Department of
Urban Affairs and Planning

Sydney Water Corporation - Illawarra Waste Water Strategy Consolidation of Bellambi, Wollongong, and Port Kembla Sewage Treatment Plants

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

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FOREWORD

Sydney Water Corporation is proposing to consolidate the Bellambi, Port Kembla and Wollongong sewage treatment plants (STP) at the Wollongong STP. This is being done in accordance with the 1997 Illawarra Waste Water Strategy, a report which was publicly exhibited and gave rise to a Pollution Reduction Program agreement between Sydney Water Corporation and the Environment Protection Authority. This agreement was subsequently included in the Bellambi, Wollongong, and Port Kembla STPs licences.

The Illawarra Waste Water Strategy has the following objectives:

- address water quality issues at Wollongong beaches;
- protect aquatic ecosystems;
- reduce the impacts of unsewered areas and sewage overflows to Lake Illawarra, rivers, lagoons and streams in the region;
- facilitate effluent reuse;
- improve the performance of the existing systems; and
- service growth and new development in the region.

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 Sydney 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 the recreational beaches adjacent to the sewage outfalls associated with these sewage treatment plants, and reduce overflows from the current sewerage systems in the three catchments concerned.

Detailed water quality and biological monitoring, and flow verification monitoring will be required in order to validate forecasted net environmental benefits. Sydney Water Corporation has also identified that up to 20 megalitres per day of very high quality reclaimed water may be recycled to supply surrounding industries, with a potential for further supply in the future.

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&A Act	*Environmental Planning and Assessment Act 1979*
EPA	NSW Environment Protection Authority
HDD	horizontal directional drill
HIPAP	Hazardous Industry Planning Advisory Paper
km	kilometre
ML/d	megalitres per day
Minister, The	Minister for Urban Affairs and Planning
NPWS	National Parks and Wildlife Service
OAP	Overflow Abatement Program
PRP	Pollution Reduction Program
RTA	Roads and Traffic Authority
SOC Act	*State Owned Corporations Act, 1989*
SMS	Safety Management System
SOLP	Sewerage Overflows Licensing Project
SPS	sewage pumping station
SSTP	storm sewage treatment plant
STP	sewage treatment plant
SWC	Sydney Water Corporation
UV	ultra violet

EXECUTIVE SUMMARY

Background to the Proposal

The Environment Protection Authority (EPA) issues licences for the operation of Sydney Water Corporation's (SWC's) Sewage Treatment Plants (STPs). The licences set the requirements for effluent quality. The EPA may also include Pollution Reduction Programs (PRP) as licence conditions. These set constraints and targets for future treatment and discharge requirements. The EPA incorporated a PRP for the Bellambi and Port Kembla STPs in its 1996/97 licence requiring SWC to undertake a study to examine options which may be available to improve overall sewage treatment in the Illawarra Region, and to prepare an environmental impact statement (EIS).

In mid-1997 SWC submitted the Illawarra Waste Water Strategy to the EPA. This study was developed to address long-term waste water management in the Illawarra Region.

Shortly after the completion of the Illawarra Waste Water Strategy, SWC completed the Sewerage Overflows Licensing Project (SOLP), a major investigation of the 28 sewerage systems in its area of operation. The SOLP's principal aim is to minimise the impacts of sewer overflows on the environment, public health, and amenity. This study resulted in the preparation and exhibition of an EIS for each of the 28 sewerage systems including the five in the Illawarra region. These EISs were the basis for SWC's application to the EPA for licences for overflows.

The EIS for the consolidation of Bellambi, Wollongong, and Port Kembla STPs arose out of the options identified in the Illawarra Waste Water Strategy. Many of the objectives of this proposal are shared with the SOLP or are in accordance with strategies and criteria defined by the SOLP.

The Proposal

Sydney Water Corporation proposes to consolidate sewage treatment for the Bellambi, Port Kembla, and Wollongong sewerage catchments at Wollongong STP (refer Figure 1). Untreated sewage from Port Kembla and Bellambi will be pumped to Wollongong STP via a new transfer pipeline. Wollongong STP will be upgraded and its capacity increased to treat up to 177 megalitres per day (equivalent to three times average dry weather flow from the three catchments) of tertiary treated and UV radiation disinfected effluent. Flows in excess of this will bypass the tertiary facilities and receive disinfection prior to blending with the tertiary effluent. All treated effluent will be discharged to the sea through a new, longer (1 km vs 220 metres) ocean outfall.

Bellambi and Port Kembla STPs will be retained and converted to wet weather treatment plants by modifying the existing sludge digestion tanks to store the waste water when the flow capacity of the transfer pipelines is exceeded during wet weather. Storm flows which exceed the storage facilities at Bellambi and Port Kembla, estimated to occur 6 times per year, will be screened, degritted, settled, disinfected (by chlorination and dechlorination), and discharged to the ocean via the existing cliff face outlets at Bellambi and Port Kembla.

No sludge processing will take place at the converted STPs. All sludge processing will take place at the augmented Wollongong STP.

A reuse facility (the water reclamation plant) has also been proposed to be incorporated at the Wollongong STP to meet the current demand, estimated at 20 megalitres per day, of recycled water for industrial uses. Additional volumes may be sought by the industries at Port Kembla and could result in more recycling. Sydney Water Corporation has emphasised that reuse is dependent on the financial viability of treating and delivering the recycled water, and that this is dependant on negotiating acceptable commercial arrangements.

The proposal will require the construction of the following components:

- sewage pumping stations, pipeline and vent shafts from Bellambi and Port Kembla to Wollongong STP;
- wet weather storage/treatment facilities at Bellambi and Port Kembla STPs and modification of existing facilities;
- amplified and upgraded facilities at Wollongong STP;
- a new ocean outfall for Wollongong STP; and
- a water reclamation plant at Wollongong STP.

The estimated capital cost of the proposal is $128 million. Construction works are expected to take approximately 18 to 24 months and will employ an estimated 75-100 people during the construction period.

Need, Justification and Benefits

The proposal, as outlined above, will address the following:

- the need to increase the capacity to treat projected future dry weather flows for the Wollongong catchment;
- the need to increase the capacity of the ocean discharge arrangements to handle extreme wet weather events at the Wollongong STP and eliminate the use of the soakage pits at the shoreline;
- the current chronic and acute risks to aquatic life identified in the environmental risk assessment studies for the existing discharges from the Bellambi and Port Kembla STPs;
- the preferred containment standard of 40 events per 10 years as was identified in the SOLP;
- resource conservation in accordance with the PRP for the Illawarra Waste Water Strategy by maximising the reuse of effluent.

Overall, the proposed effluent management improvements will achieve a reduction in the human health and ecosystem risks associated with discharges, improve bathing water quality, and improve the sewage treatment process.

EIS Exhibition

The EIS was exhibited from 20 May, 1999 to 15 July, 1999 inclusive. A total of 21 representations were received as a result of the exhibition, nine 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: a too short term planning horizon; the use of an ocean outfall contrary to State Government policy; lack of integration with the Sewerage Overflow Licensing Program; need to encroach on land currently used as a golf course; and various other aspects relating to water quality in the receiving environment through to route selection for the transfer pipeline.

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

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 SWC will need to:

- examine all interactions arising out of the current proposal and any works proposed as outcomes to the SOLP, when these are known, in order to identify the need to undertake additional environmental assessment and satisfy statutory approval processes should a modification be sought in accordance with Section 115BA of the *Environmental Planning and Assessment Act*;

- investigate opportunities to optimise the use of the sewage storage facilities by regulating flows in the transfer pipeline in order to maximise the volume of sewage able to be fully treated at Wollongong STP and minimise overflows;
- verify whether the actual environmental impacts of the proposal reflect the predictions made in the EIS; and
- finalise reuse commercial agreements/arrangements, and actively pursue new markets in order to maximise the uptake of recycled effluent.

It is anticipated that the preferred option put forward in the Illawarra Waste Water Strategy will be beneficial to the Illawarra community and result in improved water quality at the local beaches and reduced impact of operations at the STPs.

Request for Approval

Sydney Water Corporation sought the approval of the Minister for the project on 1 June, 2000.

Subsequent to the request, SWC sought to clarify certain aspects of its proposal which it considered could commit the successful contractor to a very specific system design as described in the EIS. The clarification was prepared by SWC as a supplement to the Representations Report and forwarded to the Department in September, 2000.

Extensive negotiations were required to be held between SWC, the EPA, and the Department in order to resolve this and a number of other issues. Consequently, SWC also extended the time the Minister had to determine this matter.

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 Sydney Water Corporation's (SWC) environmental impact statement (EIS) for the proposed consolidation of the Bellambi, Wollongong, and Port Kembla Sewage Treatment Plants (STPs), the issues raised in representations made in response to the exhibition of the EIS, and SWC'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

Sydney Water Corporation was a company State owned corporation under the *State Owned Corporations Act 1989 (SOC Act)* until 31 December, 1998. 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, SWC was required to obtain the approval of the Minister under Division 4 of Part 5 of the *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 SWC 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 (*Sydney Water [Transitional] Regulation 1999*) was gazetted in August, 1999 under the *Sydney Water Act 1994*. The object of this transitional regulation was to ensure that Section 37A of the *SOC Act* continues to apply to certain SWC developments, being those where a proposal to carry out the development existed before the business undertaking of Sydney Water Corporation Ltd. (as a Company State Owned Corporation) was transferred to Sydney Water Corporation (as a Statutory State Owned Corporation).

The proposed Illawarra Waste Water Strategy is explicitly listed in the transitional regulation as a development that remains subject to Section 37A of the *SOC Act* because it was Certified under the *SOC Act* by the then Minister in March, 1998, prior to the statutory process changes which disestablished SWC as a Company State Owned Corporation. At that time, 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 6 November, 1997, SWC 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 12 January, 1998.

The EIS was exhibited from 20 May, 1999 to 15 July, 1999 inclusive.

Copies of all representations made to SWC were forwarded to the Department of Urban Affairs and Planning. On 1 June, 2000 SWC 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

Sydney Water Corporation sought the approval of the Minister for the project on 1 June, 2000.

Subsequent to the request, SWC sought to clarify certain aspects of its proposal which it considered could commit the successful contractor to a very specific system design as described in the EIS. Sydney Water Corporation recognised that there may arise, at the detailed design stage, alternative technical solutions which may be favoured by the competitive bid process because they achieve a more cost effective outcome of the proposal than the specific technical solution described in the EIS. The clarification was prepared by SWC as a supplement to the Representations Report and entitled "Illawarra Waste Water Strategy Representations Report – EIS Proposal – Proposed changes subsequent to exhibition of EIS", September, 2000.

Extensive negotiations were required to be held between SWC, the EPA, and the Department in order to resolve this and a number of other issues. Consequently, SWC also extended the time the Minister had to determine this matter.

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 SWC is seeking the Minister's approval. Details of supplementary information and advice provided by SWC are included.

2.1 Background to the Proposal

Bellambi and Port Kembla STPs provide advanced primary treatment and discharge disinfected effluent from outfalls at the sea's edge. Wollongong STP provides secondary treatment and disinfection, discharging effluent via a 220 metre long ocean outfall. The diluted effluent from these STPs can travel along the shore under the influence of wind and wave-induced currents and often reach adjacent bathing waters.

Bathing waters in the Illawarra Region have complied with recreational health guidelines (for faecal coliforms) between 92 per cent and 100 per cent of the time. Bathing water problems are however, apparent at the beaches near the discharges from Bellambi and Port Kembla STPs. Monitoring of these beaches by SWC and the Environment Protection Authority (EPA) consistently demonstrated significant bathing water problems.

The current proposal builds upon the 1997 Illawarra Waste Water Strategy prepared by SWC in accordance with WaterPlan 21[1]. The Illawarra Waste Water Strategy identified and evaluated a series of options for upgrading the five sewerage systems in the region (ie. Bellambi, Wollongong, Port Kembla, Shellharbour, and Bombo), which included treatment and optimising effluent reuse and effluent discharge arrangements, to achieve the strategy's objectives. The options considered the need to serve new development areas and unsewered villages and townships within the Illawarra Region.

In response to the beach water quality problems, the EPA incorporated a Pollution Reduction Program (PRP) in the 1996/97 licences for the Bellambi and Port Kembla STPs. The PRP stipulated that by June, 1998, SWC must undertake an options study and Environmental Impact Statement (EIS) to examine the "upgrade of liquid waste collection, treatment, reuse, and disposal processes for Bellambi and Port Kembla STPs within the overall context of sewage treatment facilities within the Illawarra Region".

The PRP facilitated the completion of the Illawarra Waste Water Strategy with respect to the Bellambi, Wollongong, and Port Kembla STPs and culminated in the current proposal and EIS.

The current proposal to consolidate the three STPs, according to SWC, is complementary with proposed future improvements to the Illawarra Region's sewerage systems arising out of SWC's Sewerage Overflows Licensing Project (SOLP)[2]. The SOLP was a major investigation that was done for the 28 sewerage systems in SWC's entire area of operations as part of an extensive project to license sewer overflows from those systems.

[1] WaterPlan 21 is part of the Waterways Package released by the NSW Government in May, 1997. WaterPlan 21 established targets and initiatives to clean up the State's harbours, bays, rivers, and beaches between 1997 and the year 2020 by addressing urban waste water and stormwater problems.

[2] The SOLP's principal aim is to minimise the impacts of sewer overflows on the environment, public health, and amenity. EISs were prepared for each of the 28 sewerage systems. The EISs identified potential adverse impacts of overflows on the environment and public health associated with each of the regions sewerage systems, and arranged these into priority actions required to reduce or prevent the impacts. By determining potential impacts and a list of actions that may minimise adverse effects, a licence with an improvement program attached, can be issued by the EPA.

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

The water quality in the receiving environments at Bellambi and Port Kembla has, in the interim, been improved with the introduction of chlorination of the effluent. This resulted in a marked improvement in bathing water quality, with respect to faecal coliform levels, at the beaches near these STP discharges.

However, existing discharges from the Bellambi and Port Kembla STPs may result in chronic and acute risks to aquatic life for a distance of up to 150 metres from the effluent outlet due to the presence of certain chemicals. Therefore further effluent management improvements which achieve a reduction in the human health and ecosystem risks associated with discharges, improve bathing water quality, and improve the sewage treatment process, would be desirable.

Bellambi and Port Kembla STPs have adequate treatment capacity to cater for projected increases in dry weather flows from these catchments. However, the projected dry weather flows for the Wollongong catchment represents a significant increase. Treatment of these flows would require amplification of the Wollongong STP facilities.

Similarly, in extreme wet weather events at Wollongong STP, only part of the effluent can be discharged through the 220 metre outfall into the ocean (the outfall has an estimated gravity capacity of less than 100 ML/d). The remainder permeates into soakage pits at the shoreline. These pits are blocked and, as a consequence, overflow at the shoreline. An alternative method of managing wet weather flow discharge is therefore required.

Additional treatment or storage of the sewage at all the STPs would be required to achieve the preferred containment standard (ie 40 events per 10 years) proposed by the SOLP.

The PRP for the Illawarra Waste Water Strategy also requires SWC to maximise reuse in order to achieve continued resource conservation.

2.3 Objectives

Sydney Water Corporation has identified that the key objectives of the proposed upgrade of the Bellambi, Wollongong, and Port Kembla waste water management systems are to:

- improve current bathing water quality;
- protect ecosystems; and
- maximise effluent reuse.

These objectives are to be achieved while minimising environmental, social, and financial impacts.

2.4 Alternatives Considered

The EIS examined a number of strategies and options that are available for waste water management in the Illawarra Region. The options were evaluated in relation to:

- water quality;
- potential reuse of effluent;
- land and resource use and community impacts;
- cost; and
- community preferences.

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

These options included:

Non-structural

- Demand Management – a program with water efficient devices being retrofitted to residences to reduce water use in order to lower volumes of effluent being treated at the STPs;
- Management Improvement – including better sewer maintenance and preventing stormwater infiltrating through faulty joints or cracked pipes;
- Reuse – including on-site disposal, potable and non-potable reuse, and industrial reuse.

It was concluded that most of these measures are currently being undertaken and are likely to lead to a decrease in waste water flows but there will still be waste water that requires management using other methods.

Retain and Upgrade

Various options for increasing the level of treatment at all three STPs, and constructing longer outfalls at Bellambi and Port Kembla STPs were considered.

It was concluded that the community preferences for higher levels of treatment would impose relatively high costs to individually upgrade and operate the three STPs.

Consolidation Options

Various options to transfer up to all flows from Bellambi and Port Kembla STPs to Wollongong for treatment to either secondary or tertiary standard. The increased volume proposed to be treated at Wollongong also necessitated an examination of discharging farther out to sea in order to provide higher dilutions than the existing short outfall.

The consolidation options all required the construction of two transfer pipeline systems to intercept waste water flows form Bellambi and Port Kembla sewerage catchments and convey them to Wollongong STP. Alternative construction techniques to lay the pipelines (ie. either open trenching and/or horizontal direction drill), and various routes were examined.

Two routes were examined for the Bellambi to Wollongong STP transfer pipeline: one follows a cycleway through public reserve and a directional drill to avoid the road system around North Wollongong; and an alternative which would involve trenching along the residential streets inland of the cycleway. This is discussed in more detail in Section 5.1 below.

Two routes were examined for the Port Kembla to Wollongong STP transfer pipeline: an indirect inland route mainly along existing industrial roads, and a more direct route along the eastern side of the industrial area incorporating a directional drill under Port Kembla Harbour. This is discussed in more detail in Section 5.1 below.

2.5 The Proposal as Described in the EIS

Sydney Water Corporation proposes to consolidate sewage treatment for the Bellambi, Port Kembla, and Wollongong sewerage catchments at Wollongong STP.

In dry weather, all sewage from the Bellambi and Port Kembla catchments will be pumped to Wollongong STP via new transfer pipelines. Dry weather discharges of treated sewage will, therefore, cease at Bellambi and Port Kembla STPs. The pipelines from both the STPs will mostly be buried and located on public lands ie cycleway, park lands, streets (see Figures 2, 3, 4, and 5).

The Bellambi and Port Kembla STPs are proposed to be converted to wet weather treatment plants (ie storm Sewage Treatment Plants) by modifying the existing sludge digestion tanks to store the waste water, prior to transfer to Wollongong STP when the flow capacity of the transfer pipelines (three times the average dry weather flow) is exceeded, during wet weather. Storm flows which exceed the storage

facilities at Bellambi and Port Kembla, estimated to occur 6 times per year, will be screened, degritted, settled, disinfected (by chlorination and dechlorination) and discharged to the ocean via the existing shoreline outlets at Bellambi and Port Kembla.

No sludge processing will take place at the converted STPs. The augmented Wollongong STP will have two sludge processing streams: one to treat the primary sludge from Bellambi and Wollongong catchments plus all the secondary sludge; the other to treat the primary sludge from the Port Kembla catchment. This is because the solids form the Port Kembla catchment are currently contaminated with heavy metals and unsuitable for beneficial reuse. However, the Port Kembla sludge still requires processing to reduce the putrescibility and volumes to be handled so that it is suitable for disposal at a landfill.

Wollongong STP will be upgraded and amplified to handle the increased volume of raw sewage delivered by the transfer pipelines from Bellambi and Port Kembla STPs and to cater for new development in the catchments. Wollongong STP is being designed to cater for projected flows to the year 2021.

During dry weather, all flows will be provided with primary sedimentation, secondary treatment, tertiary treatment (filtration) and disinfection (UV radiation).

During wet weather, flows to secondary and tertiary treatment will be limited to 177 ML/d (megalitres per day) (ie equivalent to three times dry weather flow for the combined catchments of Bellambi, Port Kembla, and Wollongong). Flows above 177 ML/d will bypass the secondary and tertiary facilities and receive UV radiation disinfection before blending with the tertiary effluent and subsequent discharge through a new, longer (1 km vs 220 metres) ocean outfall.

An effluent reuse facility (the water reclamation plant) has also been proposed to be incorporated at the Wollongong STP. The proposed plant will be sized to meet the estimated demand, identified as 20 ML/d of recycled water, for industrial uses. It is anticipated that up to double this volume may be sought by the industries at Port Kembla and could result in the recycling of all average dry weather flows proposed to be treated at Wollongong STP. Sydney Water Corporation has emphasised that reuse is dependent on the financial viability of treating and delivering the recycled water, and that this is dependent on negotiating appropriate commercial arrangements.

The EIS assessed the impacts of the pollutant loads discharged into the marine environment from the Wollongong STP assuming no reuse.

The proposal will require the construction of the following components:

- sewage pumping stations, pipeline and vent shafts from Bellambi and Port Kembla to Wollongong STP;
- wet weather storage/treatment facilities at Bellambi and Port Kembla STPs and modification of existing facilities;
- amplified and upgraded facilities at Wollongong STP;
- a new ocean outfall for Wollongong STP; and
- a water reclamation plant at Wollongong STP.

2.6 Project Cost

The estimated capital cost of the proposal is $128 million. Construction works are expected to take approximately 18 to 24 months and will employ an estimated 75-100 people during the construction period.

2.7 Changes Made to the Proposal Subsequent to the Exhibition of the EIS

No changes have been made to the proposal subsequent to the exhibition of the EIS. However, at the final community consultation stage conducted for this proposal, and prior to the exhibition of the EIS, SWC favoured an option which used Osborne Park as the entry location for the two horizontal direction drills (HDD) for the Bellambi to Wollongong transfer pipeline.

As a result of community objections, an additional assessment of the proposal was undertaken. It is now proposed that, instead of staging the drilling at Osborne Park, this site will be the exit area and pipe pull-back site for both HDDs. This reduces the land uptake, machinery required, associated noise and dust generated, and the time required for operations in the park (Refer Figures 2 & 3). (Note: This last minute change was incorporated into the exhibited EIS.)

3 SUMMARY OF REPRESENTATIONS

3.1 Categories of Representations Received

A total of 21 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	8
Local Government	1
Government Departments	2
Community/Neighbourhood Groups	4
Environmental Groups	3
Local Business/Industry	3
Total	**21**

3.2 Overview of Issues Raised in Representations

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

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

Nine of the representations expressed general support for the proposal. The remainder, while not objecting to the carrying out of the proposal, raised some concerns. The following points illustrate the main concerns raised in the representations:

- **Issues with respect to ecologically sustainable development** – a too short planning horizon; the continued use of ocean outfalls; no accounting for the broader effects on the marine environment.
- **Links with the Sewerage Overflow Licensing Program** – no integration of the strategies to transfer dry weather flows to Wollongong from Bellambi and the need to manage overflows in the catchment; the need for storm treatment plants; identification of the combined impacts of storm flows from system overflows and from partly treated effluent discharges; clarification of the costs and benefits in reducing the frequency of the need to operate the storm STPs because of the reduced volumes needed to be pumped to Wollongong STP as a result of SOLP strategies to reduce infiltration and inflow; clarification of what the increased wet weather flows mean in terms of reduced volume and frequencies of overflows; and possibility to link particular nodes identified in the SOLP to the transfer pipeline.
- **Treatment Plant Process Matters** – clarification of hydraulic capacity of sedimentation tanks and wet weather bypasses; efficiency of filters; efficiency of UV radiation to kill viruses; health implications of reuse;
- **Wollongong Golf Course** – take-up of land will result in loss to playing area with possible loss in status as championship course.
- **Ecological Impact of Ocean Discharge** – need for baseline ecological studies, and clarification of the potential affect on the weedy sea dragon.
- **Pipeline Transfer Routes** – unnecessarily long period for construction; lack of consultation; will local residents have an involvement in the development of the EMP; how long will the HDD process take in Osborne Park; an alternative route for the Port Kembla to Wollongong STP transfer pipeline is preferred by residents; construction impacts on cycleway; managing acid sulphate soils.

The Department has undertaken an independent assessment of the representations and is satisfied that SWC 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 and other additional information obtained by the Department.
Sydney 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. It should be noted that private individuals who made representations to the EIS have not been identified in order to maintain their privacy.

4.1 Integration of the Illawarra Waste Water Strategy and the Sewerage Overflow Licensing Project (SOLP)

4.1.1 The Issue

The EPA, in its representation, sought clarification of how the Illawarra Waste Water Strategy integrates with the SOLP. The EPA wanted assurances that the claimed overall water quality improvements would be realised. It is also concerned that inefficient use of resources may lead to lost opportunities, particularly where infrastructure may need to be duplicated (ie a separate response to the sewer overflow problem).

4.1.2 Discussion

The two planning investigations currently being undertaken by SWC (ie the SOLP and the Illawarra Waste Water Strategy) have different focuses. The SOLP is mainly concerned with the reticulation system and wet weather flows. The current proposal to consolidate the three STPs, deals with treatment and disposal options. They are, however, inextricably linked because changes to one or the other will influence the flow regimes, water quality, costs, etc.

Sydney Water Corporation has provided an explanation in both the EIS and Representations Report which acknowledges the importance of integrating the planning for the two proposals. According to SWC, the integration occurs by providing:

- new system capacity of 69 ML/d and 51 ML/d to manage sewage flows at the downstream end of the Bellambi and Port Kembla sewerage systems respectively, in both dry and wet weather. Modelling indicates that this capacity will help to alleviate the severity of the current overflows;
- upgraded treatment of dry and wet weather flows;
- storage and pump back facilities at the proposed storm treatment plants;
- storm STPs that are consistent with the proposed wet weather overflow containment standard of 40 events per 10 years; and
- the potential for operational flexibility under varying (ie dry and wet weather) flow regimes by linking the three catchments.

Sydney Water Corporation acknowledges the EPA's concerns and suggests that the operational standards for wet weather flow containment cannot be resolved until the SOLP EISs are determined. It further reasons that without knowing these standards, it cannot "select, incorporate and integrate the most cost effective solution to reduce the frequency of overflows at the detailed design level[3]".

[3] Illawarra Waste Water Strategy – Representations Report, p 4-7, May, 2000.

Sydney Water Corporation has indicated that one of the outcomes arising out of the investigations to reduce wet weather overflows could be to carry out additional works as part of the detailed design of the Illawarra Waste Water Scheme. It has further indicated that such works could include construction of interceptor storm pumping stations; pumping overflows to the Bellambi storm treatment plant; and redirecting flows from certain pumping stations directly to Wollongong STP using the transfer rising main.

To this end, SWC has undertaken further detailed modelling investigations of the reticulation system to determine the most cost-effective way to contain wet weather overflows. Preliminary results of these investigations indicate that on-line storage arrangements may provide an effective solution to overflows in the reticulation system.

What is clear is that the current proposal is set to be determined prior to the SOLP investigations being completed[4] and, therefore, the two proposals will have different development timeframes.

4.1.3 Conclusion

The final outcomes from the SOLP EISs are outstanding. Therefore it is not possible to identify options at this stage which would provide simultaneous benefits for both programs as part of the present determination. It is the Department's view that it would also be unreasonable to delay the treatment plant upgrades since these works will provide significantly improved water quality along Illawarra's beaches.

It is likely any outcomes recommended from the SOLP would need to examine how these measures potentially affect the treatment plant processes (ie. frequency/volume of untreated discharges; reuse capabilities; water quality of treated discharges; and capacity/flow regime). This in turn would indicate whether there is a need for SWC to seek the Minister's approval to modify any approval that may be given for the Illawarra Waste Water Strategy.

It is suggested that SWC advise the Director-General, in writing, prior to commencement of any construction arising out of the Overflow Abatement Program (OAP), of:

- any measures proposed to be implemented as an outcome of the SOLP EISs for Bellambi; Port Kembla, and Wollongong;
- any linkage(s) between measures proposed in the OAP and the current proposal including:
  - frequency/volume of untreated discharges,
  - reuse capabilities, water quality of treated discharges; and
  - capacity/flow regime; and
- the approval processes it proposes to follow for any works arising out of the OAP.

This suggestion has been recommended as Condition of Approval No. 37.

4.2 Investigate Opportunities To Optimise The Use Of The Sewage Storage Facilities By Regulating Flows In The Transfer Pipeline In Order To Maximise The Volume Of Sewage Able To Be Fully Treated At Wollongong STP

4.2.1 The Issue

There may be additional scope to reduce the forecasted frequency of sewage which by-passes the full treatment at Wollongong if an effective model of catchment flow characteristics could be developed which balances existing storage capacity and regulates flows by appropriate process controls.

[4] In SWC terms this means prior to the Overflow Abatement Program [OAP] being finalised, the OAP being the implementation phase of the SOLP strategy.

4.2.2 Background

Raw sewage of up to 3 times average dry weather flow, for the three sewage catchments ie Bellambi, Wollongong, and Port Kembla will be fully treated at Wollongong STP. This will involve transferring the sewage from Bellambi and Port Kembla catchments to Wollongong STP.

When flows are in excess of 3 times average dry weather flow then Bellambi and Port Kembla STPs will be initially operated in storage mode. In storage mode the sewage will be screened, degritted, and then stored in the converted sedimentation and digester tanks. If the storage tanks approach being full, the plants will be changed to treatment mode.

In treatment mode, the sedimentation tanks at both STPs will be operated as settling facilities, and chemicals will be added to assist sedimentation and disinfect the sewage. The treated effluent will then be discharged through the existing cliff-face outlets.

Once the flows into the transfer pumping stations have dropped below the peak transfer rates, the wet weather STPs will begin to transfer the stored sewage back into the transfer systems and convey this to Wollongong STP for treatment and disposal.

Wollongong STP will receive sewage flows continuously from three sewage pumping stations (SPSs) within the Wollongong catchment and the two transfer SPSs (ie. Bellambi and Port Kembla). All incoming flows will be gauged to provide a measure of the incoming volume, screened and degritted.

During dry weather, all flows will be provided with primary sedimentation, secondary treatment, tertiary treatment (filtration) and disinfection (UV radiation). During wet weather, flows to primary sedimentation will be limited to 254 ML/d and to secondary and tertiary treatment to 177 ML/d ie 3 times average dry weather flow. All flows, including those above 177 ML/d, will still receive disinfection before blending with the tertiary effluent and subsequent discharge.

4.2.3 Discussion

The converted sedimentation and digester tanks at Bellambi and Port Kembla STPs act as reservoirs to effectively buffer the design capacity of the treatment facility at Wollongong. The EIS appears to have assumed uniform flow characteristics for all three catchments for all times including wet weather events.

There may be opportunities to optimise the sewage transfer network to treat greater than 3 times average dry weather flow that may be produced in any one catchment by a more integrated operational approach to the transfer system ie. when flows in other catchments are low. This may require developing detailed models of catchment and flow relationships and individual responses to wet weather events ie process controls to regulate the flows by using the storage capacities at the three STPs (and possibly in the transfer pipeline?).

4.2.4 Conclusion

Recommended Condition of Approval No. 38 requires SWC to identify and report on any opportunities that may be available to integrate the operation of the storage/wet weather treatment plants and the transfer network in order to maximise the full treatment of all flows at Wollongong STP.

4.3 Pursue Effluent Reuse Opportunities

4.3.1 The Issue

Sydney Water Corporation should continue to pursue opportunities to reuse effluent from the Wollongong STP.

4.3.2 Background

The *Sydney Water Act* requires Sydney Water Corporation to adopt as an ultimate aim, the prevention of all dry weather sewage discharges to waters, including ocean outfalls, except where it is necessary to safeguard public health or prevent environmental degradation, or both.

The EIS assessed the impacts of the pollutant loads discharged into the marine environment from the Wollongong STP assuming no reuse. The results indicated that there would be no significant impact on the marine ecosystems. The EIS also identified that there would be a decrease in the pollutant loads if reuse was implemented because of the reduced volume of treated effluent that would be discharged to the ocean.

The potential for reusing effluent from the Wollongong STP was identified in a 1997 Technical Memorandum[5] (subsequently incorporated by SWC in the EIS). The 1997 memorandum identified that the industrial customers in SWC's area of operations (ie. throughout Sydney) used approximately 85 ML/d of potable water. Approximately 95% of this was consumed in the Port Kembla industrial area. It was reasoned by SWC in its EIS that the Wollongong STP could potentially recycle all the predicted dry weather effluent proposed to be treated at the STP ie 59 ML/d in 2021. This is of course dependent on the financial feasibility of treating and reticulating an effluent of suitable quality, and, ultimately, the willingness of the market to use recycled effluent.

The memorandum also identified the rapid changes in the technologies for water recycling processes which could influence the pricing of recycled effluent.

4.3.3 Discussion

Recycled effluent has quality requirements over and above what is necessary for ocean discharge, and depends on the end use. Generally, industrial reuse requires an effluent containing low levels of ammonia and chloride.

The EIS has suggested that, at this stage, part of the industrial demand at Port Kembla could be met by the construction of a water reclamation plant designed to produce up to 20 ML/d of very high quality reclaimed water if this was found to be financially viable.

The current proposal aims to meet industrial effluent quality levels by retaining the existing conventional activated sludge process, amplifying this to cater for 33 ML/d, and providing a new nitrification/denitrification facility for the required feed water to the water reclamation plant[6]. The feed-water to the water reclamation plant would be microfiltered and subject to a reverse osmosis process to reduce the chloride concentrations to acceptable levels for industrial purposes.

4.3.4 Conclusion

The 1997 Technical Memorandum on reuse identified the unique opportunity posed by the consolidation of the flows from the Bellambi, Port Kembla, and Wollongong STPs, combined with the proximity of the large industrial area of Port Kembla, to maximise the reuse of treated effluent. This potential needs to be set against a background where there are rapid changes in both the reuse technology and markets that could be serviced. It would therefore appear to be important to keep abreast of reuse technologies, and any new and emerging marketing opportunities that may arise.

Recommended Condition of Approval No. 49 requires SWC to prepare a report for the Director-General and the EPA on recycling/reuse for the treated effluent at Wollongong STP within the first year of any

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[5] Paterson Britton and Partners and Consulting Environmental Engineers, 1997. *Technical Memorandum No. 10 Illawarra Wastewater Strategy Effluent Reuse from Wollongong STP, July 1997*, report prepared for Sydney Water.

[6] If 100% of the average dry weather flow was to be recycled then it would be necessary to construct additional facilities to nitrify/denitrify the whole flow, and increase the capacity of the water reclamation plant.

approval being given for this proposal, and thereafter as requested by the Director-General. The report should update and expand on the information provided in the Technical Memorandum on reuse and should:

- identify how any proposal to recycle effluent at Wollongong STP relates to SWC's corporate recycling strategy and world's best practice;
- examine the status of investigations into effluent reuse at Port Kembla with particular attention given to the current and any likely future industrial markets, including water quality requirements;
- if appropriate, identify other opportunities for implementing reuse ie. more reuse than is suggested by the current proposal, and discuss the feasibility of achieving 100% reuse for average dry weather flows; and
- identify any issues associated with the provision of additional infrastructure that may be required to accommodate more reuse than is currently proposed ie. will the STP need to be expanded beyond its proposed new boundaries in order to accommodate facilities associated with additional recycling; what issues may be associated with the construction of a reuse reticulation network.

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 Transfer Pipeline Route

5.1.1 The Issues

The representations requested additional investigations to further assess:

- the proposed trenching of the transfer pipeline along Military Road for the Port Kembla to Wollongong STP transfer pipeline with a view to minimising construction impacts on the local community and disturbances to underground infrastructure; and
- the potential impact of construction works on the cyclists and cycleways.

5.1.2 Background

Port Kembla to Wollongong STP Transfer Pipeline
Two routes were examined for the Port Kembla to Wollongong STP: an alternative indirect inland route mainly along existing industrial roads, such as Springhill Road, and the preferred, more direct route along the eastern side of the industrial area incorporating a directional drill under Port Kembla Harbour. Representations made on the EIS suggested three other options: Gloucester Boulevard and Darcy Road, and Gloucester Boulevard and Foreshore Road; and a variation to the preferred Military Road route.

Cycleways
The preferred route for the Bellambi to Wollongong STP transfer pipeline follows a cycleway and uses public reserves and parks and alignments in previously disturbed ground where possible. Cycleway users sought assurances from SWC that cycleways would be fully restored.

5.1.3 Discussion/Conclusion

Port Kembla to Wollongong STP Transfer Pipeline
The preferred route is for the pipeline to extend from Port Kembla STP to King George V Park using a directional drill. Entry for the drill is at the STP with the exit at King George V Park. The pipeline would then follow Military Road to Old Port Road and Christy Drive down to the waterfront where another directional drill is planned under Port Kembla Harbour (see Figures 4 & 5).

Sydney Water Corporation commissioned an Environmental Impact Assessment report to investigate the socio-environmental impacts associated with the proposed route along Military Road, compared to those associated with feasible alternative routes along Gloucester Boulevard and Darcy Road, and Gloucester Boulevard and Foreshore Road. The report found that the Gloucester Boulevard and Darcy Road alternative routes are viable providing that additional measures are carried out to protect a threatened frog species, and prevent disturbance to Aboriginal heritage sites.

However, it is likely that total road closures would be required for the alternatives whereas the preferred Military Road option would not require total road closure (ie. only one of the lanes will be temporarily used for pipeline construction).

The re-examination of the alternative routes suggested that the socio-environmental impacts are comparable. However the preferred option is likely to minimise traffic disruption during construction.

The apparent lesser impacts resulting from the preferred option is, therefore, more acceptable.

Cycleways
The preferred route follows a cycleway through public reserve from a new sewage pumping station (SPS) to the southern end of Stuart Park where George Hanley Drive meets Cliff Road, North Wollongong (see Figure 2). This route uses public reserves and parks and alignments in previously disturbed ground where possible. It is the most direct route and avoids the residential streets to the west.

Sydney Water Corporation has acknowledged the importance of the cycleways to the community and has made a commitment in its Representations Report to involve the Wollongong City Council's Bicycle Consultative Committee to help design mitigation measures in the proposed environmental management plan. Further, SWC has agreed to require restoration works, following construction activities, to be done to the satisfaction of Wollongong City Council (see also recommended Condition of Approval No. 33).

5.2 Take-up Of Land Currently Used by the Wollongong Golf Club

5.2.1 The Issue

Wollongong Golf Club expressed concern that the current proposal will reduce the championship status and number of holes on its golf course located on land leased from SWC, adjacent to the Wollongong STP. It has presented a representation that identifies the regional values of the golf course and outlines its long term presence within the community.

The current proposal is being designed to handle projected flows to the year 2021. Therefore any further upgrading of the capacity of Wollongong STP to handle flows after 2021, could again require land currently occupied by the golf course.

5.2.2 Background

In 1928, the Wollongong Golf Club leased land from SWC in order to expand its links from 9 to 18 holes. The completed 18 hole course underwent a modification in the early 1950s in order to accommodate a Council widening of Corrimal Street. In 1980, with the construction of the Wollongong STP, approximately 7 holes and/or associated greens and fairways had to be modified or reconstructed. All these works were necessary to keep the championship rating of the 18 hole golf course and were apparently undertaken at the sole expense of the golf club.

Sydney Water Corporation acquired the land which is currently subject to a lease to the Wollongong Golf Club, for STP purposes in 1926. The acquisition included enough area to provide buffers from any future urban uses on adjoining lands, and room for future STP expansion. Sydney Water Corporation has issued limited duration leases to the golf club in order to be able to take up its land when required.

5.2.3 Discussion

There is little doubt that the golf course has an established presence and contributes to the local economy. The current planning horizon for the STP upgrade is to the year 2021. Therefore, if it is possible to accommodate the current proposed upgrade of the STP and keep the present 18 hole championship status of the golf course, then it is likely that 15 to 20 more years of use could be made of the golf course before any further expansion of the STP is required. Even then, it is unknown how the effects of both changing technologies and potential for greater reuse could affect the future layout/configuration of the STP eg. there may be a need to further expand the STP into the leased golf course lands.

In trying to overcome the concerns of the golf club, SWC examined relocation options of all or part of the proposed treatment units. Cost estimates for this range between $10 million and $25 million and were considered by SWC to be unjustifiable.

In recent discussions with the Department, SWC has indicated that it may be possible for the upgraded Wollongong STP to proceed while maintaining the championship status of the golf course. This would require a redesign of up to six of the courses holes, including fairways and greens. It estimates that these works would cost approximately $600,000.

5.2.4 Conclusion

Representations made by and on behalf of the Wollongong Golf Club have identified the contributions made to the local and regional community by the presence of the golf course. It is the generally held view of these representations that loss to the championship status of the golf course would seriously affect the Club's viability.

The lease arrangements between SWC and the golf club have, according to SWC, always made it clear that the leased lands may be required for expansion of the STP at some time in the future. As has been seen this has occurred once with the construction of the Wollongong STP in 1980. In the present case, SWC is again exercising its rights as land owner to occupy its land.

It would appear, that for the immediate future, there is a solution which would permit the Wollongong Golf Club to retain its championship status. However this requires some significant redesign works and funding. What arrangements can be made to achieve this outcome will need be undertaken through a negotiated settlement process involving SWC and the Wollongong Golf Club Ltd.

5.3 Verify Whether The Actual Environmental Impacts Of The Proposal Reflect The Predictions Made In The EIS

5.3.1 Issue

The overall performance of the proposal should be assessed by monitoring the key outcomes predicted in the EIS eg. biological monitoring of all outfall areas, and chemical and microbial monitoring of the water column and recreational beaches.

5.3.2 Background

The EIS presents a range of modelled results, and impact predictions based on studies. These include: the proposed outfall's performance, water quality at the beaches, chlorination by-products for the Bellambi and Port Kembla wet weather treatment plants particularly in relation to the impacts on adjacent intertidal marine communities; forecasts of average dry weather flow (indicative of the intended processing capacity the Wollongong STP is being designed for); and various conclusions for marine species including the weedy sea dragon. The predictions made in the EIS are also based on a proposed performance for the frequency of overflows. The predictions indicate that the proposal may be carried out without significant environmental impacts.

5.3.3 Discussion

For some of the predictions, SWC has indicated that additional site specific studies will need to be undertaken (ie. changes in populations of weedy sea dragons), or more up to date data applied to models to re-assess the performance (ie. re-examination of the outfall performance). Some of these studies may be carried out prior to the operation of the proposal in order to optimise the final design. Others, such as monitoring the effects on the weedy sea dragon or the marine environment adjacent to the cliff-face outfalls of Bellambi and Port Kembla STPs, will necessarily have to be assessed post-operation.

For the time being, the Department accepts that the likely outcomes can be achieved by the proposal. However, it will be important to implement short and long term monitoring programs which may help:

- to alert SWC to any unforeseen environmental impacts from the operation of the Illawarra Waste Water Strategy that may need to be redressed through design or process changes;

- to alert SWC to a need to upgrade the treatment capacity or make process changes in order to be able to treat greater volumes of effluent; and
- SWC, NSW Fisheries, the Department, and the EPA to assess whether the actual impacts reflect the impacts predicted in the EIS.

5.3.4 Conclusion

Sydney Water Corporation acknowledges the need to monitor the environmental impacts of its operations. It has prepared an outline of Environmental Management Plans for Construction and Operation stages as a basis of its intent to comply with likely licensing and approval requirements. The preparation of these plans has been incorporated as recommended Conditions of Approval Nos. 35 and 36.

Recommended Condition of Approval No. 39 proposes SWC prepare an Environmental Impact Prediction Verification Report at 1 and 2 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 they are being met.

Recommended Condition of Approval No. 16 proposes that SWC shall review its projected average dry weather sewage flow for the Bellambi, Wollongong, and Port Kembla catchments every 5 years and submit a report the Director-General and the EPA. The reporting arrangements will help to identify for SWC and the regulatory agencies any need to upgrade and/or amplify the STP works before the current design capacity is exceeded.

5.4 Other Matters

A number of other matters were raised in representations made to the exhibited EIS. The Department has reviewed these and the response given to them by SWC in its Representations Report. These matters are summarised below and, where appropriate, Conditions of Approval have been recommended.

1. Too short a planning horizon. Concern was expressed that SWC did not take a long-term view of population, environmental and economic changes to the Region.

   SWC has adopted a planning horizon consistent with the financial and economic planning timeframes of 20 to 30 years adopted by the State Government.

2. Use of an ocean outfall. The options developed by SWC canvassed a number of disposal options including reuse. If reuse is taken up then the proposal will result in an overall net reduction of effluent discharged to the ocean. However, the ocean outfall has been designed to cater for a wide range of flows, including those where reuse does not occur.

   Based on the modelling results undertaken for the proposal, the new outfall is predicted to provide significant levels of dilution, and the treatment and discharge arrangements should meet bathing water quality guidelines. This matter is further addressed in recommended Condition of Approval No. 39 which aims to verify the predictions made in the EIS after the STP becomes operational.

3. Concern whether the deep bed tertiary filters would be able to cope with the effluent load.

   This is a detailed design matter and will be further developed at the tendering stage.

4. Concern was expressed about disinfection effectiveness, particularly during wet weather events when tertiary treatment of all flows will be by-passed.

   SWC is designing its process to meet the relevant criteria for primary contact recreation, but acknowledges that background water quality conditions may influence monitoring results. During

wet weather the majority of pollutants are derived from stormwater, however, all flows will receive disinfection and it is expected that the effluent will produce negligible impacts on water quality. This matter is further addressed in recommended Conditions of Approval Nos. 42, 43, 44, and 46 which establish a water quality monitoring program (see also 5.3 above) and examines the effectiveness of the UV light disinfection.

5. Co-generation of electricity and heat, using the natural gas produced during the sewage digestion process, should be considered.

   SWC is proposing to re-examine the viability of co-generation at key points during the Wollongong STP upgrade. This matter is further addressed in recommended Condition of Approval No. 26.

6. Precautions are needed to prevent leakage of sewage into waterways from the transfer pipelines.

   SWC will ensure the pipeline design complies with the relevant Australian Standard and proposes to continuously monitor the pipelines from its operations centre in order to detect pressure drops indicative of leaks.

7. Construction noise, dust, and odours were of general concern. However, no significant adverse impacts are identified.

   These matters are addressed in recommended Conditions of Approval Nos. 51, 52, 53, 54, 57, 58, 59, 60, and 61.

8. Some residents located above the proposed directional drill at Hill 60 expressed concern about vibration when drilling through hard rock.

   This matter is addressed in recommended Conditions of Approval Nos. 55 and 56.

9. Traffic was of specific concern to cyclists.

   These matters are addressed in recommended Conditions of Approval Nos. 70, and 71.

10. Aboriginal heritage values need to be considered at the exit site for the HDD at the corner of Cliff and Harbour Streets.

    Sydney Water Corporation acknowledge that additional archaeological sites may be encountered at the HDD sites. This matter is addressed in recommended Condition of Approval No. 74.

11. Concern that appropriate procedures are developed to address contaminated soils.

    This matter is addressed in recommended Condition of Approval No. 67.

12. Need to incorporate Council's acid sulphate soil guidelines.

    This matter is addressed in recommended Condition of Approval No. 66.

13. General concerns regarding the management of runoff from construction activities.

    This matter is addressed in recommended Conditions of Approval Nos. 68 and 69.

6 CONCLUSIONS AND RECOMMENDATIONS

The Department considers that the preferred option put forward in the Illawarra Waste Water Strategy will be beneficial to the Illawarra community and result in improved water quality at the local beaches and reduced impact of operations at the STPs. There will also be environmental benefits through effluent reuse and the conservation of water resources.

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 Illawarra Waste Water Strategy (including the upgraded Wollongong STP, transfer pipeline, ocean outfall, and conversions of Bellambi and Port Kembla STPs to wet weather STPs) would occur in an environmentally acceptable manner and relate to:

- clarifying the linkages between the Sewerage Overflow Licensing Program and the current proposal;
- integrating the operation of all components of the waste water strategy in order to maximise the volume of sewage that can be fully treated;
- 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, noise, and air quality;
- 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; and
- revisions of the projections made regarding average dry weather flows in order to ensure that the intended treatment capacity of the Wollongong STP is not exceeded.

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.

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 Sydney 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:

ANZECC	Australian and New Zealand Environment and Conservation Council
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&A Act	*Environmental Planning and Assessment Act 1979*
EPA	NSW Environment Protection Authority
HIPAP	Hazardous Industry Planning Advisory Paper
ML/d	Megalitres per day
Minister, The	Minister for Urban Affairs and Planning
NPWS	National Parks and Wildlife Service
OAP	Overflow Abatement Program
RTA	Roads and Traffic Authority
SMS	Safety Management System
SPS	sewage pumping station
STP	sewage treatment plant
SSTP	storm sewage treatment plant
SWC	Sydney Water Corporation
UV	ultra violet

General

1. The proposal shall be carried out in accordance with:
    - the proposal contained in the EIS entitled "Illawarra Waste Water Strategy – Consolidation of Bellambi, Wollongong, and Port Kembla Sewage Treatment Plants", prepared for Sydney Water Corporation by Australian Water Technologies, Environment, Science & Technology dated May, 1999, incorporating such changes as described in the "Illawarra Waste Water Strategy Representations Report", prepared by Sydney Water Corporation dated May, 2000, and the "Illawarra Waste Water Strategy Representations Report – EIS Proposal-Proposed Changes Subsequent to Exhibition of EIS" dated September, 2000.
    - all identified plans, safeguards, and mitigation measures presented in the "Illawarra Waste Water Strategy Consolidation of Bellambi, Wollongong, and Port Kembla Sewage Treatment Plants" Representations Report, prepared by Sydney Water Corporation dated May, 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 SWC to ensure compliance with the conditions of this approval.

5. These conditions do not relieve SWC 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, SWC shall comply with the terms and conditions of such approvals and licences.

Compliance

6. Sydney 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 substantial construction (or within such period as otherwise agreed by the Director-General), SWC 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-Operation Compliance Report

8. At least one month prior to commencement of operation (or within such period as otherwise agreed by the Director-General), SWC 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 SWC and any public authority (but excluding any dispute between SWC 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. Sydney Water Corporation shall notify the Director-General and all relevant authorities in writing of the project commencement date(s) prior to construction and operation as relevant.

Contact Telephone Number

11. Prior to commencement of construction, SWC shall provide to the Director-General, EPA, DLWC, RTA, NSW Fisheries, Wollongong 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 SWC with respect to seeking information or making a complaint.

12. An initial response to any complaint is to be made to the complainant within 24 hours of receipt. Sydney 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. Sydney Water Corporation shall maintain a Complaints Register which shall be:
    - used to record details of all complaints received and actions taken by SWC 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 Wollongong City Council.

Community Notification and Liaison

14. Sydney Water Corporation shall, at three-monthly intervals during the construction stage, advertise in relevant local newspapers or as otherwise directed by the Director-General, the nature of works proposed for the forthcoming three months, the areas in which these works are proposed to occur, the hours of operation, and the contact telephone number.

15. During the construction stage, SWC shall keep the local community informed (by way of local newsletter, leaflets, newspaper advertisements, and community notice boards, etc.) of the progress of the project including any traffic disruptions and controls, construction of temporary detours, work required outside of the nominated working hours prior to such works being undertaken.

Intended Processing Capacity of Wollongong Sewage Treatment Plant

16. Sydney 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 Bellambi, Wollongong, and Port Kembla catchments. The review shall be submitted to the EPA and the Director-General and accompanied by a report which:
    - revises the average dry weather flow projections to indicate the anticipated date when the intended design capacity of 59 megalitres per day of average dry weather flow is likely to be attained at Wollongong STP (predicted in the EIS to occur in 2021);
    - recommends strategies (including upgrade and/or amplification works) that it proposes to undertake in time to ensure the intended processing capacity of 59 megalitres per day at average dry weather flow 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 Wollongong STP

17. Following commissioning of the upgraded Wollongong STP, effluent discharged during dry weather must be treated to tertiary level and be disinfected with ultraviolet radiation. Dry weather is defined as flows up to 177 ML/d or greater flow depending on operational changes made as a result of Condition No. 16 (ie. equivalent to three times average dry weather flow for the combined catchments of Bellambi, Port Kembla, and Wollongong) and tertiary treatment is defined as preliminary, primary, and secondary treatment with sand filtration. All flows (including those above 177 ML/d) must receive screening, grit removal, primary sedimentation, and disinfection.

Treatment Levels at Bellambi and Port Kembla STPs

18. Following commissioning of the proposal, effluent discharged from the Bellambi and Port Kembla STPs must receive screening, grit removal, primary sedimentation, and chlorination and dechlorination. Settled sludge must be removed from the digesters and primary sedimentation tanks for transfer to Wollongong STP, or other appropriate location, for treatment.

Storage and Transfer from Bellambi and Port Kembla STPs

19. Bellambi STP must include at least 9 ML of wet weather storage, and Port Kembla STP must include at least 5 ML of wet weather storage.

20. The Bellambi to Wollongong transfer system must be capable of transferring at least 69 ML/d of flow from the Bellambi sewerage catchment to Wollongong STP.

21. The Port Kembla to Wollongong transfer system must be capable of transferring at least 51 ML/d of flow from the Port Kembla sewerage catchment to Wollongong STP.

22. There must be no unlicensed discharges to waterways from scour valves on the rising mains constructed as part of the proposal.

Biosolids Processing

23. If sludge derived from Port Kembla sewerage catchment is contaminated then two separate sludge processing facilities must be provided at Wollongong STP (ie one to treat sludge from Bellambi and Wollongong catchments, and the other to treat sludge from the Port Kembla sewerage catchment) in order to prevent cross contamination of sludge.

24. Stabilisation facilities must be provided with the capacity to treat sludge from Bellambi, Port Kembla, and Wollongong sewerage catchments.

25. Sydney Water Corporation shall prepare, in consultation with the EPA, a report to the EPA, within two years of commissioning the Illawarra Waste Water Strategy, which identifies opportunities that may be available to improve the contaminant grading of sludge from Port Kembla sewerage catchment to Grade C or higher to enable beneficial reuse (eg source control programs, sewer infiltration reduction programs, etc). A preferred option must be identified in the report which shall also indicate a timetable for completion of works.

Co-generation Feasibility at Wollongong STP

26. Should co-generation of electricity from the digester gas at Wollongong STP not be initially provided then SWC shall prepare a report within nine months of letting of the contract for construction, to the EPA, which re-examines the economic and financial viability of energy recovery from gas produced at Wollongong STP. The report must include an analysis of gas generated from digestion of sludge from all catchments and provide sufficient detail of costs and analytical methods for independent evaluation.

Environmental Management Representative

27. 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. 32. 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 SWC'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.

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

29. 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 SWC.

Environmental Management System

30. In the assessment of tenders for design, construction and/or operation of the proposal, SWC 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.

31. All sampling strategies and protocols undertaken as part of the monitoring programs required by these Conditions of Approval shall include sampling and analytical strategies in accordance with EPA approved analytical methods to ensure effectiveness and quality of the monitoring program. All laboratories undertaking the analysis of samples should be accredited by the National Association of Testing Authorities Australia (NATA).

Environmental Management Plan(s) (Construction Stage)

32. A project specific Environmental Management Plan(s) (Construction Stage), for the transfer pipelines, sewage pumping stations, wet weather treatment plant works at Bellambi and Port Kembla STPs, upgrade works at Wollongong STP, and the new ocean discharge pipeline shall be prepared by SWC to the satisfaction of the Director-General following consultation with the EPA, DLWC, NSW Fisheries, Wollongong 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.

33. The EMP(s) shall be made publicly available on request and shall:
    - address construction activities associated with all key sites including Stuart Park, Osborne Park, King George V Park; cycleways; and the ocean outfall,
    - cover specific environmental management objectives and strategies for the main environmental 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 marine flora and fauna; hydrology and flooding; recreation areas; visual screening, landscaping, and rehabilitation; hazards and risks; resource use and recycling; and utilities.
    - address, but not be limited to:
        - identification of the statutory and other obligations which SWC 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 SWC'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 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 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 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 SWC intends to take to ensure that all plans and procedures are being complied with;
- requirements arising from consultation with relevant government agencies, Wollongong City Council including Council's Bicycle Consultative Committee; and
- any requirements Wollongong City Council may have regarding restoration works following construction activities.

Specific requirements for some of the main environmental 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)

34. Sydney 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 SWC with the conditions of this approval or as requested by the Director-General.
    - be submitted to the EPA, DLWC, Wollongong City Council, and any other relevant government agency nominated by the Director-General;
    - be made publicly available; and
    - be certified by the EMR.

Environmental Management Plan (Operation Stage)

35. Sydney 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, NSW Fisheries, Wollongong City Council, and any other relevant government agency nominated by the Director-General. 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. The EMP (Operational Stage) shall address each of the key sites including the transfer pipelines between Bellambi STP and Wollongong STP, and Port Kembla STP and Wollongong STP, (and associated pumping stations and vents), the wet weather STPs of Bellambi and Port Kembla, the upgraded Wollongong STP, and the new ocean outfall.

36. The EMP (Operational Stage) shall be made publicly available on request and shall address, but not be limited to:
    - identification of the statutory and other obligations which SWC 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 SWC'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 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; sewer overflow following failures at the wastewater pumping stations and/or during extended periods of wet weather flows; and structural failures in the wastewater transfer pipeline;
    - steps SWC 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:
        - the management of all land compulsorily acquired for the purposes of construction and operating permanent infrastructure;
        - 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;
        - managing ocean discharges effects on the weedy sea dragons;
        - air quality (including dust and odours);
        - health and public safety;
        - landscaping and maintenance and issues relating to flora and fauna;
        - security;
        - groundwater;
        - 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 elements referred to above shall be as detailed under the conditions of this approval and/or as required under any licence or approval.

Integration of the Illawarra Waste Water Strategy and the Sewerage Overflow Abatement Program

37. Sydney Water Corporation shall advise the Director-General and the EPA, prior to commencement of any construction arising out of the Overflow Abatement Program (OAP) for the Bellambi; Port Kembla, and Wollongong sewerage systems, of any linkage(s) between measures proposed in the OAP and the current proposal (eg any anticipated changes to the: frequency/volume of untreated discharges, reuse capabilities, water quality of treated discharges, capacity/flow regime, etc).

Integration of the Operation of the Storage/Wet Weather Treatment Plants With the Augmented Wollongong STP

38. Sydney Water Corporation shall prepare a report for the Director-General within two years of commissioning the Illawarra Waste Water Strategy, which identifies opportunities that may be available to integrate the operation of the storage/wet weather treatment plants and the transfer network in order to maximise the full treatment of all flows at Wollongong STP and minimise frequency and volumes of overflows. This may require developing detailed models of catchment and flow relationships and individual responses to wet weather events ie process controls to regulate the flows by using the storage capacities at the three STPs and the transfer pipelines, as appropriate.

Environmental Impact Prediction Verification

39. 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 at 12 months and 2 years after commissioning of the Illawarra Waste Water Strategy and at any additional intervals the Director-General may require;
    - be prepared at SWC's expense;
    - detail the extent to which actual impacts reflect the predictions outlined in the EIS and any supplementary studies including, but not limited to, the following:
        - ocean discharge effects on the weedy sea dragons;
        - the level and extent of impacts on the aquatic environment in the zone surrounding the new discharge point from the Wollongong STP (eg microbiological concentrations, dilution model, etc)
        - water quality at recreational beaches, and in the mixing zones for each discharge point (ie ANZECC Water Quality Guidelines for Primary Contact Recreation);
        - effluent quality characterisation and toxicity (ANZECC Water Quality Guidelines for Maintenance of Aquatic Ecosystems including fish, crustacea, and shellfish);
        - wet weather overflow frequency for the STPs; and
        - effects of discharges on intertidal communities adjacent to Bellambi and Port Kembla STP cliff face outfalls.
    - 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.

40. The technical studies required as part of the Report in Condition of Approval No. 39 shall be prepared by appropriately qualified, independent specialists.

41. Sydney 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. 39.

Water Quality

42. As part of the EMP (Operational Stage) referred to in Condition of Approval No. 35, SWC 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 Illawarra Waste Water Strategy;
    - satisfy all relevant pollution control approval/licence requirements; and
    - reference environmental issues and goals set out in relevant EPA and other guidelines.

43. The Procedure shall address, but not be limited to:
    - identification of baseline water quality monitoring locations;
    - demonstration that the discharges of the treated effluent from the Illawarra Waste Water Strategy will meet water quality criteria in relevant ANZECC guidelines;
    - design and implementation of monitoring programs to validate the predictions and to provide a basis for future decision making processes;
    - asset management of the Illawarra Waste Water Management Strategy as recommended by the proposal;
    - emergency response and clean-up procedures; and;
    - public notification procedures for potentially affected parties during periods when overflow emergency procedures are in place (ie. health issues for primary contact recreational users);

44. The Procedure shall be prepared prior to commissioning of the upgraded plant and shall be forwarded to the EPA.

Port Kembla and Bellambi Discharge Frequency

45. The project is to be designed and constructed such that when it is operational no more than 60 discharges are to occur in a ten year period from each of Bellambi and Port Kembla Storm STPs.

UV Light Disinfection

46. Prior to the commissioning of the upgraded plant, SWC shall prepare a detailed procedure, to the satisfaction of the NSW Health Department and the EPA, with the objective of optimising the UV light disinfection process for all likely operational modes of Wollongong STP.

47. 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.

48. Sydney Water Corporation shall, at the request of NSW Health Department, take all necessary rectification action to the satisfaction of NSW Health Department, to ensure that the disposal of wastewater does not pose a potential hazard to public health, taking account of ANZECC water quality guidelines.

Effluent Reuse

49. Sydney Water Corporation shall prepare a report for the Director-General and the EPA on recycling/reuse for the treated effluent at Wollongong STP within the first year of this approval, and thereafter as requested by the Director-General. The report shall:
    - identify how any proposal to recycle effluent at Wollongong STP relates to SWC's corporate recycling strategy and world's best practice;

- examine the status of investigations into effluent reuse at Port Kembla with particular attention given to the current and any likely future industrial markets, including water quality requirements;
- if appropriate, identify opportunities for implementing additional reuse ie more reuse than is suggested by the current proposal, and discuss the feasibility of achieving 100% reuse for average dry weather flows; and
- discuss the implications for any expansion of the Wollongong STP ie will the STP need to be expanded beyond its proposed new boundaries in order to accommodate facilities associated with additional recycling.

Energy Use

50. Prior to finalising of detailed design of the plant, SWC 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 plant's design and shall be operational at the time of commissioning of the upgrade.

Air Quality

51. There must be no increase in the total odour generation rate from the Wollongong STP following commissioning of the proposal.

52. Prior to commencement of STP process infrastructure construction, SWC shall prepare a detailed Odour Management Procedure in consultation with the EPA and Wollongong 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 from the Wollongong STP;
    - 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 ventilation stacks associated with SPS along the transfer pipelines and, should problems be experienced, identify measures SWC shall take to eliminate such problems.

53. A specific Dust Management Procedure shall be prepared as part of the EMP (Construction) referred to in Condition of Approval No. 32. 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.

54. 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.

Vibration Management Procedure

55. As part of the EMP (Construction) referred to in Condition of Approval No. 32, SWC shall prepare, in consultation with Wollongong City Council, a Vibration Management Procedure. The Procedure shall provide full details of vibration control measures to be undertaken during construction stage.

56. The Procedure shall include, but not be limited to:
    - a description of anticipated vibration generating activities and locations and duration of these activities;

- impacts from site compounds/construction depots;
- vibration control equipment to be fitted to machinery;
- predicted vibration levels at sensitive receivers;
- vibration monitoring and reporting procedures;
- measures for dealing with exceedances;
- arrangements to inform residents of construction activities likely to generate vibration; and
- contact points for residents.

Noise

Noise Management Procedures

57. As part of the EMPs referred to in Conditions 32 and 35, SWC shall prepare, in consultation with Wollongong City Council, detailed Noise Management Procedures. The Procedures shall provide details of noise control measures to be undertaken during both the construction and operation stages.

58. 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 stationary 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;
    - arrangements to inform residents of construction activities likely to affect their noise amenity ie. contact point for residents; and
    - compliance with relevant EPA guidelines as far as practicable, including the Environment Noise Control Manual, and the Industrial Noise Policy.

Construction Noise

59. Sydney Water Corporation shall monitor construction noise levels to verify compliance with the requirements specified in the Noise Management Procedure. Should monitoring indicate exceedance, SWC shall consult the EPA and implement any additional mitigation measures to ensure that "best practice" is being implemented.

Construction Hours

60. 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

61. Sydney 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 Wollongong STP and all SPSs associated with the proposal. Should the review indicate a clear trend in noise levels which is inconsistent with the general predictions made in the EIS, SWC shall implement further noise mitigation measures.

Hazard Management

62. No later than two months prior to the commencement of commissioning of the upgraded plant, or within such further period as the Director-General may agree, SWC 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.

63. The SMS shall cover all operations at the Bellambi and Port Kembla storm STPs, the upgraded Wollongong STP, transfer pipelines, 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".

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

65. Twelve months after the commencement of operations of the upgraded plant or within such further period as the Director-General may agree, SWC shall carry out a comprehensive hazard audit of the Illawarra Waste Water Strategy – Consolidation of Bellambi, Wollongong, and Port Kembla Sewage Treatment Plants, and within one month of the audit submit a report to the Director-General. The audit shall be carried out at SWC'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 a month 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.

Acid Sulfate Soils

66. As part of the EMP (Construction) referred to in Condition of Approval No. 32, SWC shall prepare an Acid Sulfate Soil Management Plan in accordance with the "Acid Sulfate Soil Manual" prepared by the New South Wales Acid Sulfate Soil Management Advisory Committee, August 1998 (or its latest version), and Wollongong City Council's Fact Sheet E33 for control of acid sulfate soils.

Contaminated Soils Management

67. As part of the EMP (Construction) referred to in Condition of Approval No. 32, SWC shall prepare a Contaminated Soils Management Plan. The Plan shall address, but not be limited to:
    - procedures for further soil investigations;
    - occupational health and safety procedures;
    - safeguards to prevent the migration of excavated material, leachate, or runoff; and
    - disposal requirements, ie. removal of contaminated spoil to an EPA approved facility.

Soil and Water Management

68. As part of the EMP (Construction) referred to in Condition of Approval No. 32, SWC 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. A copy of the Procedure shall be forwarded to the EPA, DLWC, and Wollongong City Council.

69. 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

70. Traffic control plans shall be prepared in consultation with the RTA, Wollongong City Council and relevant stakeholders such as local industry and bicycle groups for areas where traffic restrictions will be required. Plans must also be prepared for the parts of the routes on the bicycle path which will disrupt bicycle and pedestrian traffic on the bicycle path and clearly identify safe alternative routes.

71. A road dilapidation report shall be prepared for all roads nominated by Wollongong City Council likely to be used by construction traffic. The report shall be prepared in consultation with Wollongong City Council prior to commencement of construction activities. Sydney Water Corporation and Wollongong 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.

Visual Impact Mitigation

72. All mitigation measures relating to the visual assessment contained in Section 9.2 of the EIS shall be incorporated unless otherwise agreed to by the Director-General.

73. 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 SWC unless otherwise agreed by the relevant property owner.

Heritage

74. Sydney Water Corporation shall implement all recommendations specified in Section 9.4 of the EIS.

Waste Disposal and/or Recycling

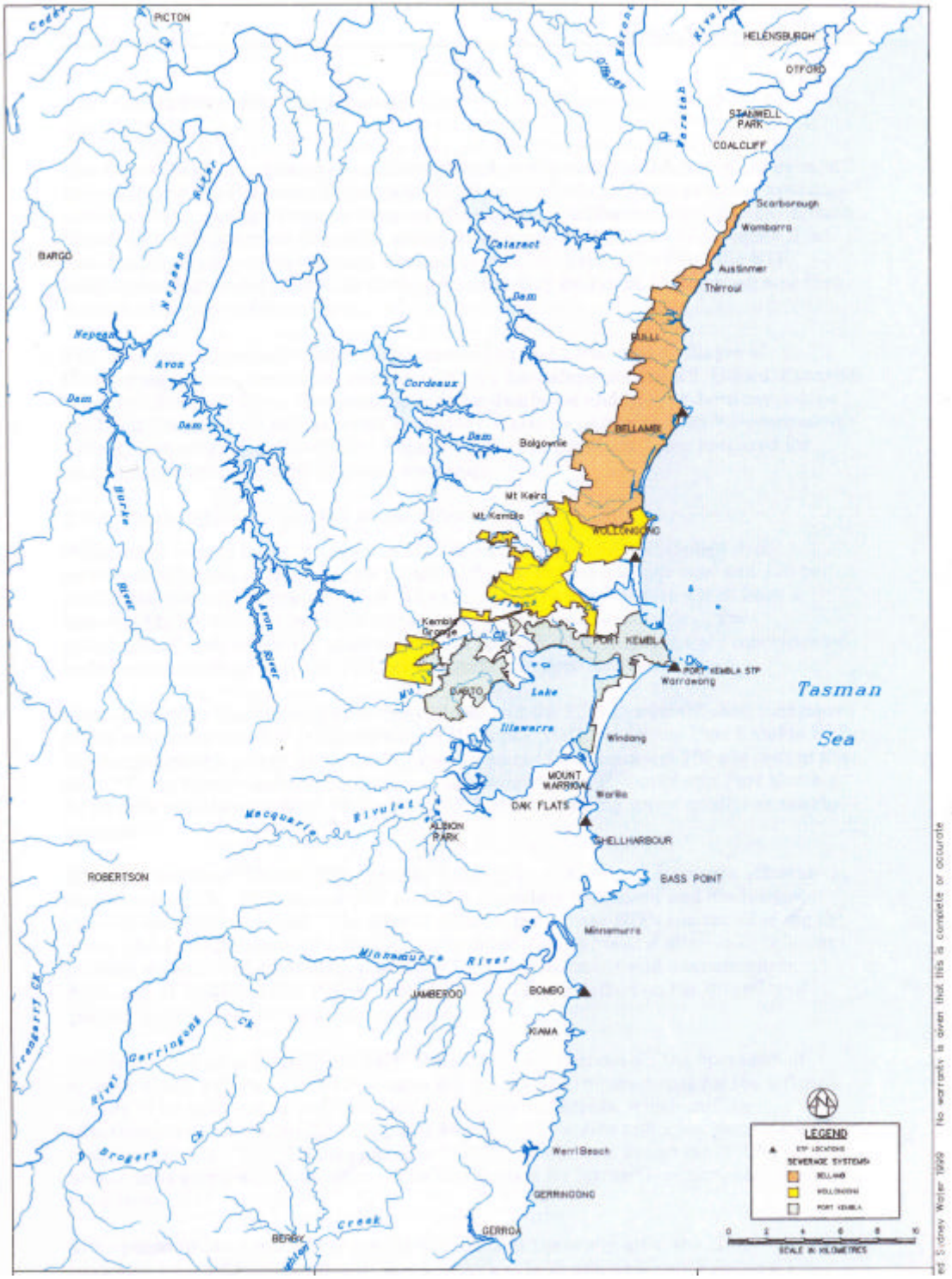
75. As part of the EMPs referred to in Conditions 32 and 35, SWC shall prepare detailed Waste Management Procedures to address the management of wastes during both the construction and operation stages. The Procedures shall be prepared prior to construction and operation, as appropriate, and shall identify 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

76. Sydney 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 SWC unless otherwise agreed to by the affected service/utility authority.

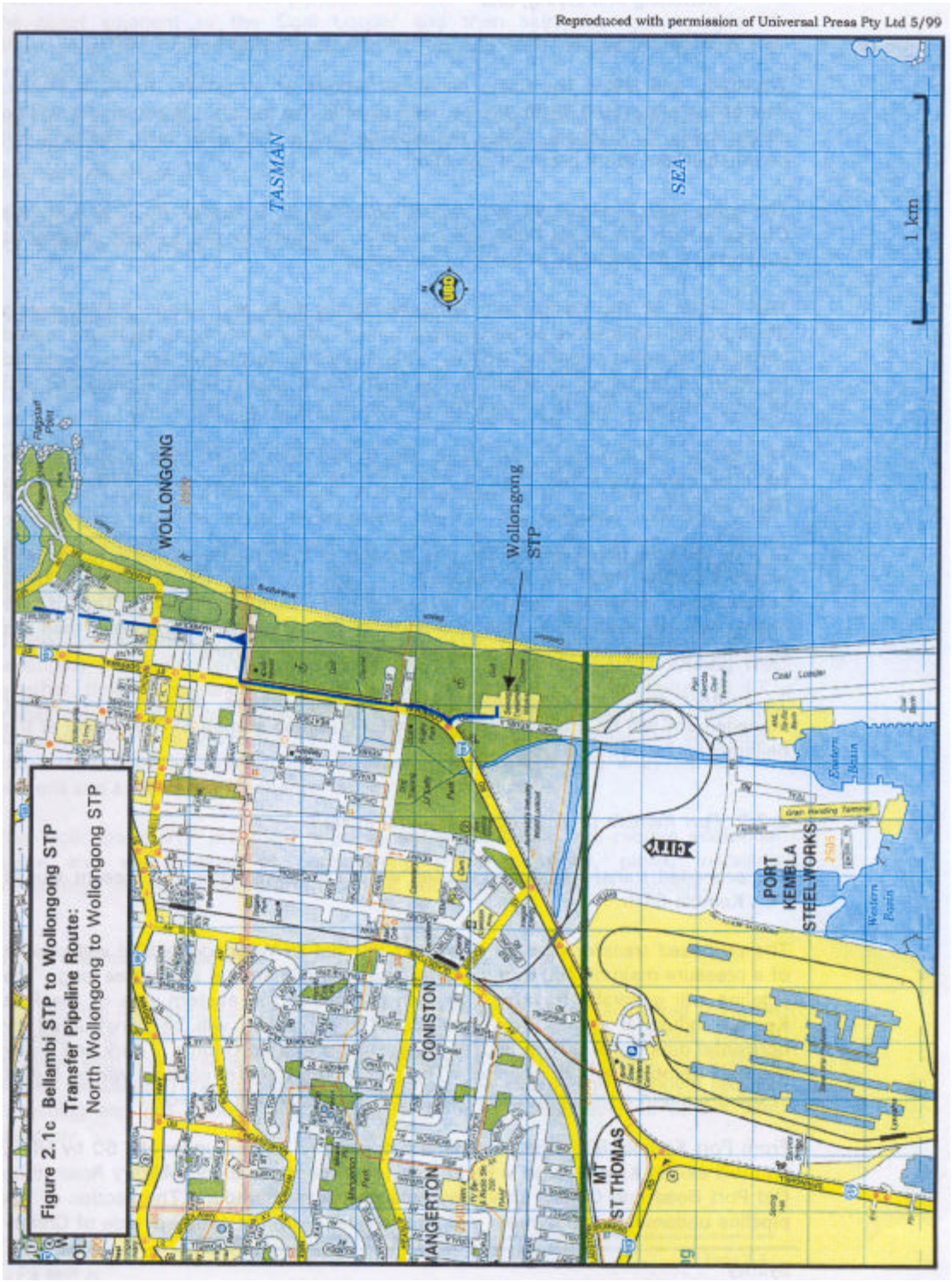
8 FIGURES

8.1 Figure 1 Location Map



8.2 Figure 2 Transfer Route – Towradgi Park to North Wollongong

8.3 Figure 3 Transfer Route – North Wollongong to Wollongong STP



8.4 Figure 4 Transfer Route – Wollongong STP to Port Kembla Coal Loader

8.5 Figure 5 Transfer Route – Port Kembla Coal Loader to Port Kembla STP