation and Exhibition of the Environmental Impact Statement

An EIS was prepared in accordance with Section 112 of the Act. In a letter dated 23 April 1998, HWC wrote to the Department seeking advice on requirements for the form and content for an EIS for the proposal. The Director General's requirements were issued in a letter dated 10 July 1998.

The EIS was not exhibited within the statutory period of 2 years and HWC again wrote to the Department seeking advice on the requirements for an EIS. A second letter was issued by the Director General on 11 December 2000 setting out her requirements.

The EIS was prepared on behalf of HWC by Sinclair Knight Merz and exhibited from 25 March to 3 May 2002 inclusive.

Copies of all representations made to HWC were forwarded to the Department. On 23 October 2003 HWC forwarded a report (hereafter referred to as *Representations Report*) to the Department addressing the issues raised in representations from the public exhibition of the EIS.

1.4 Request for the Approval of the Minister for Infrastructure and Planning

HWC sought the approval of the Minister for the project in it letter dated 20 October 2003.

2 THE CURRENT PROPOSAL

This section provides a background to the proposal and a description of the project as outlined in the EIS. It also describes the current proposal for which HWC is seeking the Minister's approval. Details of supplementary information and advice provided by HWC are included.

2.1 Background to the Proposal

HWC, with input from the former Environment Protection Authority (EPA), former Department of Land and Water Conservation (DLWC), NSW Fisheries, the Hunter Public Health Unit and the Hunter Catchment Management Trust, developed an environmental improvement plan (EIP) for HWC's ten inland wastewater treatment plants including the Cessnock WWTW. Approximately 30% of HWC's sewerage customers are served by these ten inland sewage treatment plants.

The EIP identified a $60 million program of works to be undertaken.

At the time the EIP was prepared, a number of investigations were undertaken at Cessnock WWTW by HWC in order to determine the long term strategy for the treatment plant. The investigations identified that baseline residential growth in the Cessnock catchment is generally low. However the studies identified that there was potential for the Pokolbin area to develop a number of large tourist facilities which could increase treatment plant capacity requirements if constructed.

Cessnock treatment plant is a trickling filter plant constructed in 1932 and currently serves a population of approximately 21 000 people. The plant was upgraded in 1978 with the addition of a flow equalisation tank, maturation ponds, and sludge lagoons. It was further upgraded in 1980 when a mechanical screen and grit chamber were installed. In 1995, an artificial wetland was constructed between the WWTW and nearby Black Creek and chemical phosphorous removal facilities were installed.

HWC anticipated that for the Cessnock WWTW a plant of around 26 000 EP would be required to meet catchment needs in 2019, the proposed design horizon set by HWC. However, HWC reasoned that should development proceed at the faster rate identified in their investigations, then a plant capacity of 30 000 EP would be required.

2.2 Need, Benefit, Project Justification and Consequences of Not Proceeding

Even though the existing Cessnock WWTW meets current EPA licence limits, the maturation ponds, which are used to both polish and disinfect effluent, are subject to periodic algal blooms. The algal laden effluent in the maturation ponds is discharged into Black Creek, resulting in high levels of suspended solids.

The WWTW also has a limited capacity to remove nitrogen which is the likely nutrient that promotes algal blooms in the maturation ponds. Any nitrogen taken up with algal growth in the maturation ponds is not removed from the treated effluent but discharged from the ponds into Black Creek as nitrogen bound up in algal biomass.

HWC estimates that the existing plant has a treatment process capacity for 23 000 EP. This is adequate capacity to treat sewage loads until around 2005. Beyond this date major upgrades to screening facilities would be required, measures would need to be undertaken to remove algae from the maturation ponds, and sludge digester capacity would need to be increased. The biological filters (i.e. trickling filters) would also need to be refurbished and upgraded to handle the anticipated increase in the hydraulic loads.

HWC concluded that in order to meet future population demands within the catchment, while at the same time providing even higher levels of protection for local waterways, the Cessnock WWTW would need to be renewed.

HWC identified, subsequent to the EIS, that there would be benefits, particularly in terms of process reliability, reduced greenhouse gas emissions, and reduced capital and operating costs, if the renewed plant could be based on retaining certain components of the existing treatment plant. In effect, it has chosen to construct a new plant incorporating new technology into certain of the existing processes, and adding new equipment to provide processes not currently included in the existing plant.

2.3 Objectives

HWC has established the overall objectives of the proposal as follows:

- To provide wastewater treatment facilities to service current and future development in the Cessnock area, in a sustainable manner;
- To ensure there are no significant impacts on the surrounding environment including waterways that receive treated effluent; and
- To meet requirements of the EPA Pollution Reduction Program for Cessnock WWTW.

In meeting these objectives HWC must operate according to its corporate objectives, particularly to operate in compliance with ecologically sustainable development.

2.4 Alternatives Considered

As part of its investigations for the Cessnock proposal, HWC examined the feasibility of consolidating the Cessnock and Kurri Kurri treatment plants. The consolidation option was based on locating the combined treatment facility at Cessnock. However the proposal was not favoured because it would not have been feasible to continue supplying the reuses already established at Kurri Kurri from a combined Cessnock/Kurri Kurri WWTW located at Cessnock. In addition there would have been some potential difficulties managing the total wet weather storage volumes arising from a combined WWTW.

2.5 Demand Management

HWC is pursuing strategic water cycle management options which contribute to better quality and lesser quantity of wastewater generated in its sewage catchments. The EIP is a contributor to this. In addition HWC has been analysing the performance of its wastewater systems to develop a management strategy for all wastewater assets and to create a framework within which wastewater system licences can be implemented.

An Inflow and Infiltration Reduction Committee has been formed within HWC for the purpose of reducing the amount of stormwater and groundwater entering the wastewater systems.

HWC has also formed a demand management committee to investigate ways to decrease potable water consumption. The strategy is made up of several components, some of which would also lead to a decrease in the production of wastewater e.g. community education programs, water savings devices.

HWC has also assisted the Hunter Catchment Management Trust in conducting a phosphorus reduction campaign.

2.6 The Proposal as Described in the EIS

In the EIS, HWC proposed to construct a new wastewater treatment plant adjacent to the existing Cessnock treatment facility. Treated effluent will be discharged to Black Creek.

The proposed treatment would be a continuous activated sludge process with chemical phosphorus removal (known as the Modified Ludzack Ettinger process). It was felt that the current disinfection system, a 25 day retention of treated effluent in the maturation ponds, was incapable of meeting the

proposed standard faecal coliform level of <150 CFU/100 mL (50th percentile). Accordingly ultra violet radiation (UV) disinfection was recommended for Cessnock.

It was also proposed to fully treat flows up to 3 times average dry weather flow (3 x ADWF) i.e. primary, secondary, and disinfection. Flows in excess of 3 x ADWF and up to 7 x ADWF would by-pass the bioreactor and be directed to the clarifiers. Flows above 7 x ADWF would by-pass to an interim sewage storage facility, to be returned to the inlet works once the inflow decreases to below 7x ADWF.

The proposal incorporated a second stage in the event development within the catchment resulted in the higher population projection. The proposed second stage would increase the treatment capacity from 26 000 EP to 30 000 EP and would treat the effluent to the same level as proposed in the Stage 1.

2.6.1 Project Cost

The estimated capital cost for Stage 1 of the proposal would be $16.5 million. Total annual operating and maintenance cost is approximately $0.56 million.

2.7 Changes to the Proposal since the Exhibition of the EIS

Since the EIS exhibition in May 2002, HWC has undertaken a reassessment of its preferred strategy for treating wastewater at the Cessnock plant. It identified that by retaining some elements of the existing plant, and investing in newer technologies, it could achieve the same outcomes identified in the EIS but with greater process reliability, reduced greenhouse gas emissions, and lower capital and operating costs. The preferred strategy is now based on upgrading the existing trickling filters.

The revised proposal includes:

- two new primary clarifiers;
- one new secondary clarifier;
- biological removal of nitrogen through refurbished trickling filters and maturation ponds;
- upgraded chemical dosing facilities for the removal of phosphorous;
- disinfection through the use of the maturation ponds incorporating a tertiary flotation plant and, if required, a UV radiation system;
- soil bed filters for treating odours arising from the inlet works;
- new heated anaerobic digester;
- new sludge dewatering facilities;
- cogeneration facilities for capturing the waste gas from the anaerobic digestion of the sludge to operate a turbine for electricity generation and heat;
- new reclaimed effluent system;
- site services/control room; and
- landscaping and tree planting to visually screen the site.

All flows will receive screening and de-gritting. The primary and secondary treatment process will be capable of treating up to 3 x ADWF at 32 000 EP, which caters for peak dry weather and an allowance for the treatment of wet weather flows before bypass to the maturation ponds occurs.

Flows in excess of 3 x ADWF and all secondary flows will pass through the maturation ponds receiving sedimentation and disinfection. By utilising part of the ponds as wet weather storage (i.e. by varying the operating water level in the pond), storm flows up to a 1 in 10 year event will be treated by the flotation plant thereby receiving tertiary treatment.

Two mechanical fine screens will be incorporated in a new inlet works to provide more reliable screening. A new grit removal facility will also be provided. Collected screenings and grit will be washed, dewatered and discharged to bins for disposal to landfill. The inlet works will be covered and ventilated. The extracted air will be treated with a soil bed filter for odours.

The existing primary sedimentation tanks (four square Dortmund tanks) will be replaced by two new tanks sized to provide some redundancy in the event of clarifier failure.

The biological filters (trickling filters) will have the distributor mechanisms (a four arm rotary device) and centre column replaced. This will provide the trickling filters with a hydraulic capacity to treat up to 32 000 EP.

The secondary clarifiers are used to capture fine sludge (i.e. the humus or slough that falls off the media in the trickling filters). The existing two Dortmund Tanks used for this purpose are overloaded. Therefore it is proposed to provide a single, larger tank, sized to treat the quantity of humus expected from flows up to 32 000 EP.

A tertiary treatment process, a dissolved air flotation device, will be provided after the maturation ponds to remove algal cells and phosphorus. The effluent will be flocculated with metal salts and a polymer to remove the phosphorous prior to flotation. The air injected by the air flotation device will suspend the algae which will then be skimmed off the surface prior to discharge to the existing constructed wetland and then Black Creek.

Sludge is currently stabilised using two cold anaerobic digesters. The more odorous acid forming bacteria predominate. This is a limitation of the cold digesters i.e. the elevated temperatures required to favour the growth of the methanogenic (methane forming) bacteria cannot be maintained.

HWC now proposes to construct a Mesophilic Anaerobic Digestion (MAD) process. MAD involves heating sludge to the mesophilic range (i.e. 35^0C-37^0C) which is the optimum temperature range for the growth of mesthanogenic bacteria. Digester gas, or biogas, is formed as a by-product of the MAD process. The biogas consists mainly of methane and has a heating value of approximately 22 MJ/m^3.

The digester will have a floating steel roof to enable biogas storage and pressure regulation. Biogas will be constantly drawn off and combusted in a co-generation facility. The hot gases from the co-generation facility will pass through a heat exchanger to heat the contents of the digester.

HWC identified the benefits of this revised proposal as:
- a 60% reduction in greenhouse gas emissions;
- generation of electricity from a renewable energy source (i.e. methane produced from the anaerobic sludge digestion process);
- a more reliable treatment process;
- retention of the existing water bird habitat values associated with the maturation ponds;
- a 50% reduction in biosolids produced and associated reduction in truck movements; and
- operating and capital cost savings.

2.7.1 Peer Review of Changes

In February 2003, HWC submitted its changed proposal to a peer review. The peer review included key staff from HWC as well as two independent experts – one from Sydney Water Corporation and one a council engineer.

The peer review concluded that the proposed changes to the design would result in a robust process that will achieve the required environmental performance.

2.7.2 Project Cost

The amended proposal will have lower operating costs largely because of the low energy requirements of the process and the incorporation of a cogeneration facility. The anticipated operating costs for the amended proposal are $0.45 million/year. The projected capital costs for the amended proposal are $16.5 million.

3 SUMMARY OF REPRESENTATIONS

3.1 Categories of Representations Received

A total of 8 representations were received in response to the exhibition of the EIS.

The sources of the representations are categorised below:

Representation Type	Number of Representations
Individual Residents	0
Local Government	1
Government Departments	6
Environmental Groups	1
Total	**8**

3.2 Overview of Issues Raised in Representations

In accordance with the requirements of the *EP&A Act*, HWC forwarded copies of all representations to the Department following the close of the EIS exhibition period.

In its Representations Report (dated November, 2000), HWC included a summary of the matters raised in each of the representations.

Three of the representations expressed general support for the proposal. The remainder, while not objecting to the carrying out of the proposal, raised some areas of concern. The main points raised in the representations include:

Receiving Water Quality – Need to manage construction sediment and erosion control, need to improve effluent quality and reduce nutrients, restoring natural environmental flows should be considered;
Effluent Reuse – Need to continue investigating reuse opportunities;
Odour Impacts - Need to prepare an odour assessment following construction;
Flora and Fauna – identified a number of features that were likely to be adversely affected if the original proposal had proceeded which are no longer relevant to the amended proposal.

The Department has undertaken an independent assessment of the representations and is satisfied that HWC has adequately identified all the issues raised.

4 ASSESSMENT OF KEY ISSUES

This section outlines the Department's consideration of issues (other than those discussed in the next section) relating to the current proposal having regard to information presented in the EIS, representations received in response to its exhibition, Representations Report and other additional information obtained by the Department.
Hunter Water Corporation has also provided the Department with its assessment of the issues raised in representations. This has been reviewed by the Department and, where required, further information has been sought and obtained.
Where considered appropriate, recommendations are made with regard to the manner in which a particular issue should be addressed during construction and/or operation.

4.1 Effluent Quality - Nutrients

HWC is proposing to remove the suspended solids load from the maturation ponds prior to discharge with air flotation treatment in order to achieve the EPA effluent quality design levels for nitrogen. This process may only be effective when there are high algal densities present in the maturation ponds i.e. algal blooms.

Phosphorous removal will be undertaken by an upgraded dosing facility to allow for the addition of metal salts to precipitate and remove phosphorus from the effluent. This chemical removal process is more controllable than the combined biological/physical processes proposed for nitrogen removal and provides a greater certainty.

4.1.1 The Issue - Nitrogen

There are likely to be seasonal variations which would limit the effectiveness of the biological/physical nitrogen removal process.

4.1.2 Background

It has been proposed in the EIS, on the basis of design levels specified by the EPA, that the Cessnock WWTW achieve an effluent quality, at the 50th percentile values, of 8 mg/l of nitrogen and 0.8 mg/l phosphorus (15 mg/l nitrogen and 2.0 mg/l phosphorus at the 90th percentile).

HWC is proposing to continue the use of the maturation ponds to polish the effluent and introduce a new tertiary treatment process, air flotation, at the outfall of the maturation ponds. It anticipates that this will improve in-stream water quality by removing nitrogen as organic nitrogen through harvesting suspended solids (predominately algal cells).

Algal blooms occur frequently within the maturation ponds. These are seasonal and happen more frequently in the warmer months when daylight periods are longer i.e. the warmer months and longer day length conditions, when combined with sufficient levels of plant nutrients (nitrogen and phosphorus), provides an in-pond environment which is conducive for high rates of algal growth.

The release of the high concentrations of algae contained in the Cessnock effluent was determined to be the major source of algae in Black Creek. However, it should be noted that algal densities decrease downstream of the Cessnock WWTW. This indicates that the bloom conditions in the maturation ponds are not maintained in the creek.

4.1.3 Discussion

Algal blooms are not an issue. A bloom event in the maturation ponds means the plant nutrients, phosphorous and particularly nitrogen, are being stripped from the water and bound as an organic form i.e. it is assimilated within the algae. This is an effective treatment to remove dissolved nitrogen from

the maturation ponds and means the maturation ponds are doing what they have been designed to do[1]. However, this process is only effective in removing nitrogen if there is a commensurate reduction in the algal cell counts and suspended solids in the effluent prior to being discharged to Black Creek.

HWC has proposed to install an air flotation device between the third maturation pond and Black Creek, to decrease the density of algae in the creek by removing the suspended solids from the effluent in the maturation ponds prior to discharge. This, in turn, would also remove a significant point source of organic nitrogen from Black Creek[2].

Pilot testing of similar air flotation devices proposed to be installed for Cessnock demonstrated that up to 99% of algal cells were removed.

HWC anticipates the inherent seasonal variability of the algal blooms will influence the total nitrogen concentration discharged from the maturation ponds. That is, as algal densities in the maturation ponds increase, nitrogen is taken up in the algal cells which are then captured by the proposed air flotation device. Conversely, when there is lesser algal growth in the maturation ponds (i.e. no algal bloom), then the dissolved nitrogen is discharged to Black Creek and not eliminated by the air flotation device since there are relatively few algal cells to remove.

HWC anticipates that, on the results of modelling undertaken for this process, the target medium (50th percentile), and 90th percentile values for total nitrogen will be achieved on an annual basis.

4.1.4 Conclusion

There is an inherent variability in the biological/physical process to remove nitrogen from the effluent in the maturation ponds that is tied to seasonal and climatic conditions. The EPA will licence the wastewater treatment system to the performance standards stipulated in the EIS. It will be necessary for HWC to ensure its modelled predictions meet the design levels set by the EPA for both annual target levels and, ultimately total loads.

It is noted that the EIS identified that the first maturation pond is mostly full with alum and biological sludge from the existing and past chemical phosphorus removal operations. It is likely that the restoration of this pond will be required in order to facilitate more efficient nutrient removal.

Recommended Condition of Approval No. **Error! Reference source not found.** requires HWC to restore the first maturation pond.

4.2 Disinfection

4.2.1 The Issue

Modelling was undertaken for the Cessnock maturation pond system to forecast the future disinfection levels at the anticipated higher flow rates. The modelling predicted that compliance with median faecal coliform levels would not be met. However HWC anticipates that the air flotation device, used to harvest the suspended solids (predominately algal cells), will also remove additional pathogens that are bound to these solids. There are likely to be seasonal variations which would limit the effectiveness of this proposed process.

[1] Algal blooms also enhance denitrification as this occurs primarily when the respiring algal cells create anoxic conditions at night (denitrification, reducing nitrates and nitrites to nitrogen gas, occurs in the highly anaerobic conditions created when the algal cells consume oxygen at night).

[2] The nutrients bound up in the living algae become available as inorganic nitrogen and phosphorous once the algae die and decompose.

4.2.2 Background

Secondary effluent is currently disinfected by natural UV radiation in the three maturation ponds and, for the majority of the time, meets EPA licence requirements. The ponds have a combined total volume of 114 500 m^3. A small wetland was constructed in 1996 after the final pond to assist in algae removal prior to discharge.

HWC assumes that most of the disinfection occurs in only two ponds as the first pond is mostly full with alum and biological sludge from the chemical phosphorus removal processes which has occurred over the years after construction of the ponds. These two ponds currently provide 20 days ponding.

Monitoring indicates that currently the disinfection level complies with the 50th percentile requirement of 150 FC/100 ml after the maturation pond and wetland systems, however the 90th percentile requirement of 200 FC/100 ml is exceeded on some occasions. Modelling carried out for the EIS predicted that the median FC levels will increase to 200 FC/100 mL at 26 000 EP and 300 FC/100 mL at 32 000 EP.

4.2.3 Discussion

HWC relies on the high level of natural UV disinfection that currently occurs in the ponds to achieve its target levels set in its current licence. It anticipates that the air flotation tertiary treatment will improve disinfection and cater for the greater flows. It reasons that the harvesting of suspended solids (predominantly algal cells) will remove additional pathogens that are bound to these solids.

No data was available to HWC to quantify the extent of faecal coliform removal by the flotation process. In addition, HWC anticipates that algal bloom conditions, which the air flotation relies on to capture the particulates, would not happen year round. Therefore its dependence on the air flotation to remove additional FC is unlikely to be effective at certain times of year.

The currently accepted Australian & New Zealand Environment & Conservation Council's guidelines *Australian Water Quality Guidelines for Fresh and Marine Waters*, November 1992 establishes the sampling frequency for faecal coliforms organisms. It requires a minimum of five samples to be taken at regular intervals not exceeding one month. It will therefore not be acceptable to annually average faecal bacterial samples.

4.2.4 Conclusion

HWC has assumed that a UV disinfection system will need to be installed after the floatation process to ensure that the disinfection requirements are met. It anticipates, however, that a much lower UV dose will be required to meet this requirement than if disinfection took place straight after the secondary treatment process (i.e. without the use of the maturation ponds). This, according to HWC, represents a substantial energy and cost savings.

There are uncertainties regarding the effectiveness of the air flotation process to remove faecal coliforms and attain the required level of disinfection. These uncertainties arise from an un-tested method and a seasonal variability with respect to algal concentrations. However, the EPA will licence the wastewater treatment system to the performance standards stipulated in the EIS.

Recommended Condition of Approval No. 22 requires HWC to install a separate UV disinfection system as a stand-by to ensure required disinfection levels are being achieved.

4.3 Odour

The Cessnock WWTW has the potential to generate problem odours from four main sources: the inlet works; the trickling filters; anaerobic sludge digestion process; and the maturation ponds.

4.3.1 Inlet Works

The inlet works is the major source for odours. This is the point where the raw sewage enters the plant and is screened.

HWC has proposed to construct a new, covered and vented inlet works. The vented air will be treated in a soil bed filter and this should eliminate a major odour source.

HWC has successfully used covered inlet works which vent air to soil bed filters at a number of its plants including Kurri Kurri, and Karurah. These have been demonstrated to be an effective measure to treat odours when maintained.

4.3.2 Trickling Filters

Four trickling filters (TFs) are used to remove organic matter from wastewater. The TFs are an aerobic, secondary treatment system that utilizes micro-organisms attached to a medium to remove organic matter from wastewater.

TFs enable organic material in the wastewater to be adsorbed by a population of micro-organisms (aerobic, anaerobic, and facultative bacteria; fungi; algae; and protozoa) attached to the medium as a biological film or slime layer (approximately 0.1 to 0.2 mm thick). As the wastewater flows over the medium, micro-organisms already in the water gradually attach themselves to the rock or slag surface and form a film. The organic material in the effluent is then degraded by the aerobic micro-organisms in the outer part of the slime layer.

It is generally recognised that there is lesser flexibility and control with TFs than with activated-sludge processes where the reaction process occurs within a tank i.e. the EIS proposal. In the TF process, the maximum biomass thickness is influenced by a balance of hydraulic dosage rates, type of media, type of organic matter, temperature, and nature of the biological growth.

As the layer thickens through microbial growth, oxygen cannot penetrate the medium face, and anaerobic organisms develop. As the biological film continues to grow, the micro-organisms near the surface lose their ability to cling to the medium, and a portion of the slime layer falls off the filter. This process is known as sloughing. The sloughed solids are picked up by the underdrain system and transported to a clarifier for removal from the wastewater.

Some potential issues with TFs which may give rise to odour problems include:

- Possible accumulation of excess biomass that prevents aerobic conditions. This can also impair TF performance;
- Irregular operator attention; and
- Clogging of the medium.

HWC has proposed to refurbish the existing TFs in order to provide the required hydraulic capacity to meet anticipated treatment requirements. It also proposes to provide an improved primary sedimentation tank which will be more efficient at removing the majority of the particulate Biological Oxygen Demand (BOD) from the sewage prior to secondary treatment, leaving the TFs to oxidise the soluble BOD[3].

TFs have been in use for many years both in Australia and overseas. In particular TFs have been used at Cessnock since the plant was commissioned in 1932. The process technology is well understood. However, in order to help ensure these do not become a source for problem odours, it will be necessary for the TFs to function reliably.

[3] The primary sedimentation tanks are designed to remove approximately 30% of Biological Oxygen Demand (BOD) and 60% of suspended solids.

4.3.3 Anaerobic Sludge Digestion Process

The cold anaerobic digestion process is second, only to the inlet works, as a potential source for odours at the existing WWTW. This process makes use of two cold anaerobic digesters, and two sludge lagoons.

Acid forming bacteria currently predominate within the existing cold digesters. As a result the pH is very low and the slower growing methanogenic bacteria, which are principally responsible for sludge stabilisation and methane gas production, do not have enough time to grow in sufficient numbers to break down the volatile acids to methane. The volatile acids produced by the acid forming bacteria are the odorous compounds responsible for a significant contribution to odours.

HWC has now proposed to construct a 1 000 m^3, heated, anaerobic digester. This new process will mean that the two sludge lagoons (which contribute approximately half of the odours from this process) will no longer be used.

The digester will heat sludge in the mesophilic range for growth of methanogenic bacteria. The digester has been sized to accommodate the additional solids produced from the reactions between metal salts (for phosphorus removal), and the algal sludge which may be returned from the air flotation treatment process.

According to HWC, this new digester design will eliminate the current cold anaerobic process and produce sludge that:

- breaks down the volatile acids i.e. odorous compounds;
- is suitable for beneficial reuse,
- can be stockpiled without significant odour impacts;
- is reduced in mass compared to similar volumes aerobically digested;
- produces a biogas stream containing methane that can be beneficially utilised for either heating the digester or for energy recovery (see 5.3 below); and
- has lower energy requirements as there is no need to aerate the process as with aerobic digestion.

4.3.4 Maturation Ponds

The proposal will retain the three maturation ponds as an integral part of the treatment process. The maturation ponds will be used to both disinfect, and strip additional nutrients (particularly phosphorus and nitrogen) from the treated effluent.

The three maturation ponds, because of their total large surface area, collectively constitute a major source of odours associated with the existing plant. However, according to HWC, no odour problems have ever been experienced with these ponds during the life of the plant.

It is possible, when algal bloom conditions are met, that the maturation ponds may become anoxic i.e. at night when the high density of algae are respiring and consuming the dissolved oxygen. Anoxic conditions have the potential to generate odours including H_2S (hydrogen sulphide or rotten egg gas).

4.3.5 Conclusion

Odours concentrations, according to recent modelling for the existing plant, have the potential to affect a large number of people. However there have only been 13 complaints registered with HWC in the past five years.

The re-worked odour dispersion modelling undertaken for the upgraded plant demonstrates a marked improvement in odour emissions would be achieved. It predicts that the odour performance criterion level of 3 OU would not be exceeded at any of the surrounding residences (Note: the nearest residence is located approximately 320 metres from the plant.)

A number of new features have been introduced into the Cessnock WWTW which is anticipated to be effective in improving odour control. These include covering and venting the inlet works, and constructing a new anaerobic sludge digester which eliminates the existing sludge lagoons. Even though it is likely that this will reduce existing levels of odours at the Cessnock WWTW, it will still be necessary for HWC to develop, as part of an operational environmental management plan, an Odour Management Procedure to help ensure odours do not become an issue, and to respond to nuisance odours should they develop.

Hunter Water Corporation has indicated it will carry out testing of the odour control facilities at the treatment works to ensure they are functioning as designed. It is proposed that the Odour Management Procedure set out a monitoring program to assess the effectiveness of all odour control measures, and detail what responses HWC proposes to take should odours become an issue. The Odour Management Procedure should address all potential odour sources including but not limited to the:

- Inlet works;
- Trickling filters;
- Anaerobic sludge digestion process; and
- Maturation ponds.

Recommended Condition of Approval No. 24 addresses this matter.

5 ASSESSMENT OF OTHER ISSUES

This section outlines the Department's consideration of issues (other than those discussed in the previous section) relating to the current proposal. Again, recommendations are made for conditions of approval, where appropriate, in order for particular issues to be satisfactorily addressed during construction and/or operation.

5.1 Re-use

5.1.1 Reuse of Treated Wastewater

HWC's corporate objectives include an emphasis on the reuse of effluent with a target reuse of 13% for all dry weather flows by the year 2005. Currently effluent is directly reused by the Cessnock Golf Club (~30 ML/yr) and a neighbouring farmer (~20 ML/yr). However up to 32 irrigators downstream of the plant are licensed to extract water from Black Creek, which provides a constant supply for irrigation, as the majority of the creek flow is treated effluent from the WWTW (currently ~1700 ML/yr).

Black Creek is an ephemeral watercourse, so for much of the time effluent discharged into it provides the only flow. The catchment is naturally saline although this salinity appears to have been exacerbated by developments in the catchment. The treated effluent has a concentration of total dissolved solids (TDS)[4] of approximately 700µS/cm and dilutes the saline creek waters which have a TDS of approximately 1500µS/cm.

The DEC (formerly the EPA) identified that the current continuous flow regime was contrary to the Stressed Rivers Assessment Report for Black Creek which suggested an interim objective of returning the creek to a natural flow regime and would prefer discharges from the WWTW to be limited. However the DEC acknowledged that for maximum environmental improvements, changes to the flow regime would need to be made in conjunction with both catchment management and stream rehabilitation initiatives.

Water extraction by downstream irrigators is an activity which has been made possible by the plant since its commissioning in the 1930s. Removing the effluent from the creek for other reuse purposes would take away a constant and reasonable quality water supply to these irrigators and would likely result in a consistently higher in-creek salinity.

Existing farmers and other users expressed their concerns with HWC, during community consultations meetings, that they did not want to see any reduction in the amount of effluent discharged to Black Creek.

Black Creek is a *de facto* open canal system that effectively conveys treated effluent to 32 licensed irrigators located downstream of the WWTW. The elimination of this flow is unlikely to, in itself, significantly contribute to the rehabilitation of Black Creek. This could only happen within an integrated catchment management framework designed to rehabilitate the creek.

The continuation of the flow, in conjunction with established re-uses, will preserve an existing beneficial use to downstream irrigators.

5.1.2 Reuse of Biosolids

HWC operates a Biosolids Management Strategy and investigates various uses and markets for biosolids produced at all its plants.

[4] Total dissolved solids (TDS) comprise inorganic salts and small amounts of organic matter that are dissolved in water. The principal constituents are usually the cations calcium, magnesium, sodium and potassium and the anions carbonate, bicarbonate, chloride, and sulphate.

HWC proposes to incorporate a biosolids storage area that will be located adjacent to the sludge lagoons and contain appropriate run-off and leachate controls to contain any contaminated water generated from the storage area. Storage of stable, dewatered biosolids will allow HWC to more closely match demand for biosolids.

It was reasoned by HWC that the anaerobic process offers the benefit of delivering a single bulk quantity of biosolids following dewatering every 18 months, whereas aerobic digestion delivers small daily quantities of biosolids. It was anticipated that biosolids would be recycled for a range of agricultural, landscaping, and mine site rehabilitation uses within the Hunter Valley region. Mine site rehabilitation is particularly suited to bulk delivery of biosolids.

5.2 Flora and Fauna

A flora and fauna investigation report was prepared for the site and the potential significance of likely impacts associated with the proposal on threatened species, as described under the *Threatened Species Conservation Act* (*TSC Act*), were described. The Department undertook its own review of the investigations including the assessment of threatened species undertaken in accordance with Section 5A of the *EP&A Act* (i.e. the 8 Part Test).

Subsequent to this HWC changed the proposal and there is no longer any land clearing that will disturb important flora and fauna. HWC was always going to retain a volume of water in the maturation ponds for water bird uses. The decision by HWC to continue using the maturation ponds provides added assurances that this habitat will not be lost.

HWC also, on the basis of its assessment on whether the proposed new WWTW would have any significant impact on any matters of national environmental significance as identified under the *Environment Protection and Biodiversity Conservation Act* (Commonwealth), decided not to refer the proposal to the Commonwealth Minister for the Environment.

In all new construction projects that cover large sites such as this one, there are opportunities to both protect and improve habitat values for native species by appropriate landscaping.

Recommended Condition of Approval No. 40 addresses this matter.

5.3 Methane Gas Storage

The gases produced as a result of the anaerobic digestion process, the digester gas or biogas, consists mainly of methane (~60-70%) and carbon dioxide (~30-40%). HWC proposes to capture this gas and use it in a gas turbine. All biogas would be combusted in the co-generation facility and the energy of the expanding gas harnessed to produce electrical energy. The hot exhaust gas would be passed through a heat exchanger to heat the digester to the optimum temperature range for the growth of methanogenic bacteria.

The amount of electricity generated by the anticipated 300-500 m^3/day of biogas produced from Cessnock would be sufficient to produce 30 kW of electricity and is likely to be used as a power source for the WWTW rather than be directed into the gird.

The Major Hazards Unit advised that the estimated quantity of stored gas, in conjunction with the 135 metre distance of the storage vessel to the boundary, is not sufficient to trigger the need for the preparation of a Preliminary Hazard Analysis.

5.4 Dortmund Tanks

The EIS identified that the existing primary sedimentation tanks consists of four square Dortmund tanks each with a surface area of 58 m^2. HWC identified in its previous assessment for the Kurri Kurri WWTW upgrade that there may be industrial heritage significance with the Dortmund sedimentation

tanks. It proposed then to investigate the location and condition of other Dortmund sedimentation tanks within NSW so that a comparative assessment of the Dortmund tanks could be made.

HWC's was required to prepare a report as a Condition of Approval for the Kurri Kurri proposal. It is understood that the required report is currently in a draft and near completion as a final.

Dortmund sedimentation tanks are concrete and steep sided, often cone shaped tanks characteristics of sewage treatment plants of this vintage. However in NSW, plants of this vintage are being demolished to make way for newer, more efficient technology. It is therefore becoming increasingly important to preserve representative examples of this technology.

It is recommended that the values of the Cessnock WWTW Dortmund tanks be assessed with reference to the report prepared for the Kurri Kurri approval to determine if it would be appropriate to remove them. Irrespective of the outcome of this assessment, HWC should document and prepare a photographic archival record of the tanks, since these are more than 50 years old, prior to any works that may be undertaken to remove them.

Recommended Condition of Approval No. 44 addresses this matter.

6 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that the proposal as described in the EIS and as modified in the Representations Report proceed subject to a number of recommended conditions. These are specified in the following section and are based on the extent of issues raised in representations and by the Department. These conditions would ensure that the construction and operation of the Cessnock WWTW would occur in an environmentally acceptable manner and relate to:

- environmental monitoring and reporting requirements (eg. biological, chemical, and microbial) which attempt to verify predictions concerning environmental impacts made in the EIS and Representations Report with actual impacts;
- construction and operational procedures including the preparation of detailed management plans to cover soils, water (surface and groundwater), noise, and air quality (particularly odours); and
- landscape planning to both ensure protection of habitat and improve the values of the site for native species.

The amended process is anticipated to meet the same effluent quality identified in the exhibited proposal.

These conditions will help to ensure that unavoidable adverse environmental impacts of the proposal would be adequately mitigated within an appropriate environmental management framework.

It is considered that these impacts could be managed to an acceptable level on the basis of the safeguards and mitigation measures identified in the EIS and the associated documentation. It is anticipated that the proposed WWTW will provide a reduction in the human health and ecosystem risks by achieving EPA disinfection levels and significantly reducing the total suspended solids discharged (mainly algal cells) into Black Creek.

7 RECOMMENDED CONDITIONS OF APPROVAL

This section provides the Department's recommended conditions of approval for the project under Section 115B(2) of the EP&A Act. These are based on the Department's assessment of the EIS, the representations made to Hunter Water Corporation, the Representations Report, and supplementary information and advice provided.
It is noted that the EIS and Representations Report contains extensive information on procedures and mitigation strategies to be implemented to ameliorate impacts of the proposal. The recommended conditions should therefore be implemented in conjunction with those procedures and mitigation strategies. Where there is an inconsistency with the recommendations in the EIS and the Representations Report, the recommendations in this report would prevail.

DEFINITIONS

Activity	The activity described in Schedule 1 of this Approval.
Ancillary Facility	Temporary facility for Construction such as office and amenities compound, concrete batch plant, materials storage compound.
Approved Activity Area	The footprint of the Activity covered by the Conditions of Approval.
Conditions of Approval	The Minister's Conditions of Approval for the Activity.
Construction	Includes all work in respect of the Activity **other than** survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys, minor clearing (except where threatened species, populations or

Definition of times	Daytime is 7am to 6pm Monday to Saturday, and 8am to 6pm Sundays and Public Holidays. Evening is 6pm to 10pm. Night-time is 10pm to 7am Monday to Saturday, and 10pm to 8am Sundays and Public Holidays.
Department, the	Department of Infrastructure, Planning and Natural Resources.
Directly Affected Landowner	Property owner identified in any of the EIS, Representations Report or CEMP to require a mitigation measure to ameliorate an identified impact to their property.
Director General, the	Director General of the Department or delegate.
Director General's Agreement	A written advice from the Director General (or delegate).
Director General's Approval	A written approval from the Director General (or delegate). Where the Director General's Approval is required under a Condition the Director General will endeavour to provide a response within one month of receiving an approval request. The Director General may ask for additional information if the approval request is considered incomplete. When further information is requested the time taken for the Proponent to respond in writing will be added to the one month period.
Director General's Report	The report provided to the Minister by the Director General of the Department under section 115C of the *Environmental Planning and Assessment Act 1979*.
EIS	Means the *New Wastewater Treatment Works at Cessnock*, prepared for Hunter Water Corporation by Sinclair Knight Merz, dated March 2002.
Minister, the	Minister for Infrastructure and Planning.
Operation	Means the Operation of the Activity, but **does not** include commissioning trials of equipment or temporary use of parts of the Activity during Construction.
Proponent	Hunter Water Corporation.
Publicly Available	Available for inspection by a member of the general public (for example available on an internet site or at a display centre).
Reasonable and Feasible	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. **Feasible** relates to engineering considerations and what is practical to build. **Reasonable** relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and nature and extent of potential improvements.
Relevant Councils	Cessnock City Council.
Relevant Government Departments	DEC, DIPNR.

Representations Report	*Proposed Upgrade to the Cessnock Wastewater Treatment Works – Representations Report* prepared by Assets/Planning Hunter Water Corporation, dated October 2003.
Sensitive Receiver	Residence, education institution (e.g. school, TAFE college), health care facility (e.g. nursing home, hospital) and religious facility (e.g. church).
Structure	Any fixed, artificial object including residence, farm shed, fence, dam, cable support structure, etc.

ABBREVIATIONS

CEMP	Construction Environmental Management Plan
dB(A)	Decibel, "A" weighted scale
DEC	Department of Environment and Conservation
DIPNR	Department of Infrastructure, Planning and Natural Resources
EMP	Environmental Management Plan
EMR	Environmental Management Representative
EP&A Act	*Environmental Planning and Assessment Act 1979*
EWON	Energy and Water Ombudsman
OEMP	Operation Environmental Management Plan
UV	Ultra Violet
WWTW	Wastewater Treatment Works

ADMINISTRATIVE CONDITIONS

The Activity

1. The Activity must be carried out consistent with:

   (a) the procedures, safeguards and mitigation measures identified in the EIS, as modified by the Representations Report; and
   (b) these Conditions.

   These Conditions prevail in the event of any inconsistency with the requirements for the Construction and Operation of the Activity arising out of the documents described in (a) above.

2. These Conditions of Approval do not relieve the Proponent of the obligation to obtain all other approvals and licences required under any other Act. The Proponent must comply with the terms and conditions of such approvals and licences.

Compliance

General

3. The Proponent must notify in writing the Director General, Relevant Government Departments and Relevant Councils of the start of the Activity's Construction and Operation. Such notification must be provided at least four weeks before the relevant start date unless otherwise agreed to by the Director General.

4. It is the responsibility of the Proponent to ensure compliance with all of these Conditions and to implement any measures arising from these Conditions of Approval.

5. The Proponent must comply with any requirements of the Director General arising from the Department's assessment of:

   (a) any reports, plans or correspondence that are submitted to satisfy these Conditions of Approval; and
   (b) the implementation of any actions or measures contained in such reports, plans or correspondence.

Staging *Report*

6. The Proponent may elect to construct the Activity in discrete work packages or defined stages provided that such stages or work packages are consistent with these Conditions of Approval. Where discrete work packages or defined stages are proposed, the Proponent must submit a Staging Report to the Director General at least four weeks before Construction commences (or within any other time agreed to by the Director General). The Staging Report must:

   (a) describe the work packages or defined stages; and
   (b) identify how the Conditions will be addressed in each work package or defined stage.

Pre-Construction Compliance Report

7. The Proponent must submit a Pre-Construction Compliance Report to the Director General at least four weeks before Construction commences (or within any other time agreed to by the Director General).

   The Pre-Construction Compliance Report must include:

   (a) details of how the Conditions of Approval required to be addressed before Construction were complied with;
   (b) the time when each relevant Condition of Approval was complied with, including dates of submission of any required reports and/or approval dates; and
   (c) details of any approvals or licences required to be issued by Relevant Government Departments before Construction commences.

Pre-Operation Compliance Report

8. The Proponent must submit a Pre-Operation Compliance Report to the Director General at least four weeks before Operation commences (or within any other time agreed to by the Director General).

   The Pre-Operation Compliance Report must include:

   (a) details of how the Conditions of Approval required to be addressed before Operation were complied with;
   (b) the time when each relevant Condition of Approval was complied with, including dates of submission of any required reports and/or approval dates; and
   (c) details of any approvals or licences issued by Relevant Government Departments for the Activity's Operation.

Construction Compliance Reports

9. The Proponent must provide the Director General, Relevant Councils and any other government department nominated by the Director General with Construction Compliance Reports. The EMR must review the Construction Compliance Reports before they are submitted to the Director General and bring to the Director General's attention any errors.

   The first Construction Compliance Report must be submitted a maximum six months after Construction commences and subsequent reports at intervals of a maximum six months (or at any other time interval agreed to by the Director General) for the duration of Construction.

   The Construction Compliance Reports must include information on:

   (a) compliance with the CEMP and the Conditions of Approval;
   (b) compliance with any approvals or licences issued by Relevant Government Departments for the Construction phase of the Activity;
   (c) the implementation and effectiveness of environmental controls. The assessment of effectiveness should be based on a comparison of actual impacts against identified performance criteria;
   (d) environmental monitoring results, presented as a results summary and analysis;
   (e) the number and details of any complaints, including a summary of main areas of complaint, action taken, response given and intended strategies to reduce complaints of a similar nature;
   (f) details of any review and amendments to the CEMP resulting from Construction during the six months; and
   (g) any other matter relating to compliance with the Conditions of Approval or as requested by the Director General.

   The Construction Compliance Reports must also be made Publicly Available.

Environmental Impact Audits

Environmental Impact Audit Report - Construction

10. An Environmental Impact Audit Report - Construction must be prepared and submitted to the Director General a maximum three months after the Activity begins Operation. The Environmental Impact Audit Report – Construction must also be submitted to other government departments upon the request of the Director General.

    The Environmental Impact Audit Report – Construction must:

    (a) identify the major environmental controls used during Construction and assess their effectiveness;
    (b) summarise the main environmental management plans and processes implemented during Construction and assess their effectiveness;
    (c) identify any innovations in Construction methodology used to improve environmental management; and
    (d) discuss the lessons learned during Construction, including recommendations for future Activities.

Environmental Impact Audit Report - Operation

11. An Environmental Impact Audit Report - Operation must be submitted to the Director General a maximum 24 months after the Activity begins Operation and at any additional periods that the Director General may require. The Environmental Impact Audit Report - Operation must also be submitted to other government departments upon the request of the Director General.

    The Environmental Impact Audit Report - Operation must:

    (a) be certified by an independent person at the Proponent's expense. The certifier must be advised to the Director General before the Environmental Impact Audit Report – Operation is prepared;
    (b) compare the Operation impact predictions made in the EIS, Representations Report and any supplementary studies with the actual impacts;
    (c) assess water quality in relation to nutrients and algal concentrations in Black Creek;
    (d) assess the effectiveness of implemented mitigation measures and safeguards;
    (e) assess compliance with the systems for operational maintenance and monitoring;
    (f) discuss the results of any consultation with the local community particularly any feedback or complaints; and
    (g) be made Publicly Available.

12. The Proponent must comply with all requirements of the Director General concerning any measures arising from, or recommendations in, the Environmental Impact Audit Report - Operation.

ENVIRONMENTAL MANAGEMENT

Construction Environmental Management Plan

13. A Construction Environmental Management Plan (CEMP) must be prepared and implemented in accordance with these Conditions of Approval, all relevant Acts and Regulations and accepted best practice management procedures. The Proponent must obtain the Director General's Approval for the CEMP before Construction commences or within any other time agreed to by the Director General. The CEMP must be certified by the EMR to comply with the Conditions of Approval before the Proponent seeks the Director General's approval for the CEMP.

    The Proponent must ensure that the mitigation measures identified in the EIS, Representations Report and in these Conditions are incorporated into the CEMP.

    The CEMP must:

    (a) Include a Construction Program, identifying all Construction activities associated with the Activity, and the location and timing of all these activities;
    (b) cover any relevant environmental elements identified by the Proponent, or its contractor, from their environmental due diligence investigations;
    (c) contain the Construction Sub Plans required by the Conditions of Approval;
    (d) be prepared following consultation with Relevant Government Departments and Relevant Councils;
    (e) be Publicly Available;
    (f) include a community consultation and notification strategy (including local community, Relevant Government Departments, Relevant Councils), and complaint handling procedures;
    (g) include environmental management details such as:

i identification of statutory obligations which the Proponent is required to fulfil during Construction, including all approvals and licences;
ii an environmental management structure indicating the responsibility, authority and accountability for personnel relevant to the CEMP;
iii the role of the EMR;
iv details of the Construction personnel induction and training program;
v emergency response procedures;

(h) include implementation details such as:
i measures to avoid and/or control environmental impacts;
ii the tools to be used to implement the CEMP such as plans, schedules and work instructions;

(i) include monitoring and review details such as:
i performance monitoring methods for all environmental elements;
ii auditing and corrective actions procedures;
iii CEMP review procedures.

Operation Environmental Management Plan

14. An Operation Environmental Management Plan (OEMP) must be prepared and implemented in accordance with these Conditions, all relevant Acts and Regulations and accepted best practice management procedures. The Proponent must obtain the approval of the Director General for the OEMP before Operation commences or within any other time agreed to by the Director General. The OEMP must be certified by the EMR to comply with the Conditions of Approval before the Proponent seeks the Director General's approval for the OEMP.

15. The OEMP must:

(a) identify the Operation activities;
(b) include the Operation Sub Plans required under these Conditions of Approval;
(c) be prepared in consultation with Relevant Government Departments and Relevant Councils;
(d) cover any relevant environmental elements identified by the Proponent either from its environmental due diligence investigations or required to satisfy any other licence or approval;
(e) be Publicly Available;
(f) include environmental management details such as:
i identification of statutory obligations which the Proponent is required to fulfil during the Activity's Operation, including all approvals and licences;
ii an environmental management structure indicating the responsibility, authority and accountability for personnel relevant to the OEMP;
iii details of a personnel induction and training program;
iv emergency response procedures;

(g) include implementation details such as:
i identification of relevant environmental elements;
ii measures to avoid and/or control environmental impacts;
iii the tools to be used to implement the OEMP such as plans, schedules and work instructions;

(h) include monitoring and review details such as:
i performance monitoring methods for all environmental elements;
ii auditing and corrective actions procedures;
iii OEMP review procedures.

If the Proponent has an Operation Environmental Management Plan (or similar system) for its other activities which is applicable to this Activity then that system may be proposed as the OEMP. Details of the existing system must be provided to the Director General demonstrating its application to this Activity.

Environmental Management Representative

16. The Proponent must request the Director General's Approval for the appointment of an Environmental Management Representative (EMR) at least three months before Construction commences (or within any other time agreed to by the Director General). In its request the Proponent must provide the following information, the:

    (a) qualifications and experience of the EMR including demonstration of general compliance with *ISO19011:2002 - Guidelines for Quality and/or Environmental Management Systems Auditing* (or update);
    (b) role and responsibility of the EMR;
    (c) authority and independence (from the Proponent and its contractors) of the EMR including details of the Proponent's internal reporting structure; and
    (d) resourcing of the EMR role. The EMR must be available:
        i for sufficient time to undertake the EMR role. This timing shall be agreed between the Proponent and the EMR and advised to the Department in the request for approval;
        ii at any other time requested by the Department; and
        iii during any Construction activities identified in the CEMP to require the EMR's attendance.

17. The Director General may at any time immediately revoke the approval of an EMR appointment by providing written notice to the Proponent explaining the justification for the decision. Interim arrangements for EMR responsibility following the cancellation notice must be agreed in writing between the Department and the Proponent within such period as not to impact on the effective management of the project.

18. The Department may at any time conduct an audit of any actions undertaken by the EMR. The Proponent must:

    (a) facilitate and assist the Department in any such audit; and
    (b) include in the conditions of the EMR's appointment the need to facilitate and assist the Department in any such audit.

19. The EMR is authorised to :

    (a) consider and advise the Department and the Proponent on matters specified in these Conditions of Approval and compliance with such;
    (b) certify that work does not fall within the definition of Construction where clarification is requested by the Proponent;
    (c) certify the CEMP;
    (d) certify the OEMP (if required);
    (e) review the induction and training program for Construction personnel and monitor its implementation;
    (f) periodically monitor the Proponent's activities to evaluate the compliance of Construction activities with the CEMP. Periodic monitoring must involve site inspections of active work sites at least fortnightly;
    (g) provide a written report to the Proponent of any non-compliance with the CEMP. Non compliance must be managed as identified in the CEMP;

(h) direct the Proponent to stop work immediately if, in the view of the EMR, an unacceptable impact on the environment is occurring or is likely to occur. The EMR may also require that the Proponent initiate reasonable actions to avoid or minimise adverse impacts;
(i) review corrective and preventative actions to ensure the implementation of recommendations made from audits and site inspections;
(j) certify that minor revisions to the CEMP are consistent with the approved CEMP; and
(k) provide regular (as agreed with the Department) reports to the Department on matters relevant to carrying out the EMR role including notifying the Director General of any stop work notices.

The EMR must immediately advise the Proponent and the Director General of any incidents relevant to these Conditions resulting from the Construction that were not dealt with expediently or adequately by the Proponent.

CONSULTATION

Complaints Management System

20. The Proponent must implement a Construction Complaints Management System before Construction commences. The System must include:

(a) the name and contact details of the person(s) responsible for implementing and maintaining the Complaints Management System;
(b) adequate resources including people, communication facilities, transport etc.;
(c) a 24 hour telephone number listed with a telephone company and advertised. This telephone number must enable any member of the public to reach a person who can arrange a response to their complaint;
(d) a system to receive, log, track and respond to complaints within the specified timeframe. When a complaint cannot be responded to immediately, a follow-up verbal response on what action is proposed must be provided to the complainant within two hours during night-time works and 24 hours at other times;
(e) a process for the provision of a written response to the complainant within 10 days, if the complaint cannot be resolved by the initial or follow-up verbal response; and

21. Any complaint that is unable to be resolved must be referred to the Energy and Water Ombudsman (EWON).

ENVIRONMENTAL MANAGEMENT

Water Quality

22. The Proponent shall restore the first maturation pond to its design size and depth prior to commissioning of the upgraded WWTW.

Disinfection

23. The Proponent shall install a separate UV disinfection system after the air flotation device, to ensure required disinfection levels are being achieved.

Air Quality

24. As part of the EMP (Operational Stage) referred to in Condition of Approval No.14, the Proponent shall prepare a detailed Odour Management Procedure in consultation with the DEC and Relevant Council. The Procedure shall cover all aspects of odour management including, but not limited to:
    (a) Identification of odour sources from the proposal including but not limited to the inlet works, trickling filters, anaerobic sludge digestion process, maturation ponds;
    (b) adopted criteria;
    (c) specific measures incorporated into the proposal to keep odour impacts to existing levels or reduce odour impacts experienced form the existing plant;
    (d) methodology for monitoring odour emissions (including representative meteorological conditions);
    (e) reporting procedures;
    (f) the provision of information to residents;
    (g) Hunter Water contact information;
    (h) complaint handling and reporting procedures;
    (i) measures for dealing with exceedances;
    (j) possible additional strategies that may be adopted if odours become an issue; and
    (k) procedures for monitoring and assessing the operational effectiveness of the soil bed filters.

25. A specific Dust Management Procedure shall be prepared as part of the EMP (Construction) referred to in Condition of Approval No.13. The Procedure shall:
    (a) detail all dust control measures to be implemented during construction; and
    (b) include measures to reduce dust generation from stockpiles, cleared areas and other exposed surfaces.

26. All construction vehicles shall be maintained and covered as needed to prevent any loss of load, whether in the form of dust, liquid, solids or otherwise. The vehicles shall be maintained in such a manner that they will not track mud, dirt or other material onto any street which is opened and accessible to the public.

Construction Hours

27. Construction must be restricted to between the hours of 7:00 am to 6:00 pm (Monday to Friday), 8:00 am to 1:00 pm (Saturday) and at no time on Sundays and public holidays.

28. Works may be undertaken outside these hours where:

    (a) the delivery of materials is required outside these hours by the Police or other authorities for safety reasons;
    (b) it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; or
    (c) the work is identified in the Construction Noise and Vibration Management Sub Plan and approved as part of the CEMP. This includes the identification of Construction areas where work could be undertaken that would be inaudible at Sensitive Receivers.

    Local residents should be informed of the timing and duration of work approved under item (c) at least 48 hours before that work commences.

NOISE AND VIBRATION

Construction Noise and Vibration Management Sub Plan

29. A Construction Noise and Vibration Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with the Relevant Councils and include:

    (a) Methodology for complying with construction noise objectives and noise mitigation methods identified in the EIS;
    (b) Noise and vibration monitoring, reporting and response procedures; and
    (c) Justification for any activities outside the Construction hours specified in the Conditions of Approval.

Construction Noise Objective

30. The Construction noise objective for the Activity is to manage noise from Construction activities (as measured by a $L_{A10\ (15minute)}$ descriptor) so it does not exceed the background L_{A90} noise level by:

    (a) more than 20 dB(A) for a Construction period of four weeks and under;
    (b) more than 10 dB(A) for a Construction period of greater than four weeks and not exceeding 26 weeks; and
    (c) more than 5 dB(A) for a Construction period greater than 26 weeks.

    Background noise levels are those identified in the EIS or Representations Report or otherwise identified in the Construction Noise and Vibration Management Sub Plan.

    Any activities that have the potential for noise emissions that exceed the objective must be identified and managed in accordance with the Construction Noise and Vibration Management Sub Plan. The Proponent must implement all Reasonable and Feasible noise mitigation and management measures with the aim of achieving the Construction noise objective.

    If the noise from a Construction activity is substantially tonal or impulsive in nature (as described in Chapter 4 of the *NSW Industrial Noise Policy*), 5dB(A) must be added to the measured Construction noise level when comparing the measured noise with the Construction noise objective.

Construction Noise Management

31. The Proponent must ensure that public address systems used at any Construction site are not used outside the Construction hours detailed in the Conditions of Approval unless otherwise approved through the Construction Noise and Vibration Management Sub Plan. Public address systems must be designed to minimise noise spillage off-site (for example by using directional speakers, volume control with background noise adjustments, locating and pointing speakers away from Sensitive Receivers etc.).

32. The Proponent must schedule rock breaking, rock hammering, sheet piling, pile driving and any similar activity only between the following hours unless otherwise approved in the Construction Noise and Vibration Management Sub Plan:

    (a) 9 am to 12 pm and 2 pm to 5 pm, Monday to Friday; and
    (b) 9 am to 12 pm, Saturday.

33. The Proponent must ensure that wherever practical, and where Sensitive Receivers may be affected, piling activities are completed using bored piles. If driven piles are required they must

only be installed where approved in the Construction Noise and Vibration Management Sub Plan.

34. The Proponent must consult with Directly Affected Landowners and, where feasible, erect noise mitigation measures at the start of Construction (or at other times during Construction) to minimise Construction noise impacts.

PHYSICAL ISSUES

Soil and Water Management

Soil Management Sub Plan

35. A Soil and Water Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with Relevant Government Departments and Relevant Councils. The Sub Plan must:

    (a) where relevant, be consistent with the Department of Housing's guideline *Managing Urban Stormwater - Soils and Construction*, the RTA's *Guidelines for the Control of Erosion and Sedimentation in Roadworks* and the DIPNR *Constructed Wetlands Manual;*
    (b) identify the Construction activities that could cause soil erosion or discharge sediment or water pollutants from the site;
    (c) describe management methods to minimise soil erosion or discharge of sediment or water pollutants from the site including a strategy to minimise the area of bare surfaces during Construction (such as progressive site rehabilitation);
    (d) describe the location and capacity of all erosion and sediment control measures;
    (e) identify the timing and conditions under which Construction stage controls will be decommissioned;
    (f) include contingency plans to be implemented for events such as fuel spills; and
    (g) identify how the effectiveness of the sediment and erosion control system will be monitored, reviewed and updated.

Construction

36. An appropriately qualified soil scientist must be consulted according to a schedule identified in the Soil Management Sub Plan to:

    (a) undertake inspections of temporary and permanent erosion and sedimentation control devices;
    (b) ensure that the most appropriate controls are being implemented;
    (c) check that controls are being maintained in an efficient condition; and
    (d) check that controls meet the requirements of any relevant approval/licence condition(s).

    The results of these inspections and any follow-up actions must be reported in the Construction Compliance Reports required by the Conditions of Approval.

Greenhouse Gases and Sustainable Energy

37. The Proponent must promote the reduction of greenhouse gases by adopting energy efficient work practices including:

    (a) developing and implementing procedures to minimise energy use;

(b) conducting awareness programs as part of induction for all site personnel regarding energy conservation methods; and
(c) conducting regular energy audits during the Activity to identify and address energy waste.

Traffic

38. Road dilapidation reports must be prepared for roads likely to be affected by construction traffic before Construction commences and after Construction is complete. Copies of the reports must be provided to the Relevant Councils. Any damage resulting from Construction, except that resulting from normal wear and tear, must be repaired at the Proponent's cost.

    Nothing in this Condition shall be taken as restricting the Proponent from negotiating an alternative arrangement for road damage with either the RTA or Relevant Councils.

39. A Construction Traffic Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with Relevant Councils and the RTA and include:

    (a) identification of all public roads to be used by Construction traffic, in particular roads proposed to transport large quantities of Construction materials. The timing and duration of road usage must be stated;
    (b) management methods to ensure Construction traffic uses identified roads;
    (c) identification of all public roads that may be partially or completely closed during Construction and the timing and duration of these closures. Consideration must be given to programming Construction works to minimise road closures during peak hours and/or holiday periods;
    (d) impacts on existing traffic (including pedestrians, vehicles, cyclists and disabled persons);
    (e) temporary traffic arrangements including property access;
    (f) access to Construction sites including entry and exit locations and measures to prevent vehicles queuing on public roads;
    (g) a response plan for any Construction traffic incident; and
    (h) monitoring, review and amendment mechanisms.

Landscape Plan

40. As part of the EMP (Operation) referred to in Condition of Approval No. 14, the Proponent shall prepare a Landscape Plan designed to ensure both the protection of habitat and improve the values of the site for native species. The Plan shall include, but not be limited to landscaping:
    (a) lands within and adjacent to the constructed WWTW;
    (b) lands adjacent to the maturation ponds;
    (c) the use of local indigenous species, and where feasible, propagated from locally collected seed stock;
    (d) the use of species indicative of Kurri Sand Swamp Woodland and the Lower Hunter Spotted Gum Ironbark Forest; and
    (e) the incorporation of measures to ensure no net loss of hollows eg. marking trees for retention; erection of nesting boxes to compensate for any loss of potential bat or bird roost sites.

41. All landscaping works shall be monitored and maintained at regular intervals to ensure their effectiveness. All costs of such monitoring and maintenance shall be borne by the Proponent unless otherwise agreed by the relevant property owner.

42. If during the course of Construction, the Proponent becomes aware of the presence of threatened species not identified and assessed in the EIS or Representations Report and which are likely to be affected, the Proponent must:

(a) immediately cease all work likely to affect the threatened species;
(b) inform the Director General of the DEC and/or Director of NSW Fisheries as relevant; and
(c) not recommence work likely to affect the threatened species until receiving advice from the DEC and/or NSW Fisheries to do so.

Property

43. The Proponent must ensure that access to properties is maintained throughout Construction. The Proponent must ensure that any legal property access affected by the Activity is reinstated to an equivalent standard or that alternative arrangements are negotiated with the relevant landowner(s).

Heritage

44. The Proponent, prior to any demolition of the Dortmund tanks, shall:
(a) assess the heritage values of the Cessnock Dortmund sedimentation tanks taking into account the findings of the assessment report prepared for the Kurri Kurri WWTW approval (which investigated the condition and values of Dortmund sedimentation tanks located elsewhere in NSW) to determine if it would be appropriate to demolish them; and
(b) undertake a full documentation and photographic record of the Dortmund sedimentation tanks prior any demolition for the Proponent's archives.

MISCELLANEOUS REQUIREMENTS

Hazards and Risk Management

45. As part of the Construction and Operational EMPs, the Proponent must prepare and implement Hazards and Risk Management Sub Plan(s). These Sub Plans must include:

(a) details of the hazards and risks associated with the Activity; and
(b) pro-active and reactive mitigation measures including contingency plans to be implemented in the event an identified hazard occurs.

Waste Management and Recycling

46. As part of the Construction and Operational EMPs the Proponent must prepare Waste Management and Reuse Sub Plan(s). The Sub Plans must address the management of wastes during the Construction and Operation stages respectively in accordance with the NSW Government's Waste Reduction and Purchasing Policy. The Sub Plan(s) must identify requirements for:

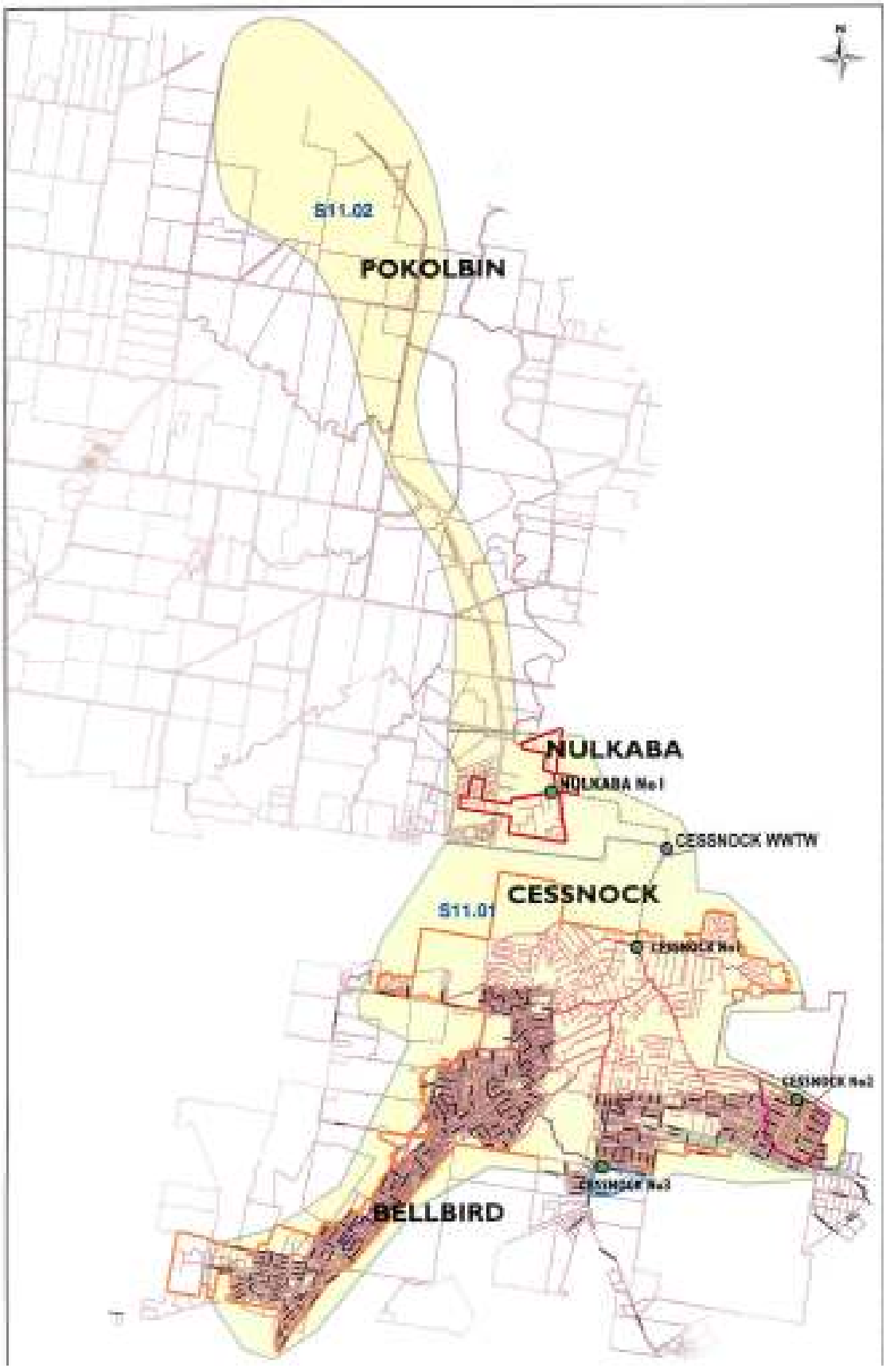
(a) the application of the waste minimisation hierarchy principles of avoid-reduce-reuse-recycle-dispose;
(b) waste handling and storage;
(c) disposal of wastes. Specific details must be provided for cleared vegetation, contaminated materials, glass, metals and plastics, hydrocarbons (lubricants and fuels) and sanitary wastes;
(d) disposal of any waste material that is unable to be re-used, re-processed or recycled e.g. the location of a facility licensed by the DEC to receive that type of waste; and
(e) implementation of energy conservation best practice.

Utilities and Services

47. The Proponent must identify the utilities and services (hereafter "services") potentially affected by Construction activities to determine requirements for diversion, protection and/or support. Alterations to services must be determined by negotiation between the Proponent and the service providers. The Proponent in consultation with service providers must ensure that disruption to services resulting from the Activity are minimised and advised to customers.

8 FIGURES

8.1 Figure 1 Location Map



8.2 Figure 2 Revised Layout