Department of
Urban Affairs and Planning

Hunter Water Corporation
Proposed New Kurri Kurri Wastewater Treatment Works

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

June, 2001

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DISCLAIMER

FOREWORD

Hunter Water Corporation is proposing to construct a new wastewater treatment plant to replace the existing Kurri Kurri wastewater treatment plant. The Kurri Kurri treatment plant was constructed in 1942. It is located outside the township of Kurri Kurri.

The proposed construction is being done in accordance with the outcomes of an environmental improvement plan (EIP) for Hunter Water Corporation's inland wastewater treatment plants. The EIP was developed with the assistance of the Environment Protection Authority and other organisations.

The EIP identified that in order to meet future population demands within the catchment, while at the same time providing a high level of protection for local waterways, it would be necessary to undertake a major upgrade at a number of sewage treatment plants including Kurri Kurri.

Hunter Water Corporation decided that the existing treatment plant cannot, in its current state, meet expected demand, or be economically incorporated within a new plant. Therefore it has proposed that a new, advanced process treatment plant, with more capacity and capable of producing higher quality effluent, should be built to replace the existing facility.

An environmental impact statement for the proposed new Kurri Kurri Wastewater Treatment Works was exhibited in February, 2000.

The overall objectives of the proposal are:

- to provide wastewater treatment facilities to service current and future development in the Kurri Kurri area; and
- to ensure there are no significant impacts on the surrounding environment including waterways that receive effluent.

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 Urban Affairs and Planning 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 Swamp Creek, the watercourse which receives the treated effluent.

Continued water quality monitoring will be required in order to validate forecasted net environmental benefits which include improved disinfection, and higher levels of nutrient removal and therefore a reduction in the frequency of algal blooms in Swamp Creek. Hunter Water Corporation has also identified that there may be further markets to develop for re-use of the treated effluent.

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.

Sue Holliday
Director-General
Department of Urban Affairs and Planning

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GLOSSARY OF TERMS

Department, The	Department of Urban Affairs and Planning
Director-General, The	Director-General of the Department of Urban Affairs and Planning (or delegate)
DLWC	Department of Land and Water Conservation
DMP	dust management plan
DUAP	Department of Urban Affairs and Planning
EIS	environmental impact statement
EMP	Environmental Management Plan
EP	Equivalent Population (1 EP = 230 L)
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	NSW Environment Protection Authority
HIPAP	Hazardous Industry Planning Advisory Paper
HWC	Hunter Water Corporation
km	kilometre
ML/d	megalitres per day
ML/yr	megalitres per year
Minister, The	Minister for Urban Affairs and Planning
NPWS	National Parks and Wildlife Service
RTA	Roads and Traffic Authority
SOC Act	*State Owned Corporations Act, 1989*
SMS	Safety Management System
UV	ultra violet
WWTW	Wastewater Treatment Works

EXECUTIVE SUMMARY

Background to the Proposal

The Kurri Kurri Wastewater Treatment Works (WWTW) is a trickling filter plant constructed in 1942. It serves Kurri Kurri, Abermain, Heddon Greta, Cliftleigh, Pelaw Main, Stanford Merthyr, and Weston (see map at Figure 1). It was augmented in 1989 with the addition of fine screens and three maturation ponds. In 1995 chemical phosphorus removal was added.

Hunter Water Corporation (HWC) and the Environment Protection Authority (EPA) 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 Kurri Kurri WWTW in order to determine the strategy for the long term future of the treatment plant.

It concluded that in order to meet future population demands within the catchment, while at the same time providing higher levels of protection for local waterways, major upgrade works would be required.

Need for the Proposal

The Kurri Kurri WWTW currently serves an EP of 18,000. The plant meets current EPA licence limits, however periodic algal blooms occur in the maturation ponds which are used to both polish and disinfect the effluent.

Hunter Water Corporation identified that with the continuing population growth in the Kurri Kurri catchment it was likely that the Kurri Kurri WWTW would reach its hydraulic capacity of approximately 19,400 EP by 2005 and would no longer be able to adequately treat dry weather flows. There was therefore a need to provide increased capacity to meet projected future population growth.

The Proposal

Hunter Water Corporation proposes to provide a new treatment plant of approximately 21,400 equivalent population (EP)[1] capacity which would satisfy demand to 2019.

Although the population projections for the Kurri Kurri area do not indicate a significant increase over the next 20 or so years, Cessnock City Council has preliminary plans to develop an industrial estate, the Tomalpin Development Zone. The estate is likely to comprise light industrial (387 ha), general industrial (900 ha), and rural residential (458 ha).

Therefore HWC has also proposed a second stage amplification which, depending on process technology and detailed design could involve the construction of an additional clarifier. This would increase the total capacity of the WWTW to approximately 25,000 EP. This second stage amplification can be constructed at any time after the proposed first stage in order to cater for possible rapid new developments in the catchment such as the Tomalpin Development Zone.

The second stage would be designed to treat the effluent to the same level as proposed in the first stage ie. in terms of quality and by-pass level of treatment.

Treated effluent would continue to be discharged into Swamp Creek.

[1] Based on historical data, a per capita loading of 230 L/EP/day has been adopted for the new Kurri Kurri WWTW corresponding to an average dry weather flow (ADWF) of 57 L/s or 4.9 ML/day.

The proposal includes:

- an activated sludge biological reactor which has flexibility to be operated in multiple process configurations and which includes a range of chemical and biological phosphorus removal technologies;
- aerobic digestion for sludge stabilisation. The sludge (or biosolids) will be suitable for re-use in accordance with HWC's Biosolids Management Strategy; and
- UV radiation disinfection.

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 biological reactor to the clarifiers. All flows will be disinfected before discharge to Swamp Creek. Flows in excess of 7 x ADWF will be diverted to the existing maturation pond number 3 for storage and pumped back to the plant for treatment during periods of lower flow.

The estimated capital cost of the Stage 1 proposal is $11.6 million.

Need, Justification and Benefits

The proposal, as outlined above, will:

- service expected population growth in the catchment;
- control bacterial levels in Swamp Creek to less than 150 faecal coliforms/100 mL (on a 50 percentile basis);
- significantly reduce phosphorus loads; and
- remove the source of high density concentrations of algal cells by decommissioning the existing maturation ponds.

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 the receiving environment of Swamp Creek.

EIS Exhibition

The EIS was exhibited from 29 January to 3 March, 2000 inclusive. A total of 8 representations were received as a result of the exhibition, three of which expressed general support for the proposal. There were no outright objections to the proposal proceeding. However there were various concerns with certain aspects of the proposal including:

- impacts of flow alteration in the receiving waters;
- proposals for reuse ignored the potential for reuse on land held by Hunter Water Corporation surrounding the WWTW;
- need to assess the long term affects on downstream ecology;
- the potential interference with the proposed F3 freeway extension between Minmi and Branxton; and
- need to consider construction impacts on Swamp Creek.

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***

Hunter Water Corporation undertook an assessment on whether the proposed new plant 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 findings and conclusions are that HWC will need to:

- verify whether the actual environmental impacts of the proposal reflect the predictions made in the EIS; and
- ensure that construction of the new WWTW does not interfere with the Roads and Traffic Authority's proposed F3 to Branxton highway link corridor.

It is anticipated that the preferred option put forward in the Kurri Kurri Wastewater Treatment Works proposal will be beneficial to the Kurri Kurri community and result in improved water quality within Swamp Creek and reduced impact of operations at the WWTW.

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 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 new Kurri Kurri Wastewater Treatment Works (WWTW), the issues raised in representations made in response to the exhibition of the EIS, and HWC's consideration of these representations.

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 Urban Affairs and Planning (Director-General) to assess and report to the Minister for Urban Affairs and Planning on the proposal.

1.2 Statutory Provisions

Hunter Water Corporation was a company State owned corporation under the *State Owned Corporations Act 1989 (SOC Act)* until 1 January, 1999. This allowed the 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. In these circumstances, HWC was required to obtain the approval of the Minister under Division 4 of Part 5 of the *EP&A Act* before carrying out the development, and took 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 new Kurri Kurri Wastewater Treatment Works is explicitly listed in the transitional regulation as a development that remains subject to Section 37A of the *SOC Act* because it was certified prior to the statutory process changes which disestablished HWC as a Company State Owned Corporation. (Note: New sewage treatment plants were automatically certified by the Minister under the Statement of Application for Hunter Water Corporation issued on 24 April, 1996.)

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 of the Department of Urban Affairs and Planning before the Minister may make a decision. The Director-General's report together with the Minister's decision are 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 Director-General of the Department of Urban Affairs and Planning 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 exhibited from 29 January, 2000 to 3 March, 2000 inclusive.

Copies of all representations made to HWC were forwarded to the Department of Urban Affairs and Planning. On 29 November, 2000 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 Urban Affairs and Planning

Hunter Water Corporation sought the approval of the Minister for the project on 29 November, 2000.

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

Hunter Water Corporation with input from the Environment Protection Authority (EPA), 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. 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.

Kurri Kurri treatment plant is a trickling filter plant constructed in 1942 with an original capacity of 14,600 equivalent population (EP). The plant was augmented in 1989 with the addition of fine screens and maturation ponds. In 1995 chemical phosphorus removal was introduced at the plant.

The Kurri Kurri treatment plant currently serves an EP of approximately 18,000.

At the time the EIP was prepared, a number of investigations were undertaken at Kurri Kurri in order to determine the long term strategy for the treatment plant. The investigations identified that with the continued growth in the Kurri Kurri catchment, the Kurri Kurri treatment plant would reach its nominal capacity and may not be able to adequately treat (ie. meet EPA licence limits) dry weather flows beyond 2005.

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

Even though the existing plant meets current EPA licence limits, periodic algal blooms occur in the maturation ponds which are used to both polish and disinfect the effluent. The algal laden effluent in the maturation ponds is discharged into Swamp Creek, effectively seeding the creek with high concentrations of algae and possibly contributing to the observed algal bloom conditions in the creek.

The current plant has limited opportunities to reduce nutrients which can induce these blooms.

Population projections also indicate that it is likely residential and non residential growth will increase loads at the existing plant from the current 18,000 EP to 21,386 EP by the year 2019.

The existing plant has a hydraulic capacity of the trickling filter dosing syphons that is limited to 90L/s. Based on current population growth rates the plant only has adequate capacity to treat projected peak dry weather flows up to the year 2005.

Hunter Water Corporation 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, major upgrade works would be required at the Kurri Kurri treatment plant.

Hunter Water Corporation identified that there is no feasible option available to retain or augment the existing plant which would result in a significantly higher quality of effluent. It has therefore chosen to construct a new plant.

2.3 Objectives

Hunter Water Corporation has established the overall objectives of the proposal as follows:

- to provide wastewater treatment facilities to service current and future development in the Kurri Kurri area; and
- to ensure there are no significant impacts on the surrounding environment including waterways that receive effluent.

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

Hunter Water Corporation considered that only one feasible site exists for the location of the new treatment plant, and that is on the existing treatment plant site. It was reasoned that the area was suitable because it:

- has adequate area in which to locate the proposed new works;
- is ready connected to the sewerage catchment reticulation network;
- will be consistent with the existing land use and zoning of the site; and
- is close to effluent disposal (Swamp Creek) and potential reuse areas.

The EIS also examined a number of strategies and options that are available for wastewater management in the Kurri Kurri community. The options evaluated included:

- nutrient removal;
- sludge management;
- disinfection;
- wet weather flow management; and
- effluent and biosolids management.

Each of the options was assessed based on:

- environmental factors - such as impacts to the receiving water quality environment, odour generation, increased noise and existing visual quality;
- capital and operating costs – overall cost as measured by net present value;
- ease of operation – simplest to most complex; and
- ability to be upgraded to achieve more stringent standards – reduce nutrients further.

The preferred option was selected on the basis of how well it preformed with regard to the evaluation criteria which included whether it could achieve the objectives of the proposed upgrade (see 2.3 above).

2.5 The Proposal as Described in the EIS

Hunter Water Corporation is proposing to construct a new wastewater treatment plant adjacent to the existing Kurri Kurri treatment facility. Treated effluent will be discharged via an effluent pipeline to Swamp Creek.

The treatment process will include an activated sludge biological reactor which has flexibility to be operated in multiple process configurations and which includes a range of chemical and biological phosphorus removal options. This will allow the process to be changed depending on the concentrations of nutrients in the effluent and/or raw sewage, or in response to changes in effluent standards or methods or treatment. Initially the facility will be operated as a biological nutrient removal process, with provision to convert to an enhanced biological-phosphorous removal facility.

It is also proposed to use aerobic digestion for biosolids stabilisation and UV radiation for disinfection.

It is proposed to fully treat flows up to 3 times average dry weather flow (3 x ADWF) with flows in excess of 3 x ADWF by-passing the reactor directly to the clarifiers. Secondary effluent from the clarifiers will then gravitate to the filter block, where up to 3 x ADWF will be lifted for filtration and the remaining flow by-passed directly to the UV disinfection facility prior to discharge to Swamp Creek. Flows in excess of 7 x ADWF will be stored in the existing maturation pond No. 3 (5 ML capacity) and returned to the treatment plant for full processing when flows return to below 3 X ADWF.

The proposed new treatment plant would have a capacity of 21,400 EP which would satisfy demand to 2019.

The proposal will require the construction of the following components:

- a new covered inlet works from the rising mains which consists of mechanical fine screens, manually raked bypass screen, screen overflow structure into the bio-reactor, grit trap, a by-pass channel around the grit chamber;
- an activated sludge bio-reactor with facilities for chemical removal of phosphorus, dosing facilities for pH control, and blowers accommodated in a building next to the reactor;
- an aerobic digester for sludge and scum stabilisation;
- two clarifiers, with provision made for a third clarifier (Stage 2 amplification) to permit increased capacity[2];
- deep bed filters; and
- UV radiation facilities.

The proposal has incorporated a second stage in anticipation of a proposed industrial estate, currently under consideration by Cessnock City Council, proceeding ie. the Tomalpin Development Zone. If this development proceeds it would bring forward the date when the projected design capacity of the plant is likely to be reached (ie. before 2019). The proposed second stage would increase the treatment capacity to 25,000 EP and would treat the effluent to the same level as proposed in the first stage ie. in terms of quality and by-pass level of treatment.

2.5.1 Reuse of Treated Wastewater and Biosolids

Treated Effluent Reuse

Hunter Water Corporation'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. On the basis of investigations undertaken to date, opportunities for immediate reuse of effluent at Kurri Kurri seems to be limited because of the widespread and dispersed locations of potential reuse sites.

Hunter Water Corporation did identify that the Kurri Kurri Golf Course and Kurri Kurri TAFE offer longer term reuse potential. The golf course currently takes 130 ML/year and there is a possibility this could increase to 268 ML/year. The EIS identified that the Kurri Kurri TAFE has a potential to eventually accept up to 366 ML/year. This would, however, depend on the TAFE establishing agroforestry, orchards, horticulture, and a proposed golf course.

If all the anticipated reuse is taken up, it would represent a 36.6% reuse of the existing flow of 1,734 ML/yr or 35% reuse of the projected ultimate flow of 1,805 ML/yr.

Biosolids Reuse

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

[2] clarifiers will not be required if, during detailed design work, it is decided to employ an intermittently decanted process.

The current proposal includes a new biosolids treatment and dewatering facility using belt filter presses and appropriate storage. It is anticipated that biosolids will be removed daily and recycled for a range of agricultural, landscaping, and mine site rehabilitation uses within the Hunter Valley region.

2.5.2 Decommissioning of the Existing Plant

Once the new Kurri Kurri treatment plant is operational, the existing plant would be decommissioned in accordance with any approval required by the EPA.

The transitional arrangements for connecting the rising mains to the new plant would require approximately half a day and, according to the EIS, there is enough storage capacity in the sewerage system to ensure that no sewer surcharges will occur within this time.

2.5.3 Project Cost

The estimated capital cost of the proposal is $11.6 million. Total annual operating and maintenance cost is approximately $490,000. It is expected that the new plant would be operational by mid 2003.

2.6 Changes to the Proposal Since the Exhibition of the EIS

The Roads and Traffic Authority raised some concerns in its representation regarding the need for a greater buffer distance between its proposed F3 to Branxton Link Freeway and the preferred site layout of the proposed WWTW.

Hunter Water Corporation revised the layout to increase the buffer between the plant and the edge of the freeway corridor from 6 metres to approximately 35 metres. The new site layout was provided in the Representations Report and is shown in Figure 2. (See further discussion in section 4.2 below).

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, future monitoring will be required to see if further reduction in nutrients is required, environmental flows should be considered;
Site Selection – need greater distance between new plant and planned road construction;
Effluent Reuse – may be opportunities for reuse on the site of the WWTW, need to use EPA's "Guidelines for the Use of Recycled Water in NSW"[3], soil management needs to be considered;
Odour Impacts – impacts not correctly described in the EIS, will need to assess odours following commissioning;

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

[3] These guidelines are currently in the process of being updated.

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 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 Need to Verify Predictions Made in the EIS Regarding Improvements in Water Quality

4.1.1 The Issues

High concentrations of chlorophyll-a[4], indicative of algal bloom conditions, have been frequently observed in the vicinity and downstream of, the Kurri Kurri WWTW discharge in Swamp Creek. The probable reasons for these observations include:

- the concentrations of plant nutrients, nitrogen and phosphorus, contained in the treated effluent released from the Kurri Kurri WWTW promoting excessive algal growth; and
- the release of the high algal concentrations contained in the Kurri Kurri WWTW effluent which develops as a result of the effluent's retention in maturation ponds[5]. The discharged effluent "seeds" the already nutrient enriched waters of Swamp Creek with algae and additional nutrients, facilitating algal growth.

Hunter Water Corporation proposes to reduce the concentration of nutrients in the treated effluent stream and to eliminate the use of the maturation ponds. It anticipates that this will improve instream water quality. It will be important to monitor the effects of the treatment process to verify anticipated water quality improvements.

Hunter Water Corporation is also proposing to introduce a new disinfection process, UV radiation. It will be important to ensure that the level of disinfection achieved by the new process is satisfactory to the maintenance of water quality criteria identified for this proposal, and any EPA licence requirements.

4.1.2 Background

Swamp Creek is a heavily nutrient enriched watercourse. Kurri Kurri WWTW contributes to this by discharging treated effluent with a median concentration of 21.9 mg/l of nitrogen and 0.9 mg/l of phosphorus.

The contribution of phosphorus, and nitrogen from the Kurri Kurri WWTW discharge is considered a small proportion of the total activities which contribute contaminants into the Swamp Creek catchment[6]. However, the contribution from the WWTW appears to be directly responsible for the diminished water quality (ie. algal blooms and high levels of nitrogen and phosphorus) between the discharge point and the Alcan monitoring station located approximately 4 km downstream.

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[4] Chlorophyll-a is used as an indicator of the amount of algal biomass in the water column. A value of 20 µg/l is used as an indicator of algal blooms ie algal levels of 15,000 to 20,000 algal cell/ml

[5] maturation ponds are used to both polish and disinfect the effluent.

[6] The DLWC estimates that the contributing fraction of phosphorous and nitrogen from the Kurri Kurri WWTW in this catchment is less than 2% compared to other sources such as dryland grazing, urban runoff, and floodplain cropping.

Modelling studies conducted as part of the EIS provided a crude approximation of the possible impacts of the discharge of effluent treated to a number of standards on the receiving environment in order to assist in the choice of an appropriate treatment process. These were compared with the base case which is the treatment plant operating in its current configuration under 1995 loadings.

The selection by HWC of the level of treatment and therefore the quality of the effluent, reflected a need to maintain the existing uses of the creek. These uses were considered to be maintenance of ecosystem, agriculture, and some irrigation.

4.1.3 Discussion

On the basis of the outcome of these studies it has been proposed in the EIS that the plant be designed to achieve an effluent, at 50 percentile values, with 10 mg/l of nitrogen and 0.1 mg/l phosphorus (15 mg/l nitrogen and 0.5 mg/l phosphorus at the 90 percentile). This will realise a reduction in the annual loading of total phosphorus from over 14,000 kg/annum in 1995 to under 300 kg/annum in the year 2019. Similarly, nitrogen loads will be reduced to under 23,000 kg/annum in 2019 from over 35,000 kg/annum in 2002.

The proposal also introduces a new disinfection process, the use of UV radiation, which eliminates the storing of the treated effluent in the maturation ponds prior to discharge. As a result, the treated effluent will no longer be a source of high concentrations of algal cells. The chlorophyll-a concentrations in the treated effluent stream of the proposed WWTW will be designed to be 10μg/l or approximately 10,000 algal cells/ml. (Note: It is anticipated by HWC that this value will be closer to zero.) However, it will be necessary to monitor the effectiveness of the new disinfection process to determine if it is achieving the outcomes identified in the EIS (ie. 150 faecal coliform units/100 mL at the 50 percentile).

It has also been proposed that arrangements may be possible to achieve a high level of reuse of treated effluent. Two sites have been identified: the Kurri Kurri Golf Course; and the Kurri Kurri TAFE. It may be possible, subject to suitable arrangements being negotiated, to reuse up to 634 ML/yr or 36% of the existing flows (or 35% of forecasted future flows). This, when combined with the proposed higher level of treatment, would reduce the total nutrient loading to Swamp Creek from the WWTW by 77% for nitrogen and 93% for phosphorus over existing levels.

4.1.4 Results

Hunter Water Corporation has identified a treatment standard for its proposed new WWTW to address observed water quality problems in a section of Swamp Creek downstream of the existing Kurri Kurri WWTW. The standard is based on the outcome of water quality modelling, and observations made from water monitoring investigations and indicates that as a result of the preferred option:

- there will be a reduction in nutrient input to the section of Swamp Creek between the discharge point and downstream to the Alcan monitoring station to a concentration associated with the protection of aquatic ecosystems; and
- water quality criteria for bathing and other recreation will be maintained in this section of Swamp Creek during dry weather, notwithstanding upstream inputs.

These outcomes are consistent with the objectives for this proposal (see Section 2.3).

The preferred process also reflects a commitment to recycle treated effluent which has the potential to further reduce the total load of nutrients into this section of Swamp Creek.

4.1.5 Conclusion

Modelling investigations produce, at best, coarse results. It will therefore be necessary for the predictions made in the EIS regarding improvements in water quality in this section of Swamp Creek (ie. reduced frequency in algal blooms and overall reduction in nitrogen and phosphorus concentrations) to be verified after commencement of operation. This should provide a more accurate assessment of the effectiveness of the preferred option.

Recommended Condition of Approval No. 29 proposes that HWC prepare an Environmental Impact Prediction Verification Report at 1, 5, 10, and 15 years after commissioning of the plant operation in order to compare monitoring results with the predictions and operational performance levels made in the EIS to see if these are being met. Recommended Condition of Approval No. 31 requires HWC to implement all the requirements of the Director-General with respect to any measures arising from the impact prediction report.

Reuse, because it can reduce the total nutrient loads in Swamp Creek catchment, should be implemented if suitable arrangements can be negotiated, and subsequent investigations determine its environmental acceptability. Recommended Condition of Approval No. 38 encourages HWC to implement reuse of effluent.

Recommended Conditions of Approval Nos. 35-37 requires HWC to prepared a detailed procedure for optimising the UV disinfection process. It also requires HWC to rectify the process if it is found to be unsatisfactory.

4.2 Potential for the Proposed WWTW to Interfere With the Alignment of the F3 Freeway Extension

4.3 The Issue

The preferred option for the construction of the new facility is located to the north of, but on the same site as the existing treatment plant. This places it within 6 metres of the edge of the RTA's proposed F3 Branxton Link Freeway corridor.

4.3.1 Background

Hunter Water Corporation investigated two areas within the site of the existing treatment works as part of the site selection process for the new treatment plant. Site 1 is located to the north of the existing treatment plant and Site 2 is located north, north-east of maturation ponds 1 and 2.

These two sites were evaluated against a number of criteria including: geotechnical considerations; proximity to residential areas; access; flood levels; site profile; services; and construction issues.

Although both areas would be suitable, Site 1 involves significantly less clearing of vegetation. On this basis HWC selected it as the preferred option.

4.3.2 Discussion

The RTA, in its representation to the EIS, objected to the proposed Site 1 because it did not afford sufficient distance between the treatment facility and the proposed F3 Branxton Link Freeway extension. The RTA suggested that, in this regard, Site 2 was a better option.

As a result of this objection, HWC reviewed the layout of the proposed plant on Site 1 and revised the minimum distance between the treatment structures and the edge of the freeway corridor to 35 metres. The revised distance is approximately twice the buffer distance between the proposed freeway and the existing treatment plant.

4.3.3 Conclusion

Hunter Water Corporation advised the RTA of the changed alignment and undertook to include a contract requirement that no structures are to be constructed within 35 metres of the freeway corridor on the basis of ISG coordinates of the freeway corridor provided by the RTA.

The RTA advised that it was satisfied with this buffer and further suggested that appropriate landscaping and tree planting should be provided.

Recommended Condition of Approval No. 52 proposes that no treatment structures are to be constructed within 35 metres of the freeway corridor as defined by the ISG coordinates provided by the RTA. Recommended Condition of Approval No. 58 requires HWC to undertake appropriate landscaping and tree planting within this buffer.

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 Sediment and Erosion Control

NSW Fisheries and the DLWC raised concerns regarding the lack of detail on how it was proposed to control erosion and runoff impacts especially during construction.

Hunter Water Corporation has undertaken to prepare a Soil and Water Management Plan as part of a Environmental Management Plan.

Recommended Conditions of Approval Nos. 54 and 55 require HWC to prepare a soil and water management procedure in consultation with the EPA, DLWC, NSW Fisheries, and Cessnock City Council.

5.2 Odour

Problem odours from WWTW are often evident as complaints made from the surrounding community. In the case of the existing Kurri Kurri WWTW, only one complaint has been made in the past four years.

The proposed new plant incorporates a number of newer technologies that have not been used at the Kurri Kurri site before. These include covering the inlet works and enclosing the belt filter press and gravity drainage deck. Air from the enclosures is proposed to be directed to a soil bed filter for treatment. In addition, biosolids are proposed to be aerobically digested, a process that produces much less odours than the current anaerobic digestion process.

Even though it is likely these newer technologies will improve odour management, it will still be necessary for HWC to develop, as part of an operational environmental management plan, an Odour Management Procedure to test whether odours are an issue at the site of the new plant and prescribe procedures to deal with them.

It is proposed that the management procedure detail responses to actions to reduce odour emission rates, identify measures taken to manage odours, and describe programs for monitoring and assessing operational effectiveness of odour control measures.

Recommended Condition of Approval No. 40 addresses this matter.

5.3 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* (ie. the 8 Part Test).

The Department's assessment considered the flora and fauna investigations report very thorough in the level of survey, assessment, and reporting carried out for the proposed development.

The main area of concern is the presence of 40 individuals of *Eucalyptus parramattensis* subsp *decadens*. However, the proposed development is restricted to the degraded and open lands of the north of the site and avoids all the populations of the *Eucalyptus parramattensis* subsp *decadens* that occur on site.

Two threatened fauna species were also recorded: the Large and Little Bentwing-bats. However it was determined that these would not roost on the site and would be present only for foraging purposes. Therefore there is no reliance on the site by these species.

Subsequent to the preparation of the EIS, a preliminary determination was made by the NSW Scientific Committee under the *TSC Act* for an endangered ecological community, the Kurri Sand Swamp Woodland. Further information was sought from HWC on the likely occurrence of this community within the proposed development site.

Consultants, acting on behalf of Hunter Water Corporation, reported that although some of the vegetation is representative of the floristics of Kurri Sand Swamp Woodland, the study area geology, soil types, position, and forest structure are not representative of this ecological community. It was therefore concluded that the Kurri Swamp Woodland is not present on the site.

Hunter Water Corporation, 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.

A number of recommendations for managing the site have been suggested in the flora and fauna report to both ensure protection of habitat and improve the values of the site for native species. These recommendations include:

- landscaping within and adjacent to the constructed WWTW lands to incorporate the use of *Eucalyptus parramattensis* subsp *decadens*, propagated from locally collected seed stock;
- using other locally indigenous species for revegetation works as identified in Appendix 1 – the flora list for the study area[7];
- specifying mechanisms to be adopted to protect *Eucalyptus parramattensis* subsp *decadens* and adjacent bushland from all direct and indirect cumulative threats associated with the development including fencing to prevent public access, and managing to prevent ongoing simplification and degradation and thereby preserving individuals of the species from outside influences;
- landscaping to incorporate the use of tree species of known value to the Squirrel Glider ie. Swamp Mahogany, Grey Gum, Cabbage Gum, Forest Gum, Banksias, Acacias, and Ironbark; and
- ensuring no net loss of hollows by retention of marked trees or erection of nesting boxes to compensate any loss of potential roost sites eg. bats, turquoise parrot.

Recommended Condition of Approval No. 58 addresses this matter.

5.4 Flows in Swamp Creek

The EPA and the DLWC raised concerns regarding the unnatural flows in Swamp Creek due to the constant release of treated effluent, especially since the creek would normally be characterised as ephemeral ie. flows during wet weather interspersed with periods of drying out during dry weather.

The Swamp Creek catchment has been greatly modified since settlement of the Kurri Kurri region. Diffuse runoff now occurs from the agricultural and urban areas, and as a point source associated with another treatment works located downstream at Farley.

According to HWC, it is likely that a storage system at Kurri Kurri, capable of storing effluent for the period of time required to replicate a natural drying cycle (ie. on the order of several months) would

[7] "Threatened Species Assessment for the Proposed Construction of a New Wastewater Treatment Plant at Kurri Kurri", Ecotone Ecological Consultants Pty Ltd, prepared for Sinclair Knight Merz Pty Ltd and Hunter Water Corporation, Appendix 1. Flora Species Recorded Within the Study Area, 23 September, 1999.

have to have an approximate capacity of 300 ML. This, according to HWC, could be expected to cost up to $15 million. (Note: to make full use of the maturation ponds for storage would only provide an estimated 10 days of storage.)

It is unlikely that the benefits of this can be justified given the other sources of runoff contributing to unnatural flows in Swamp Creek.

5.5 Groundwater

Pond storage structures, such as the maturation ponds and sludge lagoon, could be a source of contamination for groundwater.

It is proposed to use the existing Maturation Pond No. 3 as an emergency bypass storage pond for flows greater than 7 x ADWF, and Maturation Ponds Nos. 1 and 2 as storage of treated effluent for reuse applications. The maturation ponds are not lined and there is a potential that these could leach into the groundwater.

Hunter Water Corporation has identified that in the past 7 years no flows exceeding 7 x ADWF have ever been recorded at Kurri Kurri. In the event that Maturation Pond No. 3 was used for emergency storage, it is anticipated that the bypassed wastewater would be highly diluted and not present a contamination problem to the groundwater.

Treated effluent in the other two ponds will ultimately be applied to the land in any reuse application. Hunter Water Corporation has indicated that the maturation ponds are underlain by sandstone and there is little opportunity for leachate to contaminate groundwater. However because the ponds are unlined and are likely to be filled most of the time (ie. they are proposed to be used as reservoirs to store treated effluent prior to pumping to reuse sites) it should be determined if they are a source for groundwater contamination.

The existing sludge lagoon is lined with compacted clay. It is also intended to use the lagoon as an emergency sludge storage pond. The DLWC identified in its representation the need to maintain the integrity of the sludge lagoon as it could pose serious contamination problems if it leached concentrated sludge liquor to the groundwater.

Hunter Water Corporation should be required to:

- monitor the groundwater in the vicinity of the sludge lagoon, and Maturation Ponds 1 and 2 to ensure that there are no adverse impacts on the groundwater environment; and
- undertake appropriate corrective measures if monitoring demonstrates contamination (eg. renew the lining of the sludge lagoon, or line the maturation ponds.)

Recommended Conditions of Approval Nos. 32 and 33 address this matter.

5.6 Rehabilitation of the Old Treatment Plant Site

The EIS does not adequately address rehabilitation of the old treatment plant site.

Hunter Water Corporation has proposed that this matter be included as part of the Rehabilitation Management Plan for the old treatment plant, prepared as part of the EMP(Construction). Rehabilitation of the old site will require demolition of some of the existing works, earthworks, and landscaping.

As discussed in Section 5.3 above, the landscaping of the site will be done in a manner that encourages the re-establishment of habitat indicative of the area. Rehabilitation of the old site should also be undertaken in this manner.

Recommended Condition of Approval No. 53 addresses this matter.

5.7 Archaeology and Heritage

The EIS identified that there may be industrial heritage significance with the Dortmund sedimentation tanks and that there is a need to investigate the location and condition of other Dortmund sedimentation tanks within NSW so that a comparative assessment of the Kurri Kurri tanks can be made.

Dortmund sedimentation tanks are concrete, steep sided, 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.

The EIS also recommended that a full documentation and photographic record of the existing treatment plant be made, since it is more than 50 years old.

Recommended Condition of Approval No. 61 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 Kurri Kurri Wastewater Treatment Works 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 with actual impacts;
- further investigating and pursuing opportunities for reuse of treated effluent;
- construction and operational procedures including the preparation of detailed management plans to cover soils, water (surface and groundwater), noise, and air quality; and
- landscape planning to both ensure protection of habitat and improve the values of the site for native species.

These conditions will 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 new WWTW will provide a reduction in the human health and ecosystem risks by improving the quality of effluent discharged to the receiving environment.

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 and supplementary information and advice provided. It is noted that the EIS 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 specified in the EIS. Where there is an inconsistency with the recommendations in the EIS, the recommendations in this report would prevail.

The following acronyms and abbreviations are used in this section:

Department, The	Department of Urban Affairs and Planning
Director-General, The	Director-General of the Department of Urban Affairs and Planning (or delegate)
DLWC	Department of Land and Water Conservation
DMP	dust management plan
DUAP	Department of Urban Affairs and Planning
EIS	environmental impact statement
EMP	Environmental Management Plan
EMR	Environmental Management Representative
EP	Equivalent Population (1 EP = 230 L)
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	NSW Environment Protection Authority
HIPAP	Hazardous Industry Planning Advisory Paper
HWC	Hunter Water Corporation
ML/d	Megalitres per day
Minister, The	Minister for Urban Affairs and Planning
RTA	Roads and Traffic Authority
SMS	Safety Management System
UV	ultra violet
WWTW	Wastewater Treatment Works

General

1. The proposal shall be carried out in accordance with:
    - the proposal contained in the EIS entitled "Proposed New Kurri Kurri Wastewater Treatment Works", prepared for Hunter Water Corporation by Sinclair Knight Merz, dated January, 2000 and incorporating such changes as described in the "Proposed New Kurri Kurri Wastewater Treatment Works – Representations Report" prepared by Hunter Water Corporation, dated November, 2000; and
    - the Conditions of Approval granted by the Minister.

2. Despite the above, in the event of any inconsistency with the EIS, the Conditions of Approval granted by the Minister shall prevail.

3. Any modification to the proposal which would be inconsistent with the Conditions of Approval shall only be carried out with the prior written approval of the Minister.

4. It shall be the ultimate responsibility of HWC to ensure compliance with the conditions of this approval.

5. These conditions do not relieve HWC of the obligation to obtain all other approvals and licences from all relevant authorities required under any other Act. Without affecting the generality of the foregoing, HWC shall comply with the terms and conditions of such approvals and licences.

Compliance

6. Hunter Water Corporation shall:
    - comply with all reasonable requirements of the Director-General in respect of the implementation of any measures arising from the conditions of this approval;
    - bring to the attention of the Director-General any matter that may require further investigation and the issuing of instructions from the Director-General; and
    - shall implement these instructions to the satisfaction of the Director-General within such time that the Director-General may specify.

Pre-Construction Compliance Report

7. At least one month prior to commencement of any construction works (or within such period as otherwise agreed by the Director-General), HWC shall submit for approval of the Director-General a compliance report detailing compliance with all relevant conditions that apply prior to commencement of substantial construction and shall address:
    - the dates of submissions of the various studies and/or requirements of various relevant conditions, and their approval and terms of approval; and
    - action taken or proposed to implement the recommendations made in terms of approvals and/or studies.

Pre-Operational Compliance Report

8. At least one month prior to commencement of operation (or within such period as otherwise agreed by the Director-General), HWC shall submit for approval of the Director-General a compliance report detailing compliance with all relevant conditions that apply prior to commencement of operation and shall address:
    - the dates of submissions of the various studies and/or requirements of various relevant conditions, and their approval and terms of approval; and
    - action taken or proposed to implement the recommendations made in terms of approvals and/or studies.

Dispute Resolution

9. In the case of a dispute between HWC and any public authority (but excluding any dispute between HWC and its contractors and/or subcontractors involved in the construction or operation of the project) in the implementation of the Conditions of Approval, the matter shall be referred to the Director-General for resolution, or if not resolved, to the Minister whose determination of the disagreement shall be final and binding on all parties.

Project Commencement

10. Hunter Water Corporation shall notify the Director-General and all relevant authorities in writing of the project commencement date(s) prior to construction and operation.

Contact Telephone Number

11. Prior to commencement of construction, HWC shall provide to the Director-General, EPA, DLWC, RTA, NSW Fisheries, Cessnock City Council, and all relevant government agencies, a 24 hour contact telephone number which will reach a person who can arrange, within a reasonable time as appropriate to the nature of the issue, appropriate action to be taken. The contact telephone number shall also allow any member of the public to contact HWC with respect to seeking information or making a complaint.

Complaints

12. An initial response to any complaint is to be made to the complainant within 24 hours of receipt. Hunter Water Corporation shall then:
    - investigate the concerns raised by the complainant and undertake all reasonable attempts to determine the cause of concern; and
    - if adverse impacts are identified, undertake all practicable measures to modify the activity which may be causing the impacts.

Complaints Register

13. Hunter Water Corporation shall maintain a Complaints Register which shall be:
    - used to record details of all complaints received and actions taken by HWC during the construction and operation stages; and
    - available to all relevant government agencies including but not limited to DUAP, EPA, DLWC, RTA, NSW Fisheries, NSW Health, and Cessnock City Council.

Community Notification and Liaison

14. Hunter Water Corporation shall:
    - prior to commencement of construction, place an advertisement in a relevant local newspaper and prepare a brochure that is circulated to nearby residents, which describe:
      - the type and locations, and where possible the timing, of works to be undertaken;
      - any anticipated traffic disruptions and controls including temporary detours;
      - work required outside of the nominated working hours; and
      - provides contact details in accordance with Condition of Approval No. 11.
    - regularly contact adjacent landowners over the duration of the construction to provide updated information on the project and community feedback.

Intended Processing Capacity of the Kurri Kurri Wastewater Treatment Works

15. Hunter Water Corporation shall review its projected average dry weather sewage flow every five years, or at such other more frequent period as required by the Director-General, for the catchment serviced by the Kurri Kurri WWTW. The review shall be submitted to the EPA and the Director-General and be accompanied by a report which:
    - revises the average dry weather flow projections to indicate the anticipated date when the intended design capacity of 21,400 EP or 4.9 ML/day at average dry weather flow is likely to be attained at Kurri Kurri WWTW (predicted in the EIS to occur in 2019);
    - identifies a program of any necessary works, and the timing of these works, that it intends to undertake to provide Stage 2 capacity of 25,000 EP.
    - recommends strategies (including upgrade and/or amplification works) that it proposes to undertake in time to ensure the intended processing capacity of 4.9 ML/day at average dry weather flow (Stage 1) and 6 ML/day at average dry weather flow (Stage 2) is not exceeded, or design and/or operational changes to ensure that the effluent quality is equivalent to, or better than, design criteria implemented for this project.

Treatment Levels at the Kurri Kurri Wastewater Treatment Works

16. Following commissioning of the new Kurri Kurri WWTW, all flows up to 3 x ADWF must receive full tertiary sewage treatment. Flows in excess of 3 x ADWF and up to 7 x ADWF may bypass the bioreactor to the clarifiers for secondary treatment including UV disinfection. All flows in excess of 7 x ADWF must be stored in the existing maturation ponds, until the flow falls below 3 x ADWF, and then be pumped back for full treatment.

17. Effluent shall at least meet the following quality limits unless otherwise modified in any licence issued by the EPA:

Parameter	50 percentile	90 percentile
TSS mg/L	2	10
BOD_5 mg/L	5	10
NH_3-N mg/L	1	3
Total N mg/L	10	15
Total P mg/L	0.1	0.5
FC (CFU/100 mL)	150	200

Environmental Management Representative

18. A suitably qualified Environmental Management Representative (EMR) shall be available during construction activities at the site and be present on-site during any critical construction activities as defined in the Environmental Management Plan at Condition of Approval No. 23. The EMR shall have responsibility for considering and advising on matters specified in the conditions of approval and compliance with such and facilitation of an induction and training program for all persons involved with the construction activities. The following information shall be provided to the Director-General:
    - appropriateness of the qualifications of the EMR including demonstration of general compliance with the principles of AS/NZS ISO 14012:1996 *Guidelines for Environmental Auditing : Qualifications criteria for environmental auditors*;
    - role and responsibility of the EMR; and
    - authority of the EMR including details of HWC's internal reporting structure. This shall include the authority to stop work immediately if in the view of the EMR an unacceptable impact is likely to occur or to require other reasonable steps to be taken to avoid or minimise any adverse impacts.

19. The appointment of the person nominated to serve as the EMR shall be approved by the Director-General prior to commencement of construction.

20. The EMR shall immediately bring to the attention of the Director-General any major issues resulting from the construction of the project which have not been dealt with expediently or adequately by HWC.

Environmental Management System

21. In the assessment of tenders for construction and operation of the proposal, HWC shall include as a key evaluation criterion, the tenderer's demonstrated commitment to environmental management. Demonstration should be by way of commitment of a recognised Environmental Management System (such as ISO 14000, BS 7750-1994 or similar) and/or a proven satisfactory environmental management performance record.

22. All sampling strategies and protocols undertaken as part of the monitoring programs required by these Conditions of Approval shall include a quality assurance/quality control plan and shall require approval from the relevant regulatory agencies to ensure the effectiveness and quality of the monitoring program. Only accredited laboratories shall be used for the laboratory analysis.

Environmental Management Plan(s) (Construction Stage)

23. A project specific Environmental Management Plan(s) (Construction Stage), for the new Kurri Kurri WWTW shall be prepared by HWC to the satisfaction of the Director-General following consultation with the EPA, DLWC, Cessnock City Council, and any other relevant government agency nominated by the Director-General, prior to commencement of construction works. The EMP shall be prepared in accordance with the conditions of this approval, all relevant Acts and Regulations and accepted environmental management best practice.

24. The EMP(s) shall be made publicly available on request and shall:
    - address construction activities associated with the site and the decommissioned site of the old works;
    - cover specific environmental management objectives and strategies for the main environmental system elements and include, but not be limited to: water quality; noise; air/odours; erosion and sedimentation; access and traffic; property acquisition and/or adjustments; groundwater contamination; waste/resource management; terrestrial and aquatic flora and fauna; hydrology and flooding; recreation areas; visual screening, landscaping and rehabilitation; heritage items, hazards and risks; resource use and recycling; and utilities.
    - address, but not be limited to:
        – identification of the statutory and other obligations which HWC is required to fulfil during project construction including all approvals, consultations and agreements required from authorities and other stakeholders, and key legislation and policies which control HWC's construction of the proposal;
        – definition of the role, responsibility, authority, accountability and reporting mechanism applicable to people having responsibilities under the EMP;
        – measures to avoid and/or control the occurrence of environmental impacts;
        – measures (where practicable and cost effective) to provide positive environmental offsets to unavoidable environmental impacts;
        – the role of the EMR;
        – environmental management procedures for all construction processes which are important for the quality of the environment in respect of permanent and/or temporary works;
        – monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental management of the project including performance criteria, specific tests, protocols (eg. frequency and location) and procedures to follow;
        – environmental management instructions for all complex environmental control processes which do not follow common practice or where the absence of such instructions could be potentially detrimental to the environment;
        – steps HWC intends to take to ensure that all plans and procedures are being complied with;
        – rehabilitation measures to be undertaken upon decommissioning the old works (Refer Condition of Approval No. 53); and
        – requirements arising from consultation with relevant government agencies, and Cessnock City Council.

    Specific requirements for some of the main environmental system elements referred to above shall be as required under the conditions of this approval and/or as required under any licence or other approval.

Environmental Monitoring (Construction)

25. Hunter Water Corporation shall submit reports to the Director-General in respect of the environmental performance of the construction works and compliance with the Environmental Management Plan (Construction Stage) and any other relevant conditions of this approval. The reports shall:
    - be prepared at six-monthly intervals or at other such periods as requested by the Director-General to ensure adequate environmental performance over the duration of the construction works;
    - include, but not be limited to information on:
        – applications for consents, licences and approvals, and responses from relevant authorities;

  - implementation and effectiveness of environmental controls and conditions relating to the work undertaken;
  - identification of construction impact predictions made in the EIS and any supplementary studies and details of the extent to which actual impacts reflected the predictions;
  - details and analysis of results of environmental monitoring;
  - the number and details of any complaints, including a summary of the main areas of complaint, action taken, response given and intended strategies to reduce complaints of a similar nature; and
  - any other matter relating to the compliance by HWC with the conditions of this approval or as requested by the Director-General.
- submitted to the EPA, DLWC, Cessnock City Council, and any other relevant government agency nominated by the Director-General;
- made publicly available; and
- certified by the EMR.

Environmental Management Plan (Operation Stage)

26. Hunter Water Corporation shall prepare an Environmental Management Plan for the operation stage of the proposal prior to commissioning. The EMP (Operational Stage) shall be prepared to the satisfaction of the Director-General, following consultation with the EPA, DLWC, Cessnock City Council, and any other relevant government agency nominated by the Director-General.

27. The EMP (Operational Stage) shall be prepared in accordance with the conditions of this approval, all relevant Acts and Regulations and accepted best practice management procedures.

28. The EMP (Operational Stage) shall be made publicly available on request and shall address the site of the new WWTW, but not be limited to:
    - identification of the statutory and other obligations which HWC is required to fulfil including all licences/approvals and consultations/agreements required from authorities and other stakeholders, and key legislation and policies which control the HWC's operation of the project;
    - requirements of and compliance with relevant EPA guidelines;
    - sampling strategies and protocols to ensure the adequacy of the monitoring program including any specific requirements of the EPA and the DLWC;
    - monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental performance of the project during its operation, including description of potential site impacts, performance criteria, specific tests and monitoring requirements, protocols (eg frequency and location) and procedures to follow;
    - detailed contingency procedures for dealing with: power failures; overflows within the treatment plant; and bushfires;
    - steps HWC intends to take to ensure that all plans and procedures are being complied with;
    - quantities and method of storage of the chemicals likely to be used and compliance with the requirements of the *Dangerous Goods Act*;
    - summary of management strategies employed for:
      - effluent management including monitoring at discharge points in terms of quality and quantity;
      - biosolids disposal;
      - noise;
      - access and traffic;
      - water quality (including erosion and sedimentation controls) at the effluent discharge points;
      - air quality (including dust and odours);

- health and public safety;
- landscaping and maintenance and issues relating to flora and fauna;
- security;
- groundwater including monitoring in relation to the sludge lagoon and maturation ponds;
- waste/resource minimisation, management, removal and disposal;
- hydrology and flooding; and
- hazards and risks and contingency plans (emergency response).

Specific requirements for some of the main environmental system elements referred to above shall be as detailed under the conditions of this approval and/or as required under any licence or approval.

Environmental Impact Prediction Verification

29. An Environmental Impact Prediction Verification Report which assesses the key impact predictions made in the EIS and any supplementary studies, shall:
    - be submitted to the Director-General, the EPA and, upon request, to any other relevant government agency. The reports shall cover the first 12 months, and 5, 10, and 15 years of operation after commissioning of the plant operation and at any additional intervals the Director-General may require. Reports shall be submitted within 3 months of the end of each reporting period and:
    - be prepared at HWC's expense;
    - detail the extent to which actual impacts reflect the predictions including, but not limited to, the following:
        - water quality in relation to nutrients and algal concentrations in Swamp Creek; and
        - wet weather overflow and bypass frequency for the WWTW;
    - assess the suitability of implemented mitigation measures and safeguards;
    - assess compliance with the Environmental Management Plan (Operational Stage) and Conditions of Approval; and
    - discuss any community feedback on the project and issues of concern raised following commencement of plant operations.

30. The technical studies required as part of the Report in Condition of Approval No. 29 shall be prepared by appropriately qualified, independent specialists.

31. Hunter Water Corporation shall implement all the requirements of the Director-General with respect to any measures arising from the report prepared in accordance with Condition of Approval No. 29.

Water Quality

32. As part of the EMP (Operational Stage) referred to in Condition of Approval No. 26, HWC shall prepare, in consultation with the EPA and DLWC, a detailed Water Quality Management Procedure. The Procedure shall:
    - provide details of pollution control measures to be undertaken during the operation of the Kurri Kurri WWTW;
    - satisfy all relevant Environment Protection Licence requirements; and
    - reference environmental issues and goals set out in relevant EPA and other guidelines.

33. The Procedure shall address, but not be limited to, the:
    - identification of baseline surface water and groundwater quality monitoring locations;
    - design and implementation of monitoring programs to validate the predictions and to provide a basis for future decision making processes;
    - asset management and means of limiting overflows and bypass frequency, the frequency of all untreated discharges, and contamination of groundwater. (For groundwater this could mean re-lining the sludge lagoon or lining the maturation ponds);

- emergency response and clean-up procedures; and
- notification procedures for potentially affected parties during periods when emergencies, such as bypasses or power failures, occur.

34. The Procedure shall be prepared prior to commissioning of the new plant and shall be forwarded to the EPA and the DLWC.

UV Light Disinfection

35. Prior to the commissioning of the new plant, HWC shall prepare a detailed procedure in consultation with the EPA and to the satisfaction of the NSW Health Department, with the objective of optimising the UV light disinfection process for all likely operational modes of Kurri Kurri WWTW.

36. The procedure shall make explicit provision for:
    - periods when complete treatment would be completely or partially bypassed and when suspended solids levels are found to be elevated and light transmissivity is being reduced; and
    - an appropriately designed monitoring program to facilitate:
        - optimisation of the UV light disinfection process; and
        - ongoing monitoring of its UV light disinfection efficiency.

37. With respect to the procedures for optimisation of disinfection, Hunter Water Corporation shall comply with all reasonable requests of the NSW Health Department to ensure that the disposal of wastewater does not pose a potential hazard to public health.

Effluent Reuse

38. Hunter Water Corporation shall prepare a report on reuse for the treated effluent at the Kurri Kurri WWTW within the first year of this approval, and thereafter as requested by the Director-General. The report shall:
    - identify progress on all investigations to establish and expand reuse markets as identified in the EIS ie. the Kurri Kurri Golf Course and the Kurri Kurri TAFE; and
    - examine any likely future reuse markets, including water quality requirements.

Energy Use

39. Prior to finalising of detailed design of the plant, HWC shall identify all practical measures in relation to the reduction of on-site energy consumption during operation. Where practicable, such measures shall be incorporated into the WWTW design and shall be operational at the time of commissioning.

Air Quality

40. As part of the EMP (Operational Stage) referred to in Condition of Approval No. 26, HWC shall prepare a detailed Odour Management Procedure in consultation with the EPA and Cessnock City Council. The Procedure shall detail:
    - all response actions to reduce the expected odour emission rates from the proposal to existing or lower levels than those currently emitted;
    - all aspects of odour management eg. identification of odour sources, control devices, treatment, adopted criteria and implementation of any necessary additional mitigation strategies, methodology for monitoring odour emissions (including representative meteorological conditions), reporting procedures, measures for dealing with exceedances, arrangements to inform residents and contact points, complaints handling systems, reporting of complaints; and
    - procedures for monitoring and assessing the operational effectiveness of the soil bed filters and, should problems be experienced, identify measures HWC shall take to eliminate such problems.

41. A specific Dust Management Procedure shall be prepared as part of the EMP (Construction) referred to in Condition of Approval No. 23. The Procedure shall:
    - detail all dust control measures to be implemented during construction; and
    - include measures to reduce dust generation from stockpiles, cleared areas and other exposed surfaces.

42. 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.

Noise

Noise Management Procedures

43. As part of the EMPs referred to in Conditions 23 and 26, HWC shall prepare, in consultation with Cessnock City Council, Noise Management Procedures. The Procedure shall provide details of noise control measures to be undertaken during both the construction and operation stages.

44. The Procedures shall be prepared prior to construction, shall be made publicly available, and shall include, but not be limited to:
    - tests for ascertaining acoustic parameters;
    - anticipated airborne noise for all major noise generating activities and locations and durations of these activities;
    - impacts from site compounds/construction depots;
    - noise control equipment to be fitted to machinery;
    - temporary noise mitigation measures such as noise barriers;
    - shrouds around stationery plant to be installed prior to the commencement of noisy activities;
    - predicted noise levels at sensitive receivers (such as schools, churches, hospitals etc.);
    - noise monitoring and reporting procedures;
    - measures for dealing with exceedances; and
    - arrangements to inform residents of construction activities likely to affect their noise amenity ie. contact point for residents.

Construction Noise

45. Hunter Water Corporation shall meet EPA construction site noise criteria specified in the Environmental Noise Control Manual, 1994 (or its latest version).

Construction Hours

46. All construction activities including entry and departure of heavy vehicles shall be restricted to the hours 7.00 am to 6.00 pm (Monday to Friday); 8.00 am to 1.00 pm (Saturdays) and at no time on Sundays and public holidays. Works outside these hours which may occur include:
    - any works which do not cause noise emissions to be audible at any nearby residential property;
    - the delivery of materials which is required outside these hours requested by police or other authorities for safety reasons; and
    - emergency work to avoid the loss of lives and/or property and/or to prevent environmental harm.

Operational Noise

47. Hunter Water Corporation shall review the operational noise (with particular attention given to compressors, blowers associated with the aeration tanks, aeration tanks, sludge dewatering plant, return activated sludge pumps, odour control plant, sludge pumps, reuse pumps, and effluent pumps) and undertake an analysis of daytime and night time noise levels at the surrounding

residential areas during the normal operation of the Kurri Kurri WWTW. Should the review indicate a clear trend in noise levels which is inconsistent with the general predictions made in the EIS, HWC shall implement further noise mitigation measures.

Hazard Management

48. No later than two months prior to the commencement of commissioning of the WWTW, or within such further period as the Director-General may agree, HWC shall prepare and submit for the approval of the Director-General a Safety Management System report (SMS). Commissioning shall not commence until approval has been given by the Director-General.

49. The SMS shall cover all operations at the Kurri Kurri WWTW and associated transport activities involving hazardous materials. The SMS shall clearly specify all safety related procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to procedures. Records shall be kept on-site and shall be available for inspection by the Director-General upon request. The SMS shall be developed in accordance with the Department's Hazardous Industry Planning Advisory Paper (HIPAP) No. 9, "Safety Management".

50. The SMS shall also cover assessment and management of hazards associated with the storage and use of chemicals.

51. Twelve months after the commencement of operations of the WWTW or within such further period as the Director-General may agree, HWC shall carry out a comprehensive hazard audit of the Kurri Kurri WWTW, and within two month of the audit submit a report to the Director-General. The audit shall be carried out at HWC's expense by a duly qualified independent person or team approved by the Director-General prior to commencement of the audit. Further audits shall be carried out every three years or as determined by the Director-General and a report of each audit shall within two months of the audit be submitted to the Director-General. Hazard audits shall be carried out in accordance with the Department's HIPAP No. 5 *Hazard Audit Guidelines*.

    The audit shall include a review of the site safety management system and a review of all entries made in the incident register since the previous audit.

Limitations to Development in the Vicinity of the Proposed F3 Branxton Link Freeway Extension

52. Hunter Water Corporation shall ensure that no structures associated with the WWTW are constructed within 35 metres of the RTA's proposed F3 to Branxton freeway corridor. The corridor is described by the ISG coordinates provided by the RTA in its letter to HWC of 13 July, 2000.

Rehabilitation Management Plan for the Old Plant

53. As part of the EMP (Construction) referred to in Condition of Approval No. 23, HWC shall prepare a Rehabilitation Management Plan for the old treatment plant. The Plan shall address, but not be limited to:
    - procedures for treating any contaminated soils including disposal;
    - occupational health and safety procedures;
    - safeguards to prevent the migration of excavated material, leachate, or runoff;
    - demolition and earthwork requirements (Refer Condition of Approval 61); and
    - landscaping requirements (Refer Condition of Approval No. 58).

Soil and Water Management

54. As part of the EMPs (Construction) referred to in Condition of Approval No. 23, HWC shall prepare a comprehensive Soil and Water Management Procedure in accordance with the Department of Housing's guideline "Managing Urban Stormwater – Soils and Construction" (1998). The Procedure shall provide full details of all pollution control measures to be undertaken during the construction stage and satisfy all requirements for pollution control approval/licences. The plan shall be prepared in consultation with the EPA, DLWC, NSW Fisheries and Cessnock City Council.

55. The Soil and Water Management Procedure shall incorporate a detailed Erosion and Sedimentation Control Plan which shall be prepared in consultation with DLWC and shall satisfy all relevant pollution control approvals and licence conditions. A copy of the Erosion and Sedimentation Control Plan shall be forwarded to the DLWC and the EPA.

Traffic and Road Works

56. Traffic control plans shall be prepared in consultation with the RTA, Cessnock City Council and relevant stakeholders where traffic restrictions will be required.

57. A road dilapidation report shall be prepared for all roads nominated by Cessnock City Council likely to be used by construction traffic. The report shall be prepared in consultation with Cessnock City Council prior to commencement of construction activities. Hunter Water Corporation and Cessnock City Council shall review the report as soon as practicable after construction is complete. Any road/footpath/cycleway damage (aside from that resulting from normal wear and tear) attributable to the construction of the proposal, shall be repaired to a standard at least equivalent to that existing prior to any disturbance.

Landscape Plan

58. As part of the EMP (Operation) referred to in Condition of Approval No. 26, HWC 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 within and adjacent to the constructed WWTW lands incorporating the buffer between the new WWTW and the proposed RTA F3 Freeway corridor;
    - the use of *Eucalyptus parramattensis* subsp *decadens*, propagated from locally collected seed stock;
    - the use of other locally indigenous species for revegetation works as identified in Appendix 1 of Appendix G to the EIS[8];
    - specific management measures adopted to protect and preserve individual species of *Eucalyptus parramattensis* subsp *decadens* from outside influences in order to prevent ongoing simplification and degradation;
    - the use of tree species of known value to the Squirrel Glider ie. Swamp Mahogany, Grey Gum, Cabbage Gum, Forest Gum, Banksias, Acacias, and Ironbark; and
    - 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 parrot roost sites.

59. 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 HWC unless otherwise agreed by the relevant property owner.

Property

60. Land owned by nearby residents shall not be used for any construction purposes unless otherwise agreed to by the owner.

Heritage

61. Hunter Water Corporation shall, prior to demolishing any of the structures of the old plant:
    - prepare a report which assesses the heritage values of the Kurri Kurri Dortmund sedimentation tanks relative to the condition and values of Dortmund sedimentation tanks located elsewhere in NSW; and

[8] "Threatened Species Assessment for the Proposed Construction of a New Wastewater Treatment Plant at Kurri Kurri", Ecotone Ecological Consultants Pty Ltd, prepared for Sinclair Knight Merz Pty Ltd and Hunter Water Corporation, Appendix 1. Flora Species Recorded Within the Study Area, 23 September, 1999.

- undertake a full documentation and photographic record of the existing treatment plant for HWC's archives.

Waste Disposal and/or Recycling

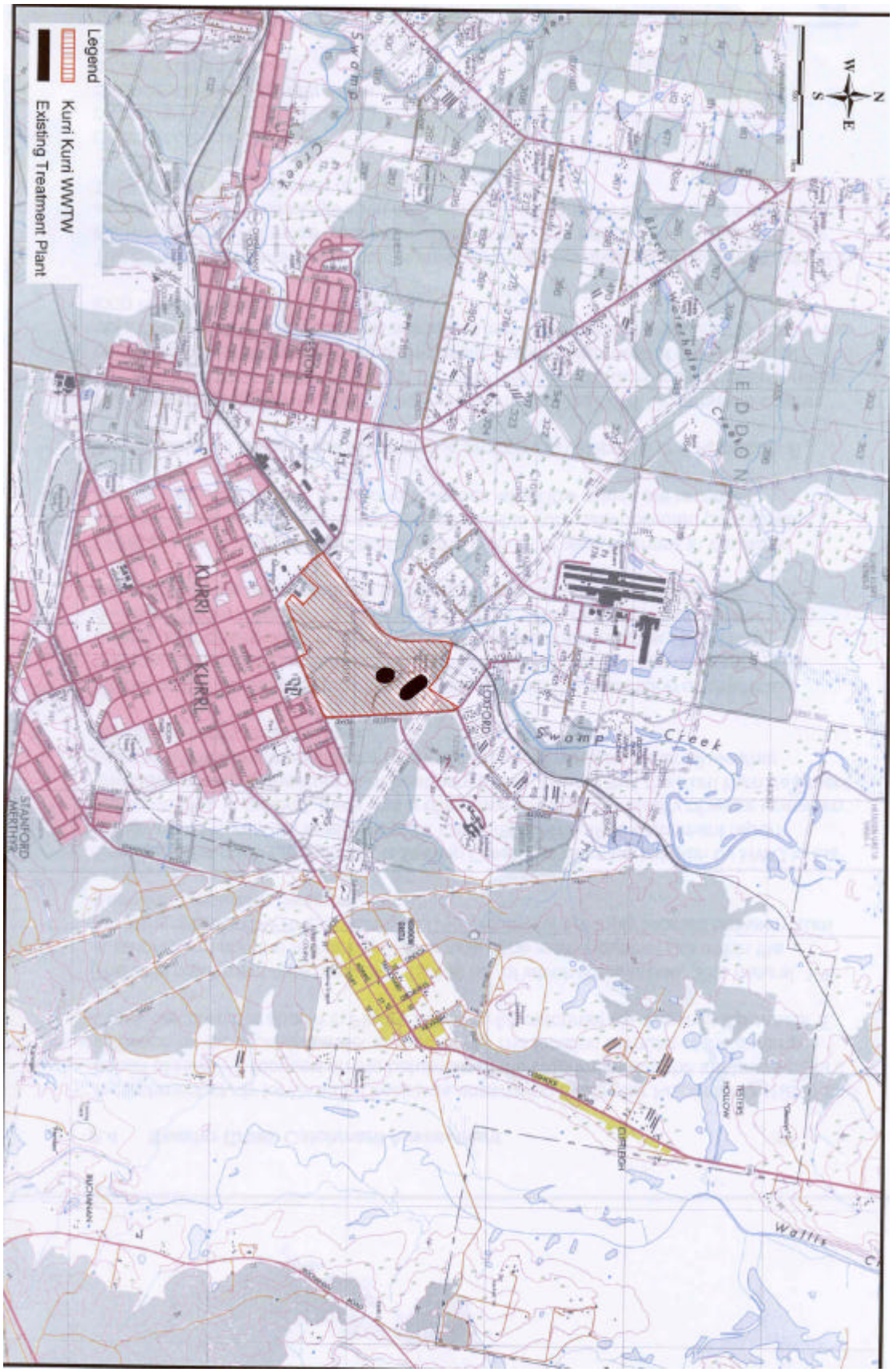
62. As part of the EMPs referred to in Conditions 23 and 26, HWC shall prepare detailed Waste Management Procedures to address the management of wastes during both the construction and operation stages. The Procedures shall be prepared prior to construction and operation, as appropriate, and shall identify requirements for waste avoidance, reduction, reuse and recycling. They shall also detail requirements for handling, stockpiling and disposal of wastes specifically spoil, concrete, contaminated soil or water, demolition material, cleared vegetation, oils, greases, lubricants, sanitary wastes, timber, glass, metal, etc. The procedures shall also identify any site for final disposal of any material and any remedial works required at the disposal site before accepting the material. Any waste material which is unable to be reused, reprocessed or recycled shall be disposed at a landfill licensed by the EPA to receive that type of waste.

Utilities and Services

63. Hunter Water Corporation shall, in consultation with the relevant service authority, identify all services potentially affected by construction activities to determine requirements for diversion, protection and/or support. Any alterations to utilities and services shall be carried out to the satisfaction of relevant authorities. The costs of any alterations shall be borne by HWC unless otherwise agreed to by the affected service/utility authority.

8 FIGURES

8.1 Figure 1 Location Map



8.2 Figure 2 Revised Layout