SYDNEY WATER CORPORATION
MULGOA, WALLACIA & SILVERDALE
SEWERAGE SCHEME

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

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FOREWORD

Sydney Water Corporation (SWC) proposes to construct a new sewerage scheme for Mulgoa, Wallacia and Silverdale. The scheme includes the existing Warragamba village which is already sewered and the building of a new Warragamba Sewage Treatment Plant (STP) to replace the existing STP which will be decommissioned.

SWC is required to obtain approval for the proposal from the Minister for Infrastructure and Planning under Division 4 Part 5 of the *Environmental Planning and Assessment Act 1979.* This report was prepared in accordance with Section 115C of the Act which requires that the Minister obtain a report from the Director-General of Infrastructure, Planning and Natural Resources before making a decision.

The purpose of this report is to review the proposal's environmental impact statement (EIS), issues raised in representations made in response to the EIS exhibition, SWC's Representations Report, proposed changes to the proposal as discussed in the Supplement to the Representations Report and Addendum to the Supplement, and any other relevant matters pertaining to the potential environmental impacts of the proposal.

The report documents this independent assessment of the proposal. It concludes that:

- the proposal satisfies its objectives which are to reduce environmental degradation and public health risks and improve local amenity.
- the proposal's potential environmental impacts can be mitigated to an acceptable level by adopting management measures identified in this report and reflected in the recommended Conditions of Approval.

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

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

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GLOSSARY AND ABBREVIATIONS

ADWF	average dry weather flow
ARI	average recurrence interval
dB(A)	Decibel (A-weighted scale)
DEC	NSW Department of Environment and Conservation (which includes the former Environment Protection Authority and former National Parks & Wildlife Service)
DEH	Commonwealth Department of Environment and Heritage
Director-General	Director-General of NSW Department of Infrastructure, Planning and Natural Resources
Director-General's Report	The report of the Director-General of the Department (under section 115C of the EP&A Act) titled Sydney Water Corporation: Mulgoa, Wallacia & Silverdale Sewerage Scheme
DLWC	Department of Land and Water Conservation (now DIPNR)
Department	NSW Department of Infrastructure, Planning and Natural Resources (DIPNR)
EIS	Environmental Impact Statement. Specifically, "Mulgoa, Wallacia & Silverdale Priority Sewerage Program" prepared by CH2M HILL for Sydney Water Corporation, December 1999.
EMP	Environmental Management Plan
ENCM	Environmental Noise Control Manual
EP&A Act	*Environmental Planning and Assessment Act 1979 ('the Act')*
EPA	Former NSW Environment Protection Authority. On 24 September 2003, the EPA, NPWS and some other agencies were amalgamated to form the Department of Environment and Conservation (DEC). This Report refers to EPA and NPWS as appropriate because it reflects the agencies as they were at the time comments were made on the proposal and the assessment was undertaken. The Recommended Conditions of Approval refer to DEC.
EPBC	*Environment Protection and Biodiversity Conservation Act 1999*
HNCMC	(former) Hawkesbury-Nepean River Catchment Management Committee
HRC	Healthy Rivers Commission
LALC	Local Aboriginal Land Council
Minister, the	NSW Minister for Infrastructure and Planning
Mg/L	milligram per litre
ML/day	megalitres per day

NPWS	Former NSW National Parks and Wildlife Service. On 24 September 2003, the EPA, NPWS and some other agencies were amalgamated to form the Department of Environment and Conservation (DEC). This Report refers to EPA and NPWS as appropriate because it reflects the agencies as they were at the time comments were made on the proposal and the assessment was undertaken. The Recommended Conditions of Approval refer to DEC.
PDWF	peak dry weather flow
POEO	*Protection of the Environment Operations Act 1997*
Project	Construction and operation of the Mulgoa, Wallacia and Silverdale Sewerage Scheme
Proponent, the	Sydney Water Corporation
PSP	Priority Sewerage Program
RTA	Roads and Traffic Authority
SCA	Sydney Catchment Authority
SOC Act	State Owned Corporations Act
SPS	sewage pumping station
STP	sewage treatment plant
SWC	Sydney Water Corporation
TSC Act	*Threatened Species Conservation Act 1995*

EXECUTIVE SUMMARY

The Project

Sydney Water Corporation (SWC) is seeking the approval of the Minister for Infrastructure and Planning for the proposed construction of a conventional gravity sewerage scheme for Mulgoa, Wallacia and Silverdale which lie approximately 50 km south-west of Sydney[1]. The proposal consists of a sewage collection system for the three villages, transfer of sewage from these villages and Warragamba to a new Warragamba Sewage Treatment Plant (STP) and decommissioning of the existing Warragamba STP.

Since the public exhibition of the project Environmental Impact Statement (EIS) in December 1999, SWC has made a number of changes to the project. The major changes are the relocation of the STP site in Warragamba, deferral of effluent re-use (a primary component of the original scheme) and relocation of a sewage pumping station in Wallacia.

The revised Project has an estimated cost of $45.4 million and would create up to 150 jobs during construction.

Background to the Proposal

Existing sewage management facilities in the villages of Mulgoa, Wallacia and Silverdale consist of various on-site systems. Some of these systems are operating poorly causing waterlogging, ponding, runoff of sewage and treated waste water, and seepage into stormwater drains. As a consequence, the quality of stormwater and watercourses in some areas has deteriorated, showing increase in pathogenic micro-organisms and nutrient loadings, particularly in wet weather.

As part of the options development for the EIS, upgrading of the existing Warragamba STP (currently operating on obsolete treatment technology) was not considered to be a feasible option. Upgrading will involve rebuilding the plant which is constrained by the confined nature of the site on the edge of a cliff. The existing plant is also operating at full capacity and does not have the capacity to receive additional sewage from the three villages. This led to the proposal for a new STP to service these villages including Warragamba.

The Project was developed in response to the NSW Government's Priority Sewerage Program (PSP). The program aims to address the environmental problems associated with unsewered areas in the Sydney and Illawarra regions. The three villages form one of seven areas identified for priority improvement by the NSW Government in 1997 under the PSP.

Need, Justification and Benefits

The current on-site treatment and waste water disposal facilities in the three villages are not operating efficiently. Inspections of residential properties in 1998 found that ponding of effluent, odour and weed growth were significant issues for some sites. SWC determined that the implementation of an alternative, improved sewage management scheme would minimise the negative impacts of inadequate on-site systems on the local streams and the Nepean and

[1] The Project includes a pressure sewerage system for a small area of the scheme (Silverdale Industrial Estate).

Warragamba Rivers. It would also meet the community's expressed desire for improved local amenity and protection of public health and the environment.

The major benefits of the proposal, as identified in the EIS, are:

- reducing risks to public health through significant reduction in nutrient and pathogen loads to the catchments in the area;
- reducing the potential for environmental impacts on the catchment of the Hawkesbury-Nepean River and the Warragamba River;
- improving the area's residential amenity and providing convenience to residents, public places and businesses of a centralised sewerage scheme, as compared with on-site systems.

EIS Exhibition and Approval Process

The Mulgoa, Wallacia & Silverdale Sewerage Scheme proposal is subject to Section 37A of the State Owned Corporations Act 1989 (SOC Act). This enables the Minister to certify proposals as being of State or regional significance and to determine the need for an EIS. This has occurred for this project. Consequently, the project requires the Minister's approval under Division 4, Part 5 of the *Environmental Planning and Assessment Act 1979.*

The EIS was publicly exhibited from 17 December 1999 to 25 February 2000. A total of 16 representations were received as a result of the exhibition.

Environmental Impact Assessment

The Department's assessment of the environmental impacts of the revised Project identified the following key issues:

- flora and fauna;
- deferral of the effluent re-use scheme;
- river discharges and water quality;
- system performance and sewage overflows; and
- population load projection and STP design capacity.

Flora and fauna

The relocation of the STP site overcomes the Department's previous concerns about the Project's impact on Shale Sandstone Transition Forest which is present at the original site. This vegetation is an endangered ecological community listed under both *the NSW Threatened Species Conservation Act* and the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act*.

At the current proposed site, an estimated 1.6 ha of vegetation is proposed to be cleared for the STP but this is considered to be at the limit of what could possibly be classified as Shale Sandstone Transition Forest. As a compensatory measure, revegetation of 2.7 ha of degraded land to the east of the site is proposed. The Department considers that the proposed revegetation adequately offsets the amount of clearing required given the siting history and practical constraints of the STP area.

As a precautionary measure, SWC referred the proposed activity to the Commonwealth Department of Environment and Heritage (DEH) due to the proposed clearing of 1.6 ha of vegetation in the STP site adjoining an area of Shale Sandstone Transition Forest. DEH determined that the construction and operation of the Project is not a controlled action[2] and therefore will not require approval under the *EPBC Act.*

The need for weed control and immediate rehabilitation of disturbed areas during and after construction is considered essential in minimising impacts.

Deferral of the effluent re-use scheme

SWC has deferred the effluent re-use component of the EIS scheme. It determined that at this stage, it could not justify re-use on the basis of no clear environmental benefit, high cost of providing the infrastructure facilities and doubtful demand and sustainability issues.

Both the Department and the DEC urged SWC to further investigate re-use options before making a decision to abandon or defer re-use. This led SWC to provide additional information demonstrating that re-use presently is not justifiable on economic grounds. A recent report commissioned by the Minister for Energy and Utilities on this issue also delivered the same conclusion. The report also concluded that the proposed full discharge of effluent into Warragamba River will meet the Healthy Rivers Commission recommendation for the Hawkesbury-Nepean River system and will increase the base flow of the river and offset downstream extractions.

The Department and the DEC now accept that implementation of re-use is not viable at this stage. They also recognise the relatively small volume of effluent discharges expected from the new STP. However, both agencies believe that with changes in Government policy on licensing water extraction and pricing in the Hawkesbury-Nepean River, effluent re-use could become attractive in the future and SWC should re-investigate at a later time. To ensure that this occurs, a condition of approval is recommended which requires SWC to provide an Effluent Re-use Report to the Director-General by 30th June 2006. The report is to include details of the sites considered for effluent application and an assessment of their suitability for long term use. It must consider a number of government policy and plans relating to water and effluent management for the Hawkesbury-Nepean catchment.

River discharges and water quality

Effluent modelling of the revised scheme was conducted for full discharges at two load situations: at 1.13ML/d for the current population covered by the scheme; and at 1.35ML/d for the ultimate future population load. The modelling results concluded that under both loads, the proposed scheme will result in water quality improvement of the Warragamba River and will be a significant improvement on the current situation.

The Department questioned the lack of comparative analysis in water quality impacts between the EIS proposal (with re-use) and the revised full discharge scheme. In response, SWC argued that the purpose and focus of modelling was on the full discharge situation so as to demonstrate

[2] Under the EPBC Act, a controlled action refers to a proposed activity that the Minister for the Commonwealth Department of Conservation and Heritage decides is likely to have a significant impact on any matters protected by that Act and would require approval under the Act.

the proposal's lack of deleterious impact on water quality and ecological health of the Warragamba River.

The Department accepts the evidence presented that the revised scheme should result in an improvement on the current situation. To confirm the water quality objectives in the EIS and Supplement Report, the Department recommends a Condition that consolidates the effluent quality targets proposed by SWC. The Condition also requires that these targets be met following optimisation of the STP process or within a maximum 18 months of commencing operation whichever is shorter. The condition will cease to apply if the scheme is subject to a system licence that specifies the same or lower concentration limits.

The DEC considers that the water quality analysis focuses on the impacts of nutrient concentrations, in particular, on concentrations achieved through substantial dilution. However, it acknowledges that the proposed scheme should result in lower in-stream nutrient concentrations and nutrient load to Warragamba River than at present. To ensure that SWC achieves the reduction in nutrient load it committed to in the Supplement Report, a Condition is recommended that enforces the predicted load limits, but will cease to apply if the DEC issues a licence that imposes similar requirements. At DEC's request, the load limits will be subject to further analysis under the licensing process.

System performance and sewage overflows

The representations raised various issues associated with the operation of the proposed scheme. These include justification for the adopted overflow frequency of 10 events in 10 years, system management during emergency situations and occurrence of high infiltration in a new system.

The scheme's proposed design frequency is consistent with frequencies adopted in other environmentally sensitive areas (eg Blue Mountains). SWC commits to meet all DEC requirements on the Project's operational management, including the proposed 10 in 10 frequency which DEC considers appropriate for the Project. Overflow containment procedures for the STP and SPSs will be sufficient to prevent dry weather overflows.

SWC indicated that elimination of infiltration is not possible with an older system (existing reticulation system in Warragamba). It is also difficult to ensure a high standard for maintenance of private sewers. However, construction of the new sewerage system using modern materials and quality control procedures will limit incidence of infiltration and leakage.

SWC has advised the Department that all flows received at the STP will be treated, and there will be no bypassing of treatment processes. However, on very infrequent occasions (when inflow exceeds 6 x average dry weather flow), some flows may only receive partial treatment.

The Department recommends Conditions that specify operational outcomes for the scheme including overflow containment limit of 10 events in 10 years, minimum effluent storage capacity at each SPS and restrictions on any sewage overflows from SPSs and collection system in dry weather. These conditions will cease to apply if the DEC issues a licence that imposes similar requirements.

Population load projection and STP design capacity

There were concerns that the proposed scheme is being designed to accommodate very little growth and may not be realistic. The representations requested the inclusion of some areas that were outside the PSP boundaries shown in the EIS (eg former Lion Park in Silverdale). SWC has since developed a revised ultimate population projection of approximately 6400 Equivalent Population (previously 4869 in the EIS), accounting for a number of currently zoned rural lands that could be connected to the scheme in the future. The conceptual design and site layout for the STP would make allowance for this expansion. SWC indicated that the increase in STP capacity (ie total average dry weather flow rate of 1.35ML/day) will not require an increase in the physical size of the plant.

Conclusions and Recommendations

The Project has changed in a number of ways since the public exhibition of the EIS. The changes are mostly in response to environmental issues that have emerged as a result of detailed design or in the case of effluent re-use, economic considerations and current demand and sustainability issues. However, the changes do not fundamentally alter the Project and generally reduce environmental impacts. The Department recognises that the Project will still meet the overall objective of the Government's PSP which is to provide an effective sewage management scheme that protects both public health and the environment. Nevertheless, the Department has some concerns about the deferral of re-use and recommends that SWC further investigates the matter in the near future.

The Department has undertaken an assessment of the likely environmental impacts of the Project. In particular, it considered key issues associated with flora and fauna, system performance and overflow management, full effluent discharges and water quality and potential expansion of the servicing area. Other issues examined were air quality, noise, traffic and transport, heritage, visual impact, soil and water management, hydrology and flooding, groundwater and hazards and risks. The Department's review concluded that, provided comprehensive mitigation measures were implemented, the adverse impacts of the Project could be reduced to an acceptable level.

The Department recommends that SWC prepare comprehensive environmental management plans for the construction and operation stages of the Project. The Plans are to describe how the mitigation measures in the EIS, Representations Report, Supplement Report and the recommended Conditions of Approval are to be practically implemented.

The Department's assessment concludes that, provided the recommended Conditions of Approval are adopted, the Project could be approved by the Minister.

1 INTRODUCTION

1.1 NATURE OF THE PROJECT

Sydney Water Corporation (SWC) proposes to construct a sewerage scheme for the three villages of Mulgoa, Wallacia and Silverdale. The scheme consists of a sewage collection system for the villages, transfer of sewage to a new Warragamba Sewage Treatment Plant (STP) and decommissioning of the existing Warragamba STP. The township of Warragamba which is already sewered will also be included within the scheme with sewage transferred to the new STP.

The proposal was developed in response to the NSW Government's Priority Sewerage Program (PSP). The program aims to address the environmental problems associated with unsewered areas in the Sydney and Illawarra regions. The three villages form one of seven areas identified for priority improvement by the NSW Government in 1997 under the PSP.

The Project has an estimated cost of $45.4 million and would create up to 150 jobs during construction.

1.2 STATUTORY PROVISIONS

Prior to January 1, 1999, certain SWC projects could be certified by the Minister to have regional or State significance under Section 37A of the State Owned Corporations Act 1989 (SOC Act). In these circumstances, and if an EIS was required, SWC was required to obtain the approval of the Minister under Division 4 of Part 5 of the EP&A Act before carrying out the development, and took on the functions of a determining authority under Part 5 of the Act.

The Water Legislation Amendment (Drinking Water and Corporate Structure) Act 1998 came into operation on January 1, 1999 and transformed SWC from a Company State Owned Corporation into a Statutory State Owned Corporation. As certification under the SOC Act only applies to Company State Owned Corporations, this change means that a project potentially of state or regional significance could no longer be certified under Section 37A of the SOC Act.

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 allow SWC to seek certification for a number of specified projects despite SWC's change of status to a Statutory State Owned Corporation.

In October 1999, the proposed sewerage scheme was certified by the Minister as being of regional significance under the provisions of the SOC Act. The Minister also determined that the proposal would be likely to significantly affect the environment and required that an EIS be prepared.

An assessment report for the proposal must be prepared by the Director-General of the Department before the Minister may make a decision. This report and the Minister's decision are to be made public.

State agencies with approval responsibilities for the project and who have been identified as determining authorities are:

- Environment Protection Authority (now part of the Department of Environment and Conservation) – for issuing an environmental protection licence under the *Protection of the Environment Operations Act 1997;*
- National Parks and Wildlife Service (now part of the Department of Environment and

Conservation) – for issuing a consent to destroy an Aboriginal site under the *National Parks and Wildlife Act 1974;*

- Roads and Traffic Authority – for issuing approval for works within the road reserve under the *Roads Act 1993;*
- Wollondilly, Penrith and Liverpool Councils – for works within the road reserve in roads under each Council's control;
- WorkCover – for issuing a licence under the *Dangerous Goods Act 1975* to store dangerous goods at the new Warragamba STP and some of the SPSs.

Approval of the DEC is required to obtain an exemption for any discharge or overflow to a Class P: Protected Waters and enable the project to proceed. The Nepean River and some of its tributaries (Scotcheys Creek, Jerrys Creek and Duncan's Creek) fall into this classification. The EPA approved an exemption through an amendment of the Clean Waters Regulations 1972 (as enforced by the *Protection of the Environment Operations Act 1997*), gazetted on June 16, 2000.

Under the Rivers and Foreshores Improvements Act 1948, a Part 3A permit is required from the Department where works are to be carried out within 40 m of a waterway. Such works will be undertaken for the proposed scheme. However, SWC being a public authority is exempt from obtaining a permit from carrying out such works but will still be subject to remedial work notices.

SWC referred the Project to the Commonwealth Department of Environment and Heritage (DEH) under the *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) due to potential significant impact of the proposed works on matters of national environmental significance (ie Shale Sandstone Transition Forest, an endangered ecological community listed under the EPBC Act). DEH determined that the proposed activity does not constitute a 'controlled action' and consequently, does not require its approval.

1.3 EIS EXHIBITION AND APPROVAL PROCESS

An EIS was prepared in accordance with Section 112 of the EP&A Act. In a letter dated 4 January 1999, SWC wrote to the Director-General of the Department seeking advice on requirements for the form and content for an EIS for the proposal. The Director-General's requirements were issued in a letter dated 4 February 1999.

The EIS was exhibited from 17 December 1999 to 25 February 2000 inclusive. Public display locations and times were advertised in the local and state papers, in accordance with the EP&A Act.

Copies of all representations made to SWC were received by the Department on 25 May 2000.

1.4 REQUEST FOR THE APPROVAL OF THE MINISTER FOR INFRASTRUCTURE AND PLANNING

SWC originally sought the approval of the Minister for the project in a letter dated 19th July 2001. This was accompanied by a report (hereafter referred to as the 'Representations Report') addressing issues raised in representations from the public exhibition of the EIS.

SWC has since submitted a Supplement to the Representations Report (hereafter referred to as the 'Supplement Report') which proposes a number of amendments to the original scheme. This was accompanied by a letter (received 1st December 2003) seeking the Minister's approval for

the revised scheme. A further amendment was subsequently proposed, which is contained in an Addendum to the Supplement Report (received 26th March 2004).

1.5 PURPOSE OF THIS REPORT

The purpose of this report is to review the project EIS, issues raised in representations to the public exhibition of the EIS, submissions made by the Proponent, proposed changes to the Project (as contained in the Supplement Report and Addendum) and other matters pertinent to the potential environmental impact of the proposal.

This report is prepared in accordance with Section 115C of the EP&A Act which requires the Director-General of the Department to assess and report to the Minister for Infrastructure and Planning on the proposal. This report documents the outcome of an independent environmental impact assessment by the Department accounting for all key issues of the proposal.

2 PROJECT DESCRIBED IN THE EIS

This section provides a description of the Project described in the EIS. It provides an overview of the information presented in the EIS and does not necessarily represent the Department's views.

2.1 THE PROJECT AS DESCRIBED IN THE EIS

The proposal involves a conventional sewage collection system for Mulgoa, Wallacia and Silverdale and the transfer of sewage to a new Warragamba STP. The existing STP at Warragamba will be decommissioned with sewage being transferred to the new STP. Following treatment, the effluent will be transferred to Chittick's Dairy at Wallacia for agricultural re-use. Approximately 71-85% of the annual effluent volume is to be re-used. Discharge to the Warragamba River would occur periodically during wet weather and cooler periods of the year when irrigation demands were low.

The new STP is an IDAL (Intermittent Decanting Aerated Lagoon) process type, incorporating the use of IDALs, Balance Tanks, Sludge Storage Tanks followed by tertiary filtration and disinfection by chlorination prior to final treated effluent discharge.

Figure 1 shows the original proposed scheme and location of the villages.

Details of the original scheme include:

- provision of a conventional sewerage system within the villages of Mulgoa, Wallacia and Silverdale, including seven sewage pumping stations (SPSs), gravity sewers and rising mains. The existing collection system within Warragamba would be retained;
- a sewage pumping station (SPS MU2) on the northern outskirts of Mulgoa which will pump flows to SPS MU1;
- a sewage transfer pumping station in Mulgoa (SPS MU1) which will pump flows from Mulgoa to Wallacia via a rising main;
- a sewage transfer pumping station in Wallacia (SPS WL1) that will collect sewage from Wallacia and the flows from Mulgoa. The combined flows will be pumped to the new Warragamba STP via a rising main;
- a sewage pumping station east of the Silverdale residential area (SPS SV1);
- a sewage pumping station north of the Silverdale residential area (SPS SV2);
- a sewage transfer pumping station in Silverdale (SPS SV3) which will pump the combined flow in Silverdale to the new Warragamba STP via a rising main;
- a sewage transfer pumping station in Warragamba (SPS Wa1) which will pump sewage from the existing sewered areas of Warragamba to the new Warragamba STP via a rising main. SPS Wa1 will be located at the existing Warragamba STP which will be decommissioned;
- the new Warragamba STP providing tertiary treatment located on land already owned by SWC at the junction of Silverdale Road and Nortons Basin Road. The new STP will be sized for an average daily flow of approximately 1.13ML/day;

- an effluent re-use scheme catering for 71-85% of the annual effluent volume and consisting of an effluent storage at the new STP site and a pipeline from the STP to Chittick's Dairy Farm (farm is located on the east bank of the Nepean River, approximately 3.5 km southeast of the new STP site, 8 km by road); and

- an effluent discharge pipe from the new STP to Middle Gully, discharging effluent that is not re-used and with sufficient capacity for peak wet weather flows.

At the new STP, between 30-60m^3 of dewatered biosolids will be generated per month. Biosolids will be transported away by trucks at the rate of approximately one truck per week. Any temporary storage of biosolids in the STP (typically 1-2 weeks) would be undertaken under enclosed and contained conditions.

Odour control facilities will be installed in 5 of the 7 SPSs (ie four transfer SPSs and one small submersible SPS).
Each SPS will be equipped with the following measures to reduce the risk of operational failure and overflow:

- an installed stand-by pump which will automatically start in the event that a duty pump fails;
- bypass pumping connections allowing portable pumps to be used in the event of a pumping station failure;
- emergency storage (minimum four hours at peak dry weather flow);
- a portable generator plug-in point, so that an external power supply can be provided in the event of a failure of the general electricity supply;
- telemetry links to a 24 hour manned control centre which monitors alarms and initiates contingency actions in the event of failure; and
- remote operation of critical items.

The capital cost of the original project was estimated at $26.1 million with an annual operating cost of $0.75 million.

2.2 BACKGROUND TO THE PROJECT

Mulgoa, Wallacia and Silverdale lie largely within the Upper Nepean River catchment except for the western part of Silverdale, which is located within the Warragamba River catchment. Lake Burragorang and Warragamba Dam are located upstream of the three villages. The villages currently rely on on-site sewerage systems which are operating poorly resulting in sewage effluent seeping off-site and accessing storm water drains. This has led to deterioration of the water quality of the watercourse with increases in problems associated with environmental degradation and public health.

The proposed sewerage scheme for the four towns was developed in response to the NSW Government's Priority Sewerage Program (PSP), formally announced in February 1997. The program aims to address the environmental problems associated with unsewered areas in the Sydney and Illawarra regions. The three villages form one of the seven areas nominated for priority consideration and identified by the NSW Government for improvement.

2.3 NEED, BENEFITS AND PROJECT JUSTIFICATION

The project has been developed to address the problem of poorly performing on-site sewage

treatment systems in the three villages and the risks they pose to the surrounding environment. Evidence of negative impact from these systems are water logging of soils, ponding and runoff of sewage effluent, odour, weed growth, and deterioration of the quality of watercourses with increase in pathogenic micro-organisms and nutrient loadings, particularly during periods of wet weather.

The general objectives of the project are:

- ameliorate the problems inherent with on-site systems; and
- address the need for an upgrade/replacement of the over 50year old Warragamba STP, which uses old style treatment processes, to improve effluent quality.

A centralised sewerage system, compared with the existing situation, is expected to deliver the following benefits:

- significant reduction of environmental impacts due to treatment of effluent to a high standard prior to discharge;
- more effective management of the public health risks associated with sewage collection and disposal in the study area.

If an improved sewage management scheme is not implemented, the EIS envisages the continuation of adverse effects on water quality in local waterways, potential health hazards and long term degradation of soil structure.

2.4 ALTERNATIVES CONSIDERED

The EIS developed a range of alternative options to meet the stated objectives for the project. 17 options, grouped under five strategies, were evaluated:

- *Strategy A – Enhanced on-site management.* This strategy is based on retaining upgraded on-site management within all of the villages, including an upgrade of Warragamba STP (which would continue to serve only the Warragamba Village);

- *Strategy B - Treat locally and discharge.* This is based on collection of sewage, centralised treatment and effluent discharge to local streams. Some options considered upgrading the existing STP at Warragamba; other options considered decommissioning this STP and constructing a new one;

- *Strategy C - Transfer to existing STP.* This is based on collection and transfer to an existing STP outside of the study area, with effluent discharged to streams local to the STP. Penrith STP was selected as the transfer location because it is the nearest existing STP to Warragamba;

- *Strategy D - Non-potable re-use.* This is based on centralised treatment with local effluent re-use included as an integral part of the scheme from inception. This differed from Strategy B options, which only made provision for effluent re-use to be added at some future date; and

- *Strategy E - Potable re-use.* This involves local treatment and returning suitably treated effluent to the raw water supply or injection of highly treated reclaimed water into the potable water supply.

Option D1x (Optimised), ie local treatment with partial effluent re-use as an integral part of the proposal, was selected as the preferred option. It was selected on the basis that it offered a balance between SWC's community, economic and environmental objectives.

3 SUMMARY OF REPRESENTATIONS

This section summarises the issues, concerns or comments made in representations to the public exhibition of the EIS.

3.1 CATEGORIES OF REPRESENTATIONS RECEIVED

A total of 16 representations were received as a result of the exhibition of the EIS. Copies of all representations were forwarded to the Department by SWC.

The sources of the representations are summarised below.

Representation type	**Number of Representations**
Individual Residents	4
Local Government	3
Government Departments	7
Community Groups	1
Environmental Groups	1
Total	**16**

3.2 OVERVIEW OF ISSUES RAISED IN REPRESENTATIONS

In its Representations Report (dated April 2001), SWC included a summary of the matters raised in each of the representations.

A number of representations expressed general support for the project. Although there were no objections to the implementation of the proposed scheme, a range of issues were raised as follows:

Flora and fauna
Concerns about the proposal's impacts on flora and fauna, in particular the Red Crowned Toadlet and Cumberland Plain Woodland, need for vegetation and weed management, consultation with relevant councils and local Landcare groups, and rehabilitation of all pipeline work areas with native vegetation.

Effluent re-use and management
A principal concern is the need to include alternative/backup irrigation sites to Chittick's Dairy farm. Other concerns relate to measures and controls to be adopted for the operation and irrigation management of the farm.

Population load projections
Concerns that lack of consideration for future rezoning and development pressures for sewerage services, which may not be accommodate by the proposal, could result in benefits being lost.

System capacity and service area

A number of specific areas (outside of the designated PSP area) were requested to be included in the scheme (eg Luddenham by Liverpool Council). This raises issues about the capacity of the new STP to accommodate additional service areas and SWC's requirements for connection to the system.

Sewage overflows and containment options of collection system

Issues raised include justification of the adopted frequency level of 10 overflow events in 10 years, clarification on the use of the 15 ML disused dam for effluent storage, design and performance of the SPSs, and modelling of the containment system.

Operation of the new Warragamba STP

A wide range of issues were raised: design capacity, discharge quantities during dry and wet years, quality and standard of treated effluent that would be discharged to Warragamba River, capability of future upgrade of the treatment process.

Soil and water management

Need for erosion and sedimentation control measures, prevention of potential erosion from effluent discharge on the northern slope of Middle Gully, and consideration of specific requirements of Penrith and Wollondilly Councils and agencies.

4 AMENDMENTS TO THE PROJECT

This Section describes the revised Project for which Sydney Water Corporation is seeking the Minister's approval. It describes the amendments to the original project which are identified in the Supplement to the Representations Report and Addendum to the Supplement Report. These amendments were made by the Proponent subsequent to the submission of the Representations Report and following further studies and investigations conducted by SWC on certain aspects of the scheme.

SWC did not propose any changes to the EIS-exhibited proposal in its Representations Report. Changes were proposed subsequent to that report and in response to the Department's consideration of the proposed scheme and further investigations carried out by SWC on various issues.

The proposed amendments are discussed in the Supplement to the Representations Report, Addendum to the Supplement and in correspondences from SWC. A consolidated list of these amendments and reasons provided by SWC are outlined in the table below.

Amendments	Description of proposed change	Reasons for the amendment
1. deferral of effluent re-use and removal from the project of effluent re-use at Chittick's Dairy		▪ not justifiable due to the high capital costs of providing infrastructure and limited environmental benefit. ▪ no financial incentive for either the Dairy farm or for an alternative effluent user (Wallacia Golf Course).
2. relocation of the STP site in Warragamba	▪ two sites were investigated. The chosen site is approx. 190m south west of the original STP shown in the EIS.	▪ proposed works on the original site could have a significant impact on an endangered ecological community (Shale Sandstone Transition Forest). ▪ current site reduces impact on this ecological community while also providing a greater buffer to nearby residents from odour, noise and visual impacts than another alternative.
3. alteration of the route and construction method for the effluent discharge pipeline	▪ original scheme - the pipeline is to be constructed in trench and/or on piers; the discharge point is at the northern slope of Middle Gully (40-50 m high above the gully). ▪ the discharge point is now at Warragamba River, 2-3 m above the river. The new pipeline will be drilled underground partly along a	▪ engineering feasibility, environmental and safety issues

	cleared track and existing telecommunications corridor to the river.	
4. provision of a pressure sewerage system within the Silverdale Industrial Estate	▪ a gravity reticulation system was originally proposed for the whole scheme. This industrial estate is now to have a pump-up pressure system with a common network. The equipment to be installed could include pumps attached directly onto the top of existing septic or pump out tanks. ▪ service area consists of approx. 35 properties within the estate.	▪ difficulties in constructing a gravity carrier alongside the upper reaches of Megarritys Creek between the end of Warren Place and the site proposed for SPS SV3.
5. elimination of SPS SV3		▪ adoption of a pressure sewerage system for the Silverdale Industrial estate resulted in the elimination of this pumping station.
6. relocation of SPS MU2 in Mulgoa	▪ the original site was in the vicinity of a driveway into a property off Fairlight Road. ▪ the new site is the rear boundary of the Mulgoa Primary School.	▪ uncertainties with securing private landowner's agreement.
7. revised ultimate population load and STP capacity	▪ average dry weather flow of 1.35 ML/day (instead of 1.13 ML/day) and equivalent population of 6,400 instead of 4,896 (figure identified in the EIS). ▪ properties considered for inclusion in the scheme are listed in Table 7.	▪ requests were received in the representations to include certain additional areas in the servicing scheme. ▪ STP capacity is sufficient to accommodate identified additional areas subject to payment of connection costs.
8. relocation of SPS WL1 in Wallacia	▪ the original site was in Water Street between the Wallacia Public School and Jerrys Creek. ▪ the new site is adjacent to the southern boundary fence of the Wallacia Golf Course (off Park Road).	▪ vulnerability of the old site to flooding (within the 100 ARI flood level). If built, a 7 metre high structure for the SPS switchgear would create adverse visual impacts; also safety/hazards issues from the chemical dosing facility.

Table 1: Summary of Amendments to the Exhibited EIS Proposal

The likely impacts of the proposed changes are discussed in sections 5 and 6 of this report and summarised in section 7.

The components of the revised Project are outlined below:

- a conventional sewerage system within the villages of Mulgoa, Wallacia and Silverdale (with the exception of the Silverdale Industrial Estate), including six SPSs, gravity sewers and rising mains. Retention of the existing collection system within Warragamba;
- a pressure sewerage system generally within the road network of Silverdale Industrial Estate that will connect to the rising main in Silverdale Road;
- a sewage pumping station (SPS MU2) on the northern outskirts of Mulgoa which will pump flows to SPS MU1;
- a sewage transfer pumping station in Mulgoa (SPS MU1) which will pump flows from Mulgoa to Wallacia via a rising main;
- a sewage transfer pumping station in Wallacia (SPS WL1) that will collect sewage generated in Wallacia and pumped from Mulgoa to Wallacia. The combined flows will be pumped to the new Warragamba Sewage Treatment Plant (STP) via a rising main;
- a sewage pumping station (SPS SV1) east of the Silverdale residential area that will pump flows to SPS SV2;
- a sewage pumping station (SPS SV2) north of the Silverdale residential area that will transfer the combined flows in Silverdale to the new Warragamba STP;
- a sewage transfer pumping station in Warragamba (SPS WA1) which will pump sewage from the existing sewered areas of Warragamba to the new Warragamba STP via a rising main. SPS WA1 will be located at the existing Warragamba STP, which will be decommissioned;
- a new Warragamba STP providing tertiary treatment located on land already owned by SWC at the junction of Silverdale Road and Nortons Basin Road. The new STP will be sized for an average dry weather flow of up to 1.35ML/day; and
- an effluent discharge pipeline from the new STP via an underground route partly along a cleared track and existing telecommunications corridor to the Warragamba River. The discharge point will be located approximately 50m downstream of Middle Gully, releasing 100% of the effluent at the quality specified in the EIS.

It is to be noted that, contrary to the EIS, it is likely that none of the proposed SPSs will now have a building or superstructure. SWC indicated that a superstructure for a large submersible pumping station is not generally typical of what is built today. Aboveground structures for the SPSs will generally consist of electrical kiosks and vent shafts. These changes are more of a detailed design issue than an amendment to the proposal. They should reduce impacts.

The Supplement Report indicated that apart from the main drilling sites identified in the EIS, trenchless technology may be used throughout the scheme but particular locations will not be identified until detailed design. To date, the identified main drilling sites are for:

- the STP outfall to the Warragamba River;
- the transfer pipeline from the old Warragamba STP to the new STP;
- the transfer pipeline from SPS WL1 to the new STP through the roundabout intersection of Park, Mulgoa and Silverdale Roads.

Figure 2 shows the revised scheme. Figures 4-6 show the sewer concept designs respectively for Mulgoa, Wallacia and Silverdale.

5 ASSESSMENT OF THE PROJECT'S KEY ISSUES

This Section of the Report provides an assessment of the key environmental issues. Those issues were identified from the following: an examination of the EIS, issues raised in representations made during the exhibition period, the Proponent's response presented in its Representations Report and the Proponent's assessment of the proposed changes to the EIS scheme contained in the Supplement to the Representations Report and Addendum to the Supplement. It is important that this Section be read in conjunction with these reports.

Other issues are discussed in Section 6.

5.1 FLORA AND FAUNA

5.1.1 Background

Terrestrial flora and fauna

Assessments of the potential flora and fauna impacts of the proposal (as described in the EIS and as amended in the Supplement Report) were conducted by Australian Museum Business Services (AMBS). Database searches, literature reviews and field survey work were used for this purpose. The survey effort for the proposal is summarised in Table 2.

Survey Period	Activities
March, May, June, September and October 1999 - undertaken for the EIS	▪ Flora surveys using quadrat based surveys and transect surveys ▪ Fauna surveys using opportunistic observation techniques and fauna habitat assessments ▪ Detailed fauna survey (harp traps, spotlighting, Ababat) ▪ Targeted surveys for the Red-crowned Toadlet and Yellow-bellied Glider at the initial STP site and downstream gullies
December 2001 and June, August and September 2002	▪ Flora surveys using quadrat based surveys and random meander transects ▪ Fauna surveys using opportunistic observation techniques and fauna habitat assessments ▪ Targeted surveys for the Red-crowned Toadlet
July and August 2003	▪ Supplementary flora surveys (quadrat based) ▪ Supplementary fauna surveys (opportunistic, targeted searches of habitat, spotlighting) ▪ Targeted surveys for land snails (eg. *Meridolum* spp.)

Table 2: Flora and Fauna surveys for the proposal

The EIS identified five major plant communities in the study area: Sydney Sandstone Ridgetop Woodland, Ironbark Forest, Cumberland Plain Woodland, Sydney Coastal River-flat Forest, and areas cleared of native vegetation.

Sydney Coastal River-flat Forest and Cumberland Plain Woodland are listed as endangered ecological communities under the TSC Act. The latter community is also listed as endangered on the EPBC Act. The EIS assessed the potential impacts of the proposal on these two endangered ecological communities in accordance with Section 5A of the EP&A Act (eight part

tests). It was concluded that the proposal is unlikely to have a significant impact on these communities.

Figure 5-4 of the EIS indicates the potential presence of Sydney Sandstone Transition Forest in the areas of the new STP site, existing Warragamba STP site and parts of Silverdale. This ecological community is listed as endangered under both the TSC Act and EPBC Act. However, the potential impact on this community was overlooked and was not assessed in the EIS.

No threatened flora species were recorded during the surveys for the EIS. However, the EIS assessed the potential impacts of the proposal on the threatened species *Eucalyptus benthamii* in accordance with Section 5A of the EP&A Act (eight part tests). One ROTAP species, Native Cranberry (*Lissanthe sapida*) was recorded throughout the gullies in the vicinity of the proposed STP site. Seven other regionally significant species were also recorded.

Three threatened fauna species were recorded in the study area during the surveys conducted for the EIS: Red-crowned Toadlet, Glossy Black Cockatoo and Square-tailed Kite. In addition, 14 other threatened fauna species are considered likely to occur in the study area. Eight-part tests were conducted for all 17 threatened fauna species.

These tests concluded that the proposal would be unlikely to significantly affect any threatened species or endangered ecological communities.

The EIS identified a number of potential impacts on flora and fauna and recommended various strategies to mitigate impacts.

Aquatic flora and fauna

The EIS presented information on results from various surveys involving suspended algae, blue-green algae, chlorophyll-a, and macro invertebrates in the rivers and streams within the study area. There is no data for fish or other aquatic vertebrates in the small local streams. However, there is two years data (1983 & 1996) from a fish survey (Resource and Conservation Assessment Council 1997) conducted for sites in the Hawkesbury-Nepean Basin, which includes a site on the Nepean River at Wallacia. None of the species found in this survey are listed as vulnerable, rare or endangered.

Post EIS

The Department sought clarification and additional information from SWC regarding certain threatened species and endangered communities following its review of the flora and fauna assessment in the EIS.

This led to a review and further flora and fauna assessment by AMBS of the original STP and associated infrastructure. AMBS's assessment indicated that the proposed works may significantly impact on stands of Shale Sandstone Transition Forest.

Consequently, SWC investigated other sites within the general area of the STP for the siting of the plant facilities and effluent pipeline discharge point. Two sites were considered. The final site is described and illustrated in the Supplement to the Representations Report and shown in Figure 3. The proposed amendments to the STP site will generally reduce impacts on flora and fauna. The Supplement to the Representations Report also makes a number of additional commitments to mitigation measures as part of the proposal. These include:

- minimising clearing and retaining shrubs and groundcover where practicable, particularly in the buffer zone of the STP;
- rehabilitation and compensatory revegetation in areas of currently degraded land identified to the east of the proposed STP site;
- rehabilitation of disturbed areas following installation, particularly the excavation corridor for the proposed transfer pipeline from Silverdale Road to the STP;
- mitigation during construction, such as fencing, locating ancillary construction facilities in previously cleared areas, inspection of culverts, pipes and other structures for fauna prior to removal, etc;
- a long-term weed control program;
- monitoring and maintenance of rehabilitation; and
- monitoring of effluent discharge.

5.1.2 Issues

The key flora and fauna issues raised in the EIS and from representations on the EIS include:

- presence of a group of Red-crowned Toadlet, which is quite large and of local significance, in the two gullies in the vicinity of the proposed (original) STP site;
- occurrence of Native Cranberry *(Lissanthe sapida*) 80m downstream of the proposed STP site;
- occurrence of Ironbark Forest and Cumberland Plain Woodland in sections of the proposed transfer pipeline routes along Silverdale Road (north of Nortons Basin Road) and Greendale Road. Ironbark Forest is a community poorly represented in conservation reserves;
- occurrence of relatively undisturbed Sydney Sandstone Ridgetop Woodland at the Silverdale industrial area;
- high potential for weed infestation following construction of the proposed works. The most likely areas of introduction of weeds are the gully into which the treated effluent will be released from the proposed STP and watercourses within the study area;
- need to minimise vegetation disturbance, carry out weed eradication and rehabilitation programs, and implement measures to avoid adverse impacts on threatened species/communities. These matters were raised in representations from Penrith City Council, Wollondilly Shire Council and the former Hawkesbury Nepean Catchment Management Trust. Both Councils also requested SWC to meet a list of specific actions dealing with native vegetation and weed control management.

Additional issues were raised by the Department. These include:

- impacts of the proposal on Shale Sandstone Transition Forest and clarification on clearing required;
- avoidance of all stands of Cumberland Plain Woodland in the routing of the pipelines;
- immediate rehabilitation of the Nepean River crossing and Jerrys Creek crossing to minimise impacts to the endangered Sydney Coastal River-flat Forest which occurs on the roadsides of these crossings;
- commitment to long-term weed control and rehabilitation;
- clarification that impacts on the Red-crowned Toadlet would be avoided.

5.1.3 Consideration and Conclusion

Amendments to the EIS proposal

The Proponent made a number of amendments to the EIS proposal as described in the Supplement to the Representations Report and Addendum to the Supplement. The Department considers that these amendments generally reduce the impacts on flora and fauna, as described in the following table. These amendments address many of the concerns raised about flora and fauna impacts during exhibition of the EIS.

Component	**Flora and fauna impacts of EIS proposal**	**Description of amendment**	**Flora and fauna impacts of the revised proposal (Supplement to the Representations Report and Addendum)**
Pressure sewerage system in Silverdale Industrial Estate	Clearing of remnant vegetation to install pipes.	Replacement of gravity carrier system.	Clearing to install pipes would no longer be necessary as pressure reticulation mains would be laid in the road or road reserve. Property collection tanks and lines would be located within existing disturbed areas.
Elimination of SPS SV3	Previous proposal involved bushland clearing and potential impact on Sydney Sandstone Ridgetop Woodland.	Adoption of a pressure sewerage system to Silverdale Industrial Estate makes this SPS redundant.	None.
Relocation of SPS MU2	None	SPS moved approximately 100m to the east.	Potential removal of planted trees and shrubs. Minimal impact.
Deferral of effluent re-use scheme	Route of effluent re-use pipeline passes remnants of Cumberland Plain Wooldland.	Deferred for future investigation.	Removes potential impact on Cumberland Plain Woodland. Potential water quality impacts. However, the proposal is not expected to adversely affect ecosystem health downstream of the new Warragamba STP due to the dilutive effect of the combined environmental and riparian flow released to the river at Megarritys Creek.
Relocation of the STP	Clearing required for STP site (1.6ha) would potentially have a significant impact on Shale Sandstone Transition Forest.	STP site relocated (190m south west) to reduce impacts on Shale Sandstone Transition Forest. The final proposed location also considered proximity to residential properties.	Clearing required for STP site (1.6ha) would not have a significant impact on Shale Sandstone Transition Forest. Vegetation to be cleared would be of less value due to condition and composition (considered to be at the limit of what could be feasibly classified as Shale Sandstone Transition Forest). Compensatory rehabilitation is proposed (see Figure 7). The

			proposed revegetation areas are intended to be equal to or greater than the area to be cleared for the STP construction.
Alteration of route and construction method for effluent discharge pipeline	Potential impacts on a locally significant population of the Red-crowned Toadlet in the two gullies in the vicinity of the proposal. Some clearing due to trench construction.	The amended discharge pipeline route would consist of a 230m long directional drill from the cleared telecommunications corridor to the water's edge of the Warragamba River.	Discharge location moved to avoid impacts on Red-crowned Toadlet. Disturbance to vegetation avoided, including individuals of Native Cranberry (*Lissanthe sapida*) and protection of *Lomandra fluviatilis*.
Population and service area	Not applicable.	Enlarged scope of servicing area and population load.	Potential water quality impacts due to discharges of pollutants (ammonia). However, modelling predicted that aquatic fauna in the Warragamba River would not be impacted even in wet weather.
Relocation of SPS WL1	Removal of several large Cabbage Gums from the Water St site (near Jerrys Creek). The vegetation in the vicinity of the site is remnant Sydney Coastal River Flat Forest (an endangered ecological community).	Site moved from Water St to a site in the Wallacia Golf Course. An overflow structure will remain near Jerrys Creek.	No clearing required at the new site. The installation of the overflow structure near Jerrys Creek would be located to minimise any impacts on the Sydney Coastal River Flat Forest.

Table 3: Comparison of flora and fauna impacts of the EIS proposal and the revised proposal

Threatened Species

The Department concurs with the conclusions of the eight part tests for threatened species that the proposal would be unlikely to significantly affect any threatened species or endangered ecological communities. The Department notes that mitigation and compensatory measures proposed for the Project are essential in justifying this conclusion.

Aquatic Flora and Fauna

The Department considers that the erosion and sediment control measures and chemical spill management proposed for the scheme are adequate for protection of aquatic flora and fauna.

During operations, comprehensive water quality monitoring would be required to ensure discharges are within specified criteria. Water quality is discussed further in Section 5.3.

Referral to Commonwealth DEH

SWC has referred the project to the Commonwealth Department of Environment and Heritage (DEH) due to the proposed clearing of 1.6ha of vegetation in the STP site adjoining an area of Shale Sandstone Transition Forest. DEH has considered and determined that the proposed work does not constitute a controlled action under the EPBC Act and thus, does not require its approval under that Act.

Mitigation Measures

The proposal has the potential for significant impacts on vegetation communities and habitat, including endangered ecological communities. Mitigation measures during construction and operation as recommended in the EIS, Representations Report and the Supplement Report include:

- investigation of alternative locations for transfer pipeline routes to minimise potential impacts on flora and fauna;
- sedimentation and erosion controls, such as silt fencing;
- weed control prior to, during and post construction of the proposal;
- minimising clearing and retaining shrubs and groundcover where practicable, particularly in the buffer zone of the STP;
- rehabilitation and compensatory revegetation in areas of currently degraded land identified to the east of the proposed STP site (see Figure 7);
- rehabilitation (including monitoring and maintenance) of disturbed areas following installation, particularly the excavation corridor for the proposed transfer pipeline from Silverdale Road to the STP;
- monitoring of effluent discharge.

The Department supports the proposed mitigation measures detailed in the EIS, Representations Report and Supplement to the Representations Report. To ensure these commitments are implemented during construction and operation, the Department recommends Conditions of Approval Nos 24 and 25 that require:

- the preparation and implementation of a Flora and Fauna Management Sub Plan;
- comprehensive rehabilitation requirements for the proposal, including areas identified in Figure 8, the excavation corridor for the transfer pipeline from Silverdale Road to the STP, ancillary construction sites including all bored pipeline entry and exit pits, and landscape plantings disturbed within the Mulgoa Primary School grounds;
- a Weed Management Plan;
- actions to be undertaken in the event that unexpected impacts on threatened species are likely to occur; and
- a Bushland Restoration and Maintenance Report describing long-term regeneration, weed control, fire management and monitoring strategies.

DEC comments

The DEC recommends an offset ratio for revegetation works at the STP site of 8:1[3], consistent with its position on other Western Sydney proposals. That is much more substantial than what

[3] The DEC generally recommends a 2:1 "like-for-like" offset ratio where the loss of 1 ha of high quality vegetation would be counter-balanced by the protection of 2 ha of vegetation of the same type and quality. However, in this case, it recommended a 8:1 offset ratio to reflect the risks involved in the revegetation process (fire, plant failure).

is proposed, ie revegetation of 2.7 ha of currently degraded land in the vicinity of the STP site to compensate for the 1.6 ha that will be cleared. SWC advised that the revegetation area encompasses all practical land it has available on the site that could be revegetated. It is not prepared to purchase additional land specifically for this purpose.

The Department considers that the extent of the proposed rehabilitation area provides an adequate offset for the clearing of 1.6 ha of vegetation. The Department notes that:

- the Proponent investigated alternative sites for the STP to avoid impact on an endangered ecological community and has changed the plant location to reduce impacts;
- the current proposed STP site could not avoid clearing of Shale Sandstone Transition Forest. However, the vegetation to be cleared would be of less value than at the original site, ie it is considered to be at the limit of what could be feasibly classified as Shale Sandstone Transition Forest;
- the scale of clearing has been minimised;
- revegetation would occur on land owned and managed by the Proponent;
- the proposed revegetation areas are greater than the area to be cleared for the STP site.

Overall, the Department considers that the proposed rehabilitation reasonably compensates for the residual flora and fauna impacts of the proposal.

Conclusion

Construction impacts on flora and fauna would be manageable provided the mitigation measures identified are successfully implemented. The Environmental Management Representative would play a key role in monitoring the implementation of mitigation measures.

On the whole, the Department considers that, individually and cumulatively, the amendments to the EIS proposal would reduce the flora and fauna impacts of the Project.

5.2 DEFERRAL OF EFFLUENT RE-USE

5.2.1 Background

An integral part of the original project involved transfer and re-use of the treated effluent for irrigation purposes at Chittick's Dairy Farm, situated on the east bank of Nepean River in Wallacia. The dairy currently uses water from this river for irrigation of 50 ha of farmland.

The EIS stated that about 71-85% of the annual effluent volume will be re-used at the farm. The effluent that is not re-used (when on-farm storage is full and there is no demand for irrigation) will be discharged to Middle Gully near Warragamba. An Effluent Irrigation Management Plan will be developed to describe the irrigation practices on the farm and address the operation and management of the scheme. Assessment of impact in the EIS was largely predicated on effluent re-use as a principal component of the scheme.

SWC now proposes to defer the effluent re-use scheme and to discharge all treated effluent into the Warragamba River. The reasons for the deferral, as stated in the Supplement Report, are:

- the re-use scheme for Chittick's Dairy does not meet SWC's goals for sustainable water supply and demand, ie targeting re-use options that provide least cost solutions for waste water management and reducing the demand for potable water; and
- high cost of re-use and doubts over the continued viability of the dairy farm as a single point of disposal.

5.2.2 Issues

The representations raised the following concerns in relation to the originally proposed effluent re-use scheme:

- need for alternative irrigation site(s) in the event of problems where Chittick's Dairy site is not operational;
- need to prepare contingencies where there is no guarantee that farms will accept effluent in the long term;
- need to assess the potential for irrigation runoff and to ensure that environmental, safety and public health issues are addressed.

In view of the deferral of the re-use scheme, consideration of these concerns is not discussed in this report.

The current proposed change to 100% discharge to the Warragamba River was questioned by the Department and the DEC at the outset for the following reasons:

- SWC had not demonstrated that a commercial agreement could not be negotiated with the owner of Chittick's Dairy nor that other potential users (eg Wallacia Golf Course) have been approached/investigated more recently;
- SWC has not placed a timeframe on its deferral of a re-use scheme;
- insufficient analysis in support of a revised scheme without a re-use component;
- current Government policy requires more integrated approaches to water resource management to improve the health of the Hawkesbury-Nepean River. To be consistent with this broader Government policy and approaches, further consideration must be given to alternative effluent management opportunities before discarding re-use as an option and adopting a full direct discharge approach.

5.2.3 Consideration and Conclusion

SWC's response

SWC has undertaken further investigation on potential re-use options since the Supplement Report. It maintains that effluent re-use at this stage is deferred, not abandoned. It has provided the following arguments for deferring effluent re-use:

- there would be no environmental or financial benefit accruing to either Chittick's Dairy or Wallacia Golf Course from using reclaimed effluent. Currently these users satisfy their irrigation requirements by drawing water from the Nepean River at a nominal cost;

- the estimated cost of using infrastructure for effluent delivery to the Dairy Farm is $2.5 – 3M; and to the golf course, $1.4M. These costs will be recouped over a 20-year period. SWC would respectively charge these users $1.19 and between $ 0.85 – 1.02 per kilolitre, for recycled effluent provided. It cannot see any financial incentive for these businesses when compared to their present irrigation supply sources;
- demand issues: recycled effluent from the new STP would constitute only one sixth of the potential peak demand by the dairy operation. At the golf course, only 25% of the treated effluent available each day from the new STP could be disposed of for its use.
- without a re-use scheme, the revised scheme will still result in a significant environmental improvement over the current situation by eliminating run-off from existing on-site systems and improving the water quality of the river system. It will be an improvement on the existing Warragamba STP.

The Minister for Energy and Utilities has also independently commissioned an investigation into re-use. This was undertaken by the Department of Energy, Utilities and Sustainability. The conclusion of the investigation, as advised by that Minister, is that re-use is presently not justifiable on economic, social and environmental grounds. Note that a copy of the report has not been made available to the Department.

DIPNR and DEC position

Effluent re-use in the original scheme was claimed as an environmental benefit but the loss of this benefit was not discussed in the Supplement. Despite this deficiency, both the Department and the DEC now accept that re-use at this stage is not critical for the scheme. This is due to the high costs of providing the connecting pipelines and the relatively small volumes of discharges from the new STP and their quality. However, both agencies believe that with Government policy changes in licensing river extraction/water use and pricing, opportunities for re-use could become attractive in the future. Thus, the potential for implementation of a re-use scheme will need to be re-investigated by SWC at a later time.

To ensure that this occurs, the Department recommends Condition of Approval No 45. This requires SWC to submit a report to the Director-General by 30th June 2006 on the suitability of implementing an effluent re-use scheme. It also requires the report to consider a number of specified Government policies and plans relating to water and effluent management in the Hawkesbury-Nepean River system.

Note that the re-use scheme originally proposed in the EIS (Chitticks Dairy) has not been assessed in this report. Therefore, a condition specifying that nothing in this Minister's approval authorises re-use is recommended (Condition of Approval No 3). This Condition does not prohibit the inclusion of an effluent off-take point at the new Warragamba STP which DEC has suggested to SWC to facilitate supply of treated effluent by tanker.

5.3 RIVER DISCHARGES AND WATER QUALITY

5.3.1 Background

In the EIS, effluent modelling was conducted for both full discharge and re-use scenarios. Due to the changes proposed to the scheme (ie full discharges at all times, increased volume of effluent released, relocated release site), SWC has undertaken further water quality modelling

in the Supplement Report. This modelling focused on the full discharge proposal. The indicated purpose was to predict the impact of the new STP effluent and the new discharge point on the water quality and ecological health of the Warragamba River below the Warragamba Dam wall.

The sources of measurement data for the modelling are described in the Supplement Report. The modelling considered the combined environmental and riparian flow to the Warragamba River of 43.4ML/day (regulated discharges by the Sydney Catchment Authority) and the proposed STP effluent discharge of 1.13ML/day. A maximum capacity scenario of 1.35ML/day[4] that allows for the future connection of houses in suburbs planned but not yet built (eg at the site of the former Lion Park) has also been modelled. The predictions were based on the STP effluent quality reported in the EIS. They were also based on a mass balance analysis where the model used assumed no losses from sedimentation or uptake.

Modelling results in the Supplement Report indicated that the predicted concentrations of all parameters would meet the appropriate in-stream ANZECC and Healthy Rivers Commission – Hawkesbury Nepean River guidelines at all the designated locations. The Supplement also identifies a reduction in nutrient loads between the existing situation and the proposed new STP for both the 1.13ML/day and 1.35ML/day discharge scenarios.

5.3.2 Issues

The main concerns relate to the effluent modelling and water quality analysis provided by SWC.

The Department considers that there is a lack of discussion regarding difference in impacts on water quality and load reductions between the full discharge and re-use options (ie a comparison of the EIS proposal and the current proposal).

The DEC noted that the water quality analysis focuses on the impacts of nutrient concentrations, and in particular, on concentrations that are achieved through substantial dilution. It indicated that it is also interested in nutrient loads. However, it acknowledges SWC's predictions that the proposed scheme would result in lower in-stream nutrient concentrations and nutrient load to Warragamba River than at present but suggested more analysis would be required for load impacts.

5.3.3 Consideration and Conclusion

Impacts of full discharge

Unlike in the EIS, the water quality modelling for the revised scheme did not present a comparative analysis between the full discharge and re-use options. It only focused on the full discharge proposal. SWC argued that the primary purpose of the additional modelling in the Supplement Report was to demonstrate the lack of a deleterious impact of full discharge on river health and an improvement in water quality on the existing situation.

The predicted outcomes of a new STP with 100% discharge to Warragamba River based on this modelling are:

[4] This scenario is based on total average dry weather flow – see Addendum to Appendix A of Supplement to the Representations Report.

- recovery of ecosystem health between the current STP discharge and Megarritys Creek;
- maintenance (or improvement) of ecosystem health below Megarritys Creek;
- reduction in nutrient loads (TN and TP) over the current situation both for 1.13ML/day and 1.35ML/day discharge scenarios;
- compliance with all guidelines at all testing sites.

In terms of nutrient concentration, the modelling results in Table 4 showed that all in-stream contaminant concentrations would comply with both ANZECC and HRC guidelines at 1.13ML/day discharge[5]. At 1.35ML/day discharge (20% effluent volume increase), the only change in impact will be below Middle Creek (Table 5). At this site, ammoniacal-N was the only variable which would exceed the (ANZECC) guideline, ie rise by 15% to 0.23MG/L.

The modelling report identified ammonia as the toxicant of most concern from STPs. A single exceedance of the ANZECC level would be expected to result in some die off of aquatic fauna. However, the report concluded that with dilution from the 43.3 ML/d riparian flow, the new STP with ADWF of 1.35ML/d will not have any ammoniacal N toxicity impacts on the macro-invertebrate fauna, even in wet weather.

Site	TN (mg/L)	TP (mg/L)	50% Ammoniacal N (mg/L)	BOD (mg/L)	FC (CFU/100 mL)
Warra R below dam wall	0.395	0.032	0.010	1	32
Warra R d/s STP	0.395	0.032	0.010	1	32
Warra R d/s of Megarritys Ck	0.273	0.005	0.008	2	1
Warra R d/s Middle Creek	0.455	0.008	0.020	2	4
Guideline Values					
ANZECC (2000)*	0.50	0.050	0.020		150
Healthy Rivers Commission**	0.700	0.035	0.020		150

*ANZECC (2000) Guidelines, ** Healthy Rivers Commission 1998
These predictions are based on the STP effluent quality (at 50 Percentile) reported in the EIS and a minimum riparian flow of 43.3 ML/d.

Table 4: Predicted water quality outcomes from full discharge to Warragamba River at 1.13 ML/day

[5] The DEC notes that incorrect ANZECC Guideline values for both TN and TP were used by SWC. The appropriate value for TN is 0.35 mg/L, in which case the discharge will not meet the ANZECC guideline for TN, but will meet the HRC's. The correct value for TP is 0.025 mg/L which will meet both Guidelines. Notwithstanding the discrepancy in values, DEC considers that the proposed scheme should result in lower in-stream nutrient concentrations than at present.

Site	TN (mg/L)	TP (mg/L)	50% Ammoniacal N (mg/L)	BOD (mg/L)	FC (CFU/100 mL)
Warra R below dam wall	0.395	0.032	0.010	1	32
Warra R d/s STP	0.395	0.032	0.010	1	32
Warra R d/s of Megarritys Ck	0.273	0.005	0.008	2	1
Warra R d/s Middle Creek	0.490	0.009	0.023	2	5
Guideline Values					
ANZECC (2000)*	0.50	0.050	0.020		150
Healthy Rivers Commission**	0.700	0.035	0.020		150

*ANZECC (2000) Guidelines, ** Healthy Rivers Commission 1998

These predictions are based on the STP effluent quality (at 50 Percentile) reported in the EIS and a minimum riparian flow of 43.3 ML/d.

Table 5: Predicted water quality outcomes from full discharge to Warragamba River at 1.35 ML/day

In terms of nutrient load (volume times concentration), the proposed STP design is predicted to reduce both the TN and TP load at average dry weather flow respectively by 26% (from 4,100 kg/yr in 2003 to 3,096 kg/yr) and 76% (256 kg/yr in 2003 to 64 kg/yr). This is despite a predicted 135% increase in effluent discharge volume[6]. At 1.35 ML/day discharge, the equivalent reductions are 12% for TN (from 4,100 kg/yr to 3696 kg/yr) and 71% for TP (from 256 kg/yr 72 kg/yr). Table 5 illustrates the predicted reductions in TN and TP at these discharge levels.

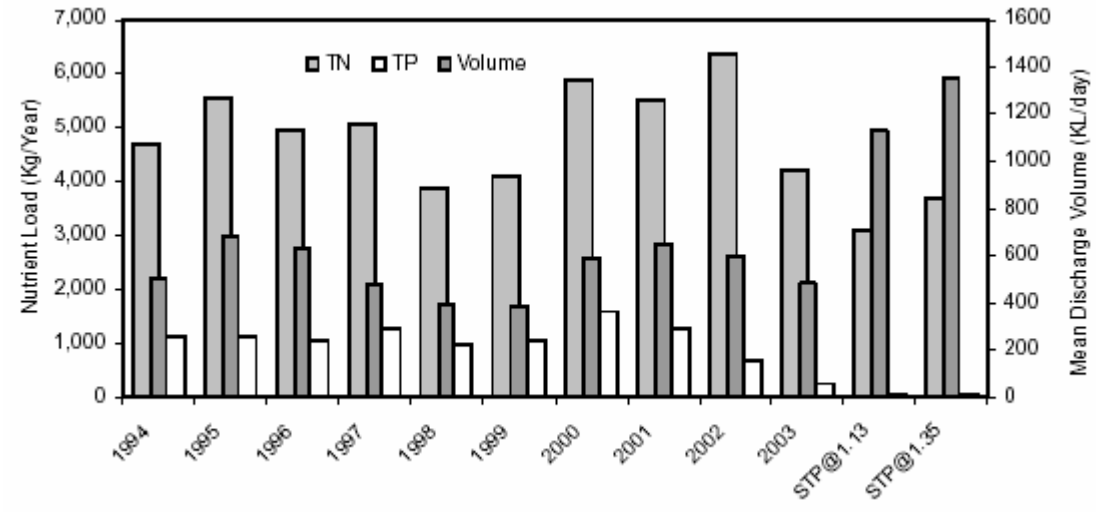

Table 6: Warragamba STP effluent loads to Warragamba River

Based on the above modelling results, SWC concluded that the revised scheme at the proposed maximum flow will result in water quality improvement of the Warragamba River and will be a significant improvement on the current situation.

[6] This is based on the 2003 mean discharge volume of 0.483 ML/day from the existing STP. The year 2003 was used for comparative analysis because it achieved the best performance in reducing nutrient load since the STP was upgraded in 2000 and 2001.

The Department considers that TN and TP are the prime contaminants of concern with STP discharges and are indicative of the level of treatment that would apply. Therefore, no separate assessment was undertaken of other pollutants such as BOD, Total suspended solids and Oil and Grease. It recognises that there is some uncertainty with modelling predictions but the analysis provided suggests that the scheme will deliver an improvement in water quality of Warragamba River over the current situation.

To ensure that the Project meets the water quality objectives stated in the EIS and Supplement Report, the Department recommends Condition of Approval No 43. This Condition consolidates the effluent quality targets proposed by SWC and requires these to be met following optimisation of the STP process or within a maximum 18 months of commencing operation whichever is shorter. To avoid conflicting requirements between the Department and the DEC, this Condition will cease to apply if the scheme is subject to a system licence that specifies the same or lower concentration limits.

DEC comments

The DEC considers that SWC has not extended its analysis of the water quality impact of the new sewerage scheme to the local waterways, ie whether there would be an overall increase or decrease in nutrient load in local waterways as a result of the new scheme. It has requested SWC to provide this analysis as part of the Project's POEO Act Licence application. At DEC's request, Condition of Approval 44 is recommended which requires SWC to ensure that the discharge from the scheme meets the predicted TN and TP limits indicated in Section 3.2 of Appendix A of the Supplement Report. The Condition will cease to apply if the DEC issues a licence that imposes similar requirements.

5.4 SYSTEM PERFORMANCE AND SEWAGE OVERFLOWS

5.4.1 Background

The Project's proposed containment level is 10 overflows in 10 years. This was derived from water quality modelling of the Upper Nepean Catchment areas conducted by SWC in 1999. The computer model was based on the preliminary system design and on several assumptions about sewerage system performance (ie emergency overflow storage capacity of 4 hours at peak dry weather flow (PDWF) at SPSs; 2% rainfall ingress). The new STP and all SPSs will be equipped with an emergency overflow.

Overfows within the collection system are either dry weather or wet weather overflows and occur as a result of various events, ie power outage, equipment breakdown, excess rainwater inflow, leakage or exfiltration. Overflow containment measures for the sewerage system components (STP, SPSs, transfer and collection system) are described in the EIS.

The EIS indicated that the 10 in 10 containment level will not include the existing reticulation system of Warragamba village. Work associated with upgrading the Warragamba River is being addressed through the Sewerage Overflows Licensing Project (SOLP) management.

In the revised scheme, treated effluent discharges will now be released directly to the Warragamba River, instead of indirectly via Middle Gully.

5.4.2 Issues

The representations raised the following issues:

- justification of the adopted frequency of 10 overflow events in 10 years;
- validity of sewerage system modelling conducted (ie concerns that deterioration of sewerage systems and other potential sources of infiltration were not factored in);
- quality of effluent releases to Middle Gully/Warragamba River;
- management of the sewerage system, in particular during emergency situations;
- occurrence of high infiltration in a new system.

5.4.3 Consideration and Conclusion

Overflow frequency

The EIS indicated that the proposed wet weather overflow limit of 10 events in 10 years is a high containment level that recognises the recreation and commercial uses of the scheme's receiving environment (ie Nepean River and tributaries). Achievement of higher standards, for example, 5 events in 10 years or 1 event in 10 years would mean respectively a 10 % and 20% addition to the cost. In addition, adopting a higher standard would have management implications such as higher operating costs and difficulty of ensuring high standard for maintenance of private sewers.

The scheme's proposed design frequency is consistent with frequencies adopted in other environmentally sensitive areas (eg Blue Mountains). In the Representations Report, SWC stated that it will meet all DEC requirements, including overflow frequency. The DEC accepts the 10 in 10 containment standard. Recommended Condition of Approval No 47 sets this overflow limit. It also sets a no dry weather overflow situation for the SPSs and sewerage reticulation system. A further Recommended Condition of Approval No 46 requires that each SPS contain a minimum effluent storage capacity for peak dry weather flow. Both these conditions will cease to apply if the DEC issues a licence that imposes similar requirements.

Treatment Plant Capacity

SWC has advised the Department that all flows received at the STP will be treated, and there will be no bypassing of treatment processes. However, on very infrequent occasions (when inflow exceeds 6 x average dry weather flow (ADWF)), some flows may only receive partial treatment. SWC cited the experience with Picton STP as an example of the infrequency of partial treatment occurrences. Since it was commissioned in 1999, the STP which has a storm switch that activates at 3 x ADWF has experienced only 6 occasions where that flow level was exceeded.

Chlorination is the proposed disinfection method. It was selected because it provides greater flexibility to disinfect widely varying flows which are expected through the new STP due to high levels of infiltration (11%) in the Warragamba system.

Collection/transfer system modelling

SWC has prepared computer models of the collection system which will be refined as part of detail design. System modelling will predict the location of overflows that occur as a result of hydraulic overload. SWC indicated that overflow containment procedures for SPSs will be sufficient to prevent dry weather overflows resulting from extended power failure or exceptional

equipment failure. Although overflows can occur at the SPSs and the collection system in wet weather, sewage will be diluted by the rainwater that causes the increased flows.

Sewerage system management

The proposed scheme includes the existing Warragamba collection system which is prone to rainwater infiltration. SWC claims that it is not possible to completely eliminate infiltration which occurs as a system gets older. Infiltration commonly occurs on private property and SWC does not have control of the private sewer lines that drain to its systems. However, construction of the new sewerage system using modern materials and quality control procedures will limit the incidence of infiltration and leakage.

SWC commits to the development of a Contingency Plan to ensure that SPS failures are addressed and corrective actions implemented within the storage time of the SPSs. Details of contingency and emergency response procedures and all other aspects of scheme operation will be contained in the project Operation Environmental Management Plan (OEMP).

Conclusion

The Department considers that the design and overflow management of the sewerage scheme, including compliance with the recommended conditions, should minimise potential overflows. The operational performance of the scheme, including overflow management, will be regulated by DEC through the Project's POEO Act Licence.

5.5 POPULATION LOAD PROJECTION

5.5.1 Background

A range of alternative development scenarios (low, moderate and high) were developed by consultants (Keys Young) for Warragamba and the three villages in determining scheme capacity. Sewage loadings were estimated using forecasts of development and population within the area. These were based on an evaluation of potential development on vacant lots, redevelopment of existing blocks and development of new release areas. The medium development scenario was adopted for Silverdale and the high scenario for all the others. The original scheme proposed to cater for an ultimate population of 4896 within the current residential zones of the three villages and Warragamba.

In the Supplement Report, SWC has revised the ultimate population that could be serviced by the new STP to 6,400. Through consultation with relevant Councils and developers, it identified a number of areas that could be included in the scheme provided they meet SWC's connection requirements. Details of these areas are shown in Table 6.

5.5.2 Issues

Several issues were raised in the representations:

- concerns that the proposed scheme is being designed to accommodate very little growth and may not be realistic. Some land may be redeveloped at higher densities and some rezoning may occur as a result of development pressures;
- clarification regarding the extent and justification for inclusion of new release areas referred to in the EIS. Also, whether the design of the STP does factor in the stated maximum of 4000 daily visitors to the Warragamba area;

- requests/questions regarding inclusion of a number of lands in the area proposed to be serviced. These include the old Lion Park site (760 lots) within Penrith LGA; Luddenham (requested by Liverpool Council due to the impacts of existing septic and on-site systems); retirement village at 334-354 Littlefields Road, Mulgoa; industrial zoned land between Farnsworth Avenue and Econo Place, etc.

SWC's current decision to provide future services to additional areas raises further issues:
- impact assessment of the increased flows to the STP that would result from potential increases in equivalent population, and consequent increase in discharges to the Warragamba River;
- capacity of the STP for future expansion.

5.5.3 Consideration and Conclusion

Proposed additional areas

In its Representations Report, SWC indicated that it cannot incorporate possible rezoning outside the study area due to uncertainties that they will proceed. The system capacity is designed to accommodate existing and future development that is expected to occur in current zonings. The objective of the PSP is to service existing land use zonings. However, SWC indicated that for certain sites outside of the PSP areas (eg old Lion Park site, retirement village at Littlefields Road, Mulgoa), the proposed scheme would have sufficient capacity to accommodate the increased flows from their potential development.

The Representations Report made it clear that no new release areas are included in the planning for the scheme. SWC advised that the flows from the existing system currently include the effects of visitors to Warragamba. This was factored in the STP design.

In the Supplement Report, SWC identified those areas which are capable of being connected to sewerage services. These areas are within the boundaries of the servicing area shown on the Supplement Report but outside the scope of the PSP specified in the EIS. Connection will entail payment of a capital contribution towards the cost of the sewerage service, unlike all existing lots within the PSP areas which will be provided with a subsidised connection.

Area	Location	Zoning
Silverdale	Lion Park Large parcel upper right Lion Park Houses that front Silverdale Road	Wollondilly Council – 5(c1) Rural 1(a1) Rural 1 (a1)
Mulgoa	Land bounded by Allan, Littlefields and Winbourne Roads Block directly to the south bounded by Winbourne, Allan, Church and Vincent Roads	1(vr) Village residential (550m^2 blocks are permitted but are limited to1 per 2000 m$^{2)}$ Penrith City Council – 1(rc) Rural Conservation (minimum lot size 4000 m$^{2)}$)
Wallacia	Wallacia Golf Course	Penrith City Council – 1(a)

Table 7: Proposed New Areas within the Service Area

SWC stressed that majority of the new areas would require rezoning and have yet to be approved, including the Lion Park. Consequently, there is no change in the works proposed at the STP, although the conceptual design and site layout for the STP would make allowance for the expansion and an ultimate flow situation of 1.35ML/d.

Impact assessment

SWC has not undertaken any specific environmental impact assessment for the areas outside the PSP subsidised area. However, it has provided a preliminary assessment of certain issues associated with future expansion that would potentially impact on its infrastructure, ie surface water quality, hydrogeology and flooding and aquatic flora and fauna. SWC indicated that any future expansion of the STP to cater for additional potential flows would be subject to further environmental impact assessment. If and when future connection to the sewerage system is required by any of the identified areas, assessment would be undertaken for the infrastructure which needed upgrading. This assessment would be the developer's responsibility. Under Section 73 of the Sydney Water Act, the developer is required to obtain a Subdivider/Developer Compliance Certificate to undertake a development. The process is managed by accredited Water Servicing Coordinators on behalf of the developer.

SWC advised that the proposed ultimate effluent flow of 1.35 ML/day (based on total ADWF) and an equivalent population of 6400 will not require an increase in the physical size of the plant contemplated. The Department accepts this proposal primarily on the basis that:

- there will be no increase in the physical size of the plant, as proposed in the EIS and Supplement Report;
- at the ultimate discharge level, proposed scheme would reduce both TN and TP loads despite a predicted 135% increase in effluent discharge volume over the current situation.

Condition of Approval No 42 is recommended which limits the ADWF discharge to Warragamba River to 1.135ML/day. The Condition will cease to apply if the system licence issued by the DEC imposes dry weather requirements consistent with the Supplement Report.

6 CONSIDERATION OF OTHER ISSUES

This Section of the Report provides the Department's assessment of the Project's other environmental impacts. It is based on an examination of the EIS, issues raised in representations made during the exhibition period, Proponent's response to these issues (presented in its Representations Report), Supplement to the Representations Report, Addendum to the Supplement, and further consultation with the Department.

This Section should be read in conjunction with the above reports.

6.1 EROSION AND SOIL CONTAMINATION

6.1.1 Background

During construction, soil erosion and sedimentation of watercourses could occur due to clearing of vegetation, movements of construction machinery and general construction activities. Soils could also be contaminated with oil, grease or fuel from construction machinery operation and maintenance. In addition, there is potential for soil contamination at the existing STP site during construction of the SPS in Warragamba due to leakages from existing treatment facilities.

The EIS indicated that erosion potential along pipeline routes will be moderate to high. Minimal clearing would be required for the construction of SPSs. However the new Warragamba STP area (13,000 square metres) is largely vegetated and would require substantial clearing. The Supplement Report indicated that 1.6 ha clearing would be required for the STP construction. The clearing area includes a 20 metre-wide buffer zone around the STP facility for fire protection purposes.

Several elements of the Project have changed since the Representations Report which are expected to have a changed impact. These changes are:

- alteration of route and construction method for the effluent discharge pipeline;
- use of directional drilling instead of trenching for pipeline construction within the Silverdale Industrial Estate.

During the operational phase of the project, the risk of soil contamination could occur from:

- exfiltration from rising mains and gravity sewers, and from chemical spillages;
- production and storage of biosolids at the STP.

The EIS details a range of control measures to minimise impact on soil and surface/groundwater during the construction and operation of the project. These include the preparation of an erosion and sedimentation control plan, as part of the Construction Environmental Management Plan (CEMP), and a contingency plan, as part of the OEMP. The development of the CEMP will incorporate the erosion and sedimentation control requirements of the relevant local councils.

6.1.2 Issues

Areas of concerns are:

- likely erosion problems from effluent discharges at the northern slope of the Middle Gully (original proposed discharge location) was previously raised by the DEC. SWC has

eliminated this concern by amending the route and discharge point of the pipeline and using directional drilling for pipeline installation;

- potential soil contamination from construction of the SPS in Warragamba due to leakages from existing treatment facilities;

- potential runoff from the construction site of SPS WL1 to enter Jerrys Creek due to the moderately sloping ground at the golf course site.

6.1.3 Consideration and Conclusion

Construction

The proposed changes to the STP effluent discharge pipeline are expected to have a much reduced impact compared to the original proposal in terms of soil erosion and vegetation disturbance.

In the EIS, the proposed discharge pipeline was to be approximately 400 m long and 450 mm in diameter and the pipeline constructed in trench and/or piers to suit hydraulic requirements. The discharge point is at the northern slope of the Middle Gully which is 40-50 m deep at this location. The amended route is a shorter distance of 230 m (and using smaller diameter pipes) by directional drill. The new discharge point is at the water's edge of the Warragamba River, 2-3 m above the current river water level in rock strata. SWC advised that a connecting bend bolted to the rock outcrops may be attached to direct flows 1-2 m below the water surface.

Disturbance of soils would be restricted to the construction sites and occur from excavation of pipelines, STP and SPS sites. A wide range of measures are recommended in the EIS for implementation in the erosion and sedimentation control plan. These include:

- identification of areas for erosion and sediment control, location of stockpiles, work sites, general access and parking requirements;
- minimising vegetation clearance and area of soil exposure;
- interception, treatment and appropriate disposal of water runoff generated at the construction sites;
- rehabilitation of disturbed sites as soon as possible;
- monitoring of rehabilitation to ensure that it has been successful.

Directional drilling works are proposed for several identified sites. Only limited information was provided regarding the site establishment aspects of these works. A potential risk with this activity is loss in drilling fluid which could contaminate soil and watercourses. SWC indicated that it will manage drilling slurry at all drilling sites in the most appropriate manner as part of the CEMP. A condition to this effect is recommended (Condition of Approval No 40). The condition specifically requires that the CEMP cover the monitoring of cutting fluid returns and actions to be taken in the event of losses in drilling fluid.

Prior to the construction of the SPS at the Warragamba STP site, Recommended Condition of Approval No 39 requires site investigation to confirm the presence or absence of contamination. If contamination is present, the site will have to be managed in accordance with the relevant legislative requirements approved by the DEC before the likely disturbance. The investigations

and proposed measures are to be detailed in the Soil and Water Management Plan. Recommended Condition of Approval No 38 sets out these requirements.

The Department considers that erosion and sedimentation during construction will not be a significant issue provided the recommended measures are successfully implemented.

Operation

During the Project's operation, SWC's approach to minimising problems that may impact on soil and water quality include stormwater management, chemical handling procedures and contingency planning. These matters will be addressed, and will form part of the OEMP.

At the Warragamba STP, between 30-60m^3 of dewatered biosolids will be generated per month from the subject areas. According to the EIS, the risk of biosolids contaminating soils, ground or surface water would be minimal as any temporary storage of biosolids in the STP (typically 1-2 weeks) would be undertaken under enclosed and contained conditions. SWC indicated that dewatered biosolids will be transported away by trucks at the rate of approximately one truck per week.

As for construction, the Department considers that the proposed measures during the project's operation would be adequate subject to them being successfully implemented.

6.2 TRAFFIC AND TRANSPORTATION

6.2.1 Background

The EIS described the access/traffic routes and road conditions for construction vehicles to the proposed STP, SPSs and rising main/collection system sites. All construction traffic would use Mulgoa Road and/or Silverdale Road as the main access roads and then local roads to reach individual construction sites. Traffic generation and impact during construction is discussed in the EIS and summarised in Table 5.42 of the EIS.

Construction of the SPSs is estimated to generate approximately 23 average vehicle movements (2-3 trucks and 20 cars) per day over a period of 5-7 months. However, during short peak periods (eg delivery of construction materials), truck movements may be double the average.

The proposed relocation of WL1, as discussed in the Addendum to the Supplement Report, will require more substantial excavation than at the original site. Consequently, a much larger number of truck movements are expected during the excavation phase, ie approximately 40 truck movements (in/out) per day over a three- week excavation period.

Construction of the new STP at the corner of Nortons Basin Road and Silverdale Road is estimated to take 12 to 15 months. A daily average of 50 car and 8 truck movements are expected during this time. Trucking movements along Nortons Basin Road are currently fairly high (33 truck movements per day) as this is the primary access road to Nolans Quarry. The EIS recommends the widening of this road up to the STP access road to ensure traffic safety during construction.

Construction of the rising mains to the STP is expected to generate about 24 vehicle movements per day for each section of the pipeline. The proposed rising main routes are Mulgoa Road, Silverdale Road, Winbourne Road, Ridgehaven Road and Warradale Road. The rate of construction will be approximately 50 metres per day and the area of traffic disturbance will vary from week to week.

Construction of the collection system is expected to have minimal impact due to the generally low traffic flows on affected roads and the transient nature of pipeline construction. The trenching works may result in partial road closures and temporary access restrictions to driveways. However, this will only take a day or so at any given residence.

6.2.2 Issues

The main issues involving construction traffic are:

- proximity of the Mulgoa Public School and Wallacia Public School to construction sites;
- need to widen/improve Nortons Basin Road (the primary access road to Nolans Quarry) and provide signage/safety warnings to ensure traffic safety during construction of the new STP;
- should directional drilling be used for the rising main crossings of Nepean River and Jerrys Creek, access from the drill sites along Silverdale Road and Mulgoa Road would need to be controlled with safety warnings and speed limits;
- significant excavation works required at the new Wallacia SPS site and associated larger number of truck movements during excavation;
- representations from Penrith and Wollondilly Councils requesting that SWC consult and report to the Councils' Local Traffic Committees regarding the Traffic Management Plan and the implementation of the proposed traffic arrangements. These councils also requested that they be consulted regarding the restoration of excavations within their public road reserves.

6.2.3 Consideration and Conclusion

A construction Traffic Management Plan (TMP) is proposed in the EIS to coordinate traffic operations. The aim is to avoid construction and peak traffic at each construction site occurring at the same time. SWC has committed in the Representations Report to consult with relevant councils in the development of the TMP.

The access roads to the construction sites are generally quiet roads with low traffic flows. Traffic disruption is expected to be minimal outside of the peak periods. Peak construction traffic near the schools at Mulgoa and Wallacia should be timed to avoid peak school traffic. If possible, construction activities for the SPS within the Mulgoa Public School should be conducted during school holidays to ensure safety and minimise disturbance to the school.

Construction of the SPS in Wallacia (off Park Road) will involve excavation of a 14 m deep pit and a larger amount of spoil than the original site in Water Street. As a consequence, transport and disposal of spoil will generate as many as 40 truck movements (in/out) per day over a three-week excavation period. Traffic management controls proposed for the main construction sites will apply to this site.

Safety warning, speed limit signs, and stop/go traffic controls (where narrowing a road to one lane) are essential on designated access roads and all construction sites. At the STP site, SWC should consider the need to widen or improve Nortons Basin Road up to the STP access road to enable construction trucks and transport trucks from Nolans Quarry to pass with ease.

The Department considers that the traffic impact of the construction activities can be properly managed through a Traffic Management Plan. Recommended Condition of Approval No 62 requires the preparation of this Plan, in consultation with relevant Councils, the Police and the RTA. Also recommended are:

- Condition of Approval No 63 which requires SWC to assess the need for widening of Nortons Road up to the STP access road to ensure traffic safety in the area;

- Condition of Approval No 61 which requires the preparation of road dilapidation reports to monitor construction traffic effects on public roads. Where damage has occurred, SWC is required to repair the damage at its cost.

During the operational phase of the scheme, minimal traffic will be generated at the SPS sites. At the new STP, vehicular movements are estimated to be less than 40 movements per week resulting from various activities including general operations, housekeeping and plant maintenance. The volume and frequency of traffic movements associated with these activities are outlined in Table 5.43 of the EIS.

The operation of the proposed scheme will gradually eliminate the continuous pump-out and sludge removal trucking operations in the three villages. This will have a small but positive impact on the traffic conditions in the villages.

6.3 NOISE AND VIBRATION

6.3.1 Background

The EIS provided a summary of the noise assessment undertaken by Caleb Smith (1999) for the construction and operational phases of the Project. The assessment was based on the noise criteria in the DEC's Environmental Noise Control Manual (ENCM).

Existing background levels were determined at 3 representative locations in the area based on an initial inspection of each site and subsequent categorisation of these sites into acoustically similar areas. Recommended noise levels for the STP and each SPS were then calculated based on the ENCM's criteria. The construction noise criteria vary according to length of construction time.

For the operation of the scheme, estimates of received noise levels at various distances from the STP and each SPS were made based on the anticipated acoustic power levels of various plant at these sites. The new STP and SPSs were individually assessed to determine the specific treatment required to meet the noise criteria during the operational phase.

With the relocation of the STP to a new site, SWC conducted noise testing and monitoring in 2003 to predict the noise levels from the new plant and assess the noise impact on the nearest residents. Background noise was recorded over a representative 7-day period and the

appropriate NSW EPA Amenity Criteria for suburban areas determined. The results of this testing and recommended noise control measures are contained in a Noise Impact Report attached to the Supplement Report.

Apart from the relocation of two SPSs to new sites, there have been refinements to the final siting of other SPSs (although the sites are still within the described area in the EIS) which may result in changed impact on surrounding residents. Of particular note is SV2 in Silverdale which is proposed to be sited as close as 6-7 m to the nearest property boundary.

6.3.2 Issues

The EIS and Supplement Report identified these impacts:

- Construction of SPSs – significant exceedances of the construction noise criteria were predicted from the construction noise impact of all plant operating on a typical submersible SPS site (with or without rock breaking);

- Operation of the new STP - the new STP would exceed the EPA criteria at the nearest residence if no noise control measures were implemented.

6.3.3 Consideration and Conclusion

Construction

Construction of the SPSs, except for the Wallacia SPS (WL1), is expected to take between 5-7 months, with less than a month of intensive site activity involving excavation and concrete pouring. Construction of WL1 could take longer, with a longer period of intensive site activity. Construction of the STP is expected to take about 12-15 months, with significant earthworks and civil construction expected to take up to 6 months. Less noisy activities such as installation of mechanical equipment and electrical services are expected to consume a sizeable part of the construction period for each site but would not produce significant environmental noise.

Construction of the collection system is expected to generally progress at the rate of 50m per day. Individual residences are expected to receive construction noise only for a week or so.

All SPSs are typically located adjacent to residences. Without mitigation measures, significant exceedances of the construction noise criteria are predicted. For example, at a distance of 30m from the construction site (without rock breaking), predicted exceedances are between 32 and 37 dB(A) based on a construction period of less than 26 weeks. Noise impact could be most pronounced on residences near the SV2 site and may require additional mitigation measures to reduce impact.

Construction vibration is only expected where rock breaking is involved. Where rock breaking is required for construction works within 30m of any residence or 50m of a heritage building, the EIS recommends that monitoring be conducted of ground vibration close to the nearest residence until satisfactory vibration levels of less than 2mm/sec peak have been demonstrated.

Some road traffic noise will be generated by the construction activity, principally due to trucks delivering raw materials such as sand, concrete, pipes and mechanical plant. An average of 1 truck per day is expected for construction of the collection system and most SPSs, and up to 10 trucks for construction of the STP. Larger truck numbers are expected during significant but

short term activities such as initial bulk earthworks or concrete pouring. Construction employees will generate additional traffic movements. Predicted traffic noise from truck and car movements, as presented in the EIS, are well within EPA's daytime criterion of 55 dB(A)Leq, 1hr at any typical residential distance from nearby roads.
Recommended measures in the EIS and Representations Report during the construction phase include:

- restriction of noisy activities, such as significant earthworks, to the hours 8:00am to 4:00pm Monday to Friday, when within 100 m of any residence;
- fitting of machines used on site with residential grade exhaust silencers and maintaining the machines in good condition for the duration of the work;
- installation of noise barrier to residences within 50m of any SPS site.

To manage construction noise and vibration impacts, the Department recommends Conditions of Approval Nos 30 to 36 which cover the following requirements:

- preparation of a detailed Construction Noise and Vibration Management Sub Plan;
- definition of construction noise and vibration objectives;
- restrictions on construction hours, including limits on noisy construction activities such as rock breaking.

Operation

Sewage pumping stations

The EIS and Representations Report recommend specific noise control treatments for SPSs that are located close to residents. Of these, SV 2 in Silverdale is the closest to residents and may require additional noise mitigation treatment to minimise impact. SWC advised that the predicted noise to the nearest residence will meet the 33dB(A) night noise criterion with no special soundproofing aids. Noise measurements will be taken during the commissioning of the station and if necessary, acoustic material will be attached to the underside of the wet well covers to ensure compliance with the required limit.

All other SPSs are predicted to meet the 33dB(A) night noise criterion provided they are designed with acoustic and mechanical features as discussed in the EIS.

Among the recommended measures for mitigating noise are:
- provision of close-fitting steel wet well covers in lieu of the usual aluminium covers;
- construction of the electrical control kiosk with either low-noise and low-vibration relays and contactors;
- erection of acoustic fences where necessary;
- insulation of the pumping stations.

The Department considers that implementation of the proposed measures should minimise impact on residences in proximity to the proposed SPSs.

New STP

SWC's noise impact assessment determined the acceptable noise levels for the new STP based on background noise levels (Rating Background Level) obtained at the site and the

applicable amenity criteria from the EPA's Noise Industrial Policy. This information is presented in Table 3 (Noise monitoring results and predictions) of the Supplement Report and reproduced below:

Period	RBL	Intrusiveness criterion	Amenity criterion (Table 2.1 – EPA)
Day (7am to 6pm)	40 $L_{A90 – 15 minute}$	40+ 5 = 45 $L_{Aeq 15 minute}$	55 $L_{Aeq 15 minute}$
Evening(6pm to 10pm)	38 $L_{A90 – 15 minute}$	38+ 5 = 43 $L_{Aeq 15 minute}$	45 $L_{Aeq 15 minute}$
Night (10pm to 7am)	35 $L_{A90 – 15 minute}$	35+ 5 = 40 $L_{Aeq 15 minute}$	40 $L_{Aeq 15 minute}$

Table 8: Acceptable Noise Levels

Given that the STP will operate 24 hours a day, 7 days a week, the night time noise level of 40 dB(A) was the noise goal adopted for the new STP. The nearest residence (at 2519 Silverdale Road, Warragamba) is 250 m away from the STP site.

The noise level expected from the STP (total emission of 99 dB(A) $L_{Aeq)}$) were derived from noise data collection of similar equipment at a number of STPs. The blower room and the IDAL tanks were identified as the two dominating noise sources which will require engineering measures to reduce noise. The noise report recommended that all blowers be housed in an acoustic enclosure (25 dB(A) noise reduction), and a noise barrier be erected around one perimeter of the IDAL tanks facing the closest residence on Silverdale Road. If these noise control measures are implemented, the noise emitted from the STP is expected to meet the 40dB(A) noise goal adopted for the STP.

Recommended engineering noise controls are essential for the STP to meet the DEC's noise requirements. The Department recommends Condition of Approval No 37 which requires SWC to monitor operation noise to verify that noise levels are within the amenity criteria specified in Table 3 of the Supplement Report. Should monitoring indicate a clear trend in noise levels inconsistent with the predictions made in the Supplement Report, SWC must implement further noise mitigation measures.

6.4 AIR QUALITY

6.4.1 Background

During construction, local air quality could be impacted by dust generated by construction earthworks, machinery and truck movements; and exhaust emissions from construction traffic and machinery. Dust generation from exposed areas, soil excavation, soil stockpiles and machinery movements could be a problem during dry and windy periods.

At the operational phase, odour impacts could potentially result from the operation of the SPSs and the new STP. The EIS identified and analysed those SPSs which, given their proximity to sensitive receptors and the length of time wastewater remains in the rising mains, could cause odour unless suitably treated. Odour control facilities are proposed for SPSs MU1, WL1 and SV1.

Odour emission modelling was completed for the new STP site in November 2003. The modelling report indicates that no individual residence near the STP would experience any odour impact. The identified main potential odour producing sources are the inlet works and

sludge treatment works producing dry biosolids. SWC advised that the proposed odour treatment method is biological filtration or soil bed.

6.4.2 Issues

Areas of concern are:

- dust generation during construction works;
- DEC's view that the odour assessment in the Supplement Report does not provide sufficient information to support its conclusion, ie operation of the STP will not result in offensive odour impacts.

6.4.3 Consideration and Conclusion

Construction

To minimise the production of dust during construction works, SWC will develop a dust management plan as part of the CEMP. The plan will detail responsibilities for implementation of controls, reporting requirements and customer complaint procedures. The EIS recommended the following measures for implementation:

- regular watering of exposed surfaces, soil stockpiles and unsealed access roads;
- vegetation clearing to be kept to the minimum required;
- early stabilisation, revegetation and landscaping to be carried out immediately after construction;
- if areas are prone to high winds, erection of dust screens during dry period as necessary;
- covering of trucks transporting construction materials.

The Department endorses these measures and provided they are implemented, dust emissions during construction should be minimised. The Department recommends the inclusion of Conditions of Approval Nos 50 to 52 to manage air quality during construction. These conditions include a requirement to prepare a detailed Dust Management Sub Plan as part of the CEMP.

Operation

Sewage pumping stations

During the scheme operation, the EIS stated that odour is not anticipated to be an issue at some SPSs as fresh (aerobic) sewage does not emit the offensive odour which characterises septic sewage. However, odour emissions could potentially occur from other SPSs (at the discharge point of rising mains and from air release valves) if not properly treated.

Odour control facilities are proposed for SPSs MU1, WL1 and SV1 to mitigate the potential for odours. This will consist of chemical storage, a chemical dosing vessel, pipework, dosing pumps and meters. In addition, components of the SPSs will be located underground, and a vent shaft installed at all of the SPSs to enable high level odour dispersion.

The adoption of the above control measures (ie chemical odour control, enclosed facilities and vent shafts) should control any odour impact on residents in proximity to the SPSs. The

Department recommends Condition of Approval No 54 which requires the Proponent to outline in the OEMP any contingency measures to deal with odour occurrences at SPSs.

STP

The odour modelling[7] conducted for the STP concluded that there is a very low chance of odour emissions from the STP presenting a nuisance to neighbouring properties. The Ausplume model results indicate that the extent of odour migration outside of the STP boundary is 1 OU to the north, <0.6 OU to the east and west and 2 OU to the south. No individual residence near the STP is exposed to an odour level above 0.6 OU, which would theoretically result in no odour being experienced. The terrain around the Warragamba STP is such that any odour emissions would naturally disperse over a very short distance and migrate towards and down the river valley away from populated areas near the STP.

The odour report recommends that the odour emissions and impacts from the new STP should be reviewed against the EPA's criterion of 6.0 OU, the level applicable to the STP given its local setting and population density.

The DEC considers that SWC's odour assessment report does not provide sufficient detailed information to support its conclusion. It identifies the range of information that the odour impact assessment report should include. Notwithstanding these deficiencies, the DEC notes that SWC is required to comply with Section 129 of the POEO Act, which prohibits emission of any offensive odour from a sewage treatment system.

The Department notes that the odour emission inventory used in the odour dispersion modelling is based on olfactometry sampling obtained from other STPs, and may not represent the actual OU emissions from the new STP. However, it expects that odour at the new STP should not be an issue provided all the necessary best practice measures to control odour are implemented. Proposed measures in the EIS include enclosing the inlet works and the biosolids unit and chemical dosing (or feeding through a soil bed) at the STP. SWC will also have to satisfy itself that the odour controls for the Project can meet the statutory requirement of Section 129 of the POEO Act.

To ensure that odour impacts of the STP are considered during detail design, Recommended Condition of Approval No 53 requires the preparation of an Odour Management Plan as part of the OEMP. The Plan must present the results of odour dispersion modelling for the final design layout of the STP and contain details of a monitoring program to be implemented to verify the modelling.

6.5 VISUAL IMPACT

6.5.1 Background

The visual characteristics of the study area and the proposal's impacts during construction and operation are assessed in the EIS and Supplement Report. Construction of the new Warragamba STP and SPS Wa1 will not be not be readily visible from surrounding properties

[7]The modelling was based on the design process units to be implemented at the STP and the anticipated odour emissions from the STP.

as the sites are screened by existing vegetation. Construction activities for the other components of the sewerage scheme will have a short term visual impact to local residents and users of various roads which are affected by those activities.

Once the sewerage scheme is operational, potential visual impacts will be those associated with the STP, SPSs and vent shafts. SWC clarified that (contrary to the EIS) it is unlikely that any of the SPSs will have a superstructure and the only above ground structures will generally be an electrical kiosk and a vent shaft in close proximity to the station.

Vent shafts are also proposed at the end of rising mains and occasionally along gravity mains. Four are proposed and only indicative locations are known at this stage. SWC indicated that the final siting of these structures will be determined during detail design in consultation with potentially affected parties. The indicative locations are:

- corner of Mulgoa and Littlefields Roads, Mulgoa;
- 500 m south of Park Street on Mulgoa Road, Mulgoa (within SCA's water supply pipeline corridor);
- corner of Silverdale Road and Ridgehaven Road;
- 1 km south of Farnsworth Avenue on Silverdale Road (within the Sydney Water reservoir site).

6.5.2 Consideration and Conclusion

The Department considers that the visual impact of the proposal during construction will be minimal. Construction activities for the transfer and collection pipelines are small scale and transient in nature. Those involving the SPSs will (in some cases) affect neighbouring residents but would be short term.

Construction of the new STP is expected to take between 12 to 15 months. The Department notes that the only visual evidence of the STP development may be the construction vehicles entering and leaving the site. It is expected that as much vegetation as possible will be kept to provide screening of the STP.

Following construction, the visual impact of the STP will be mitigated by vegetation screening and ensuring that the buildings and structures are designed and coloured to integrate with the surrounding landscape. With the SPSs, the components of the stations will predominantly be located underground and aboveground structures will be limited mainly to electrical kiosks and ventshafts. Visual impact will vary at each SPS site depending on the proximity of these structures to residences and their siting and screening relative to affected properties. Of the SPSs, the closest to residences is SV2 (6-7 m) where effective screening or treatment is required in consultation with affected residents.

The Department recommends Condition of Approval No 64 which requires SWC to prepare, prior to construction, a Landscape Design Report which would address the Project's landscaping and built elements. In relation to the SPSs, recommended Condition of Approval No 66 requires the Proponent to consult with affected residents and landowners regarding the final siting of the SPSs and rehabilitation and screening works to be implemented. All landscaping or rehabilitation works are required to be monitored and maintained by a suitably qualified landscape specialist for three years following construction (Condition of Approval No 65).

6.6 HERITAGE

6.6.1 Background

Non-indigenous heritage

The EIS identified 14 non-indigenous heritage items that are in close proximity to the construction and installation of the proposed scheme. These were compiled from relevant local planning instruments and the heritage registers of the NSW Heritage Office, Australian Heritage Commission and SWC. The EIS also described the proposed mitigative measures for individual items during construction works.

SPS Wa1 will be constructed within the grounds of the existing Warragamba STP. The EIS indicated that this activity will not impact on the STP which will be decommissioned.

The Heritage Office in its representations endorsed the heritage analysis presented in the EIS.

Aboriginal heritage

Aboriginal heritage studies for the proposed scheme were undertaken by Darwala-Lia Archaeological Services (1999). Consultation was also undertaken with all relevant Aboriginal Land Councils and Native Title claimants on the proposed pipeline routes. In addition, a search in the NPWS's Aboriginal site register and site surveys were conducted. The surveys recorded a total of five sites along Greendale, Mulgoa and Silverdale Roads that have trees and plant species of particular Aboriginal significance, these being scar trees, yam plant, yam bed and Ground Berry. Several areas were also identified as having potential for subsurface sites containing plant and animal food or cultural species.

6.6.2 Issues

Identified issues are:

- need to minimise impacts on Aboriginal sites and places. Recommended measures, as described in the EIS, include directions that pipelines should follow to avoid identified scar trees, yam plants, etc; buffer zones around plant species and construction areas; collection of plants and seeds before construction; and monitoring of construction works by the appropriate LALCs;

- collection and archiving of the yam plant (Mulgoa Road) and a buffer zone for the Ground Berry plant (Mulgoa Road) as recommended by Penrith Council in its representations.

6.6.3 Consideration and Conclusion

The construction of the proposed scheme could potentially impact on non-indigenous and Aboriginal heritage items. To ensure that these items are protected, the EIS recommended measures for implementation by construction crews when carrying out works in the vicinity of these items. These include:

- training and induction on the significance of heritage resources in the study area;
- restriction of works within defined work corridors;
- use of hand trenching techniques when working in very close proximity to heritage items;

- use of directional drilling techniques where heritage items cannot be avoided;
- monitoring of ground vibration where rock breaking is required within 50m of a heritage building/structure.

In response to the above issues on heritage sites, SWC in its Representations Report committed to comply with the recommended measures. Both non-indigenous and Aboriginal heritage items in the vicinity of the proposed works will be identified in the CEMP and all necessary environmental controls applied during construction.

The operation of the various components of the proposal is not expected to result in any ongoing or future impact on non-indigenous and Aboriginal heritage items. Pipelines are for the most part located underground and the proposed SPSs (except for the pumping station within the existing Warragamba STP) are not located in the immediate vicinity of any of the identified heritage items.

To ensure the protection of Aboriginal and non-indigenous heritage items, the Department recommends Conditions of Approval Nos 26 and 28 which require the preparation of Indigenous Heritage and Historical Relic Management Plans as part of the CEMP. Where Aboriginal or heritage relics are uncovered during trenching works, Conditions of Approval Nos 27 and 29 impose 'stop work' provisions and requirements for notification of the DEC or the Heritage Council, as relevant.

6.7 HAZARDS AND RISKS

6.7.1 Background

The EIS discussed the hazards and risks associated with the operation of the scheme as involving the use of chemicals, plant breakdown and bushfire hazards.

Chemicals to be used for the sewage treatment process and odour control are proposed to be stored at the new Warragamba STP and in some of the SPSs. The EIS identified the chemicals proposed to be used at the STP, their purpose in the treatment process, volumes to be used and stored, and their Dangerous Goods classification (DG class). Several chemicals that could be used for odour control at the SPSs were also identified. However, the technology to be applied will not be determined until detail design when the quantity and type of chemicals will be known. One of the options available makes use of either ferric or ferrous chloride (both classified as Dangerous Goods). The quantity of chemicals to be used at the SPS, should this option be adopted, is outlined in the EIS.

Plant breakdown could occur from mechanical problems or operational errors, creating a potential for raw sewage to leave the plant and impact on the surrounding environment. A number of safety features are proposed to be adopted, including the development of a contingency plan for each of the SPSs. The new STP will be capable of unmanned operation for up to 4-5 days.

In the event of bushfires, there is a potential that operation of the STP and some SPSs (due to their location in vegetated areas) may be impacted upon or their equipment damaged. A bushfire hazard reduction program will be developed for these facilities and incorporated in the OEMP.

6.7.2 Issues

Identified issues are:

- management of risks and adoption of preventative measures in relation to operational failure and overflows at the STP and SPSs, use of chemicals and incidences of bushfires;

- representations from Penrith Council which raised the need for all staff at the new STP to have adequate training in storage of hazardous chemicals and in emergency response in cases of accidents;

- safety issues associated with the use of Sodium Hypochlorite (for chlorination of effluent) and Spent Pickle Liquor (for phosphorous reduction) at the STP (an accidental contact of these two chemicals is likely to release toxic chlorine gas).

6.7.3 Consideration and Conclusion

The Department considers that the hazards and risks outlined above would be adequately managed through a range of measures detailed in the EIS and in the Representations Report. Examples of these measures are:

Chemical storage and use

- Dangerous goods licences will be required for the storage of Spent Pickle Liquor solution, Sodium Hydroxide and Sodium Hypochlorite at the new Warragamba STP, under the Dangerous Goods Act;
- Storage tanks and filling areas will be bunded and provided with appropriately designed drainage and safety equipment;
- Necessary safety training for personnel operating the chemical storage facilities.

Plant breakdown

- Remote operation of critical items;
- Use of qualified personnel and adequate training of operators;
- Installation of monitoring equipment for the operator to gauge and control the treatment process.

Bushfire hazards

- SPS and STP components will be kept clear of vegetation so as to prevent fire spread into operational areas;
- Location of all SPSs close to roads so that access is unlikely to be restricted for more than short periods in the event of a bushfire.

The Department recommends that the STP layout be designed to ensure appropriate separation distances between the Spent Pickle Liquor and Sodium Hypochlorite tanks, pumps and pipeworks. Further, that the site operator verifies that the storage tank connections have been correctly made before bulk deliveries of these two chemicals are unloaded.

Recommended Condition of Approval No 67 requires that SWC prepare Hazards and Risk Management Sub Plans for both construction and operation. The plans must address the need to ensure appropriate separation distances between the Spent Pickle Liquor and Sodium Hypochlorite facilities.

6.8 HYDROLOGY AND FLOODING

6.8.1 Background

The EIS identified that parts of Wallacia are within the 100 year ARI flood contour. These include the original site of SPS WL1 in Wallacia and part of collection system and rising main in that area. Peak flood level at Wallacia Weir (at Jerrys Creek) near the SPS WL1 site is estimated to be 44 m AHD in a 100 ARI flood event.

Mulgoa Creek (1 km east of the Mulgoa collection system) was also identified as subject to occasional flooding. The Blaxland Crossing Bridge across the Nepean River (along Silverdale Road), according to Wollondilly Council, is affected by floods in heavy rains.

The proposed STP site is elevated above the 100 year ARI flood levels for the Warragamba River and the Nepean River and flooding risk is minimal. A stormwater system will be constructed in this area to collect and divert stormwater from the sealed areas into natural drainage channels.

The EIS indicated that construction of the scheme will not affect the existing flooding regime in the Warragamba River or Nepean River Catchment. At creek crossings, construction of the transfer and collection system pipelines will not affect creek/river flows due to the proposed methods of construction. These will be either by attaching pipelines to existing bridges/culverts, constructing separate pipe bridges immediately adjacent to existing road bridges, or by directional drilling or thrust boring under creek beds.

The operation of the proposed scheme is concluded to have no significant effects on the existing flooding regime of the above two catchments.

Sydney Catchment Authority advised that no part of the proposed scheme is within the hydrological catchment of the Warragamba Dam.

Since the Supplement Report, further investigation of the SPS site in Wallacia has raised concerns about flooding risks for the proposed station. This led to a proposal for a new site at the Wallacia Golf Course on Park Road. SWC's impact assessment of the SPS at the new site is contained in an Addendum ("Relocation of Sewage Pumping Station WL1 in Wallacia") to the Supplement Report.

6.8.2 Issues

The main issues associated with hydrology and flooding are:

- relocation of SPS WL1 to the Wallacia Golf Course site because of concerns with flooding in the area of the original site (Water Street, near Jerrys Creek);

- construction of the transfer pipeline across the Nepean River (Blaxland Crossing on Silverdale Road) – Wollondilly Council considers that in flood conditions, significant floating debris can be a problem if the pipeline is attached to the bridge;
- construction of the transfer pipeline across Jerrys Creek.

6.8.3 Consideration and Conclusion

Wallacia SPS

The EIS acknowledged that SPS WL1 would be within the 100 year ARI but stated that this is normally managed by placing switchgear for the pumping station above the 100 year ARI and suspending operation of the station under flood conditions. In this instance, SWC determined that to avoid flooding risks, this would mean erecting a building approximately 7 m high or placing the switchgear approximately 150-200 m south of the site. SWC considered that neither of these options is suitable due to adverse visual impact to be created by the building and also safety hazards issues associated with chemical dosing. This resulted in the relocation of this SPS.

The proposed new site (for the pumping station itself) is above the 20 year ARI. The switchgear and chemical dosing facilities are proposed to be located 30 m away, at approximately the 100 year ARI. SWC indicated that there are no other readily identifiable alternative locations for this SPS that will satisfy flooding requirements, provide good access and have minimal impacts on the natural and social environment. The new location reduces the potential flooding issues during construction and operation.

No other SPSs were identified to be in flood liable areas. Recommended Condition of Approval No 48 requires that all electrical equipment associated with the SPSs must be located above the 100 ARI flood level.

STP

The Department notes that the risk of flooding for the proposed STP site (over 80m AHD) is minimal as it is elevated above the 100 year ARI flood levels for the Warragamba River and the Nepean River. It is also above the level of the existing Warragamba STP.

Water crossings

Sydney Water advised that the current preferred method for pipeline construction across the Nepean River (Blaxland Bridge) and Jerrys Creek (Wallacia Bridge) is attachment of the pipeline to the existing bridges. At Blaxland Bridge, the pipeline would be designed to withstand flooding impacts and would be located on the downstream side of the bridge. This construction method will avoid disturbance or obstruction of the river bed.

6.9 GROUNDWATER

6.9.1 Background

Groundwater investigations in the study area were undertaken in 1998 as part of the effluent irrigation feasibility study prepared by NSW Agriculture's Organic Waste Recycling Unit

(OWRU). The investigations identified two types of aquifer in the Wallacia region: shallow shale aquifer and deeper sandstone. The EIS concluded that due to the shallowness of the pipeline excavation, no adverse impact on groundwater is expected from the construction or operation of the proposed scheme.

Where directional drilling is proposed, appropriate containment procedures for the drilling fluids will be provided.

6.9.2 Issues

Potential groundwater impacts could result from:

- excavation in the area of SPS Wa1 if soils are contaminated due to leakages from existing STP treatment facilities;
- deep excavation required for the construction of SPS WL1 in Wallacia;
- directional drilling at various sites (ie below Megaritty's & Middle Creek, effluent discharge pipeline to the STP outfall, etc).

6.9.3 Consideration and Conclusion

To confirm the absence or presence of contamination at the existing STP site (site for SPS Wa 1), a soil sampling program would be implemented before construction. If contaminated soils are found, an appropriate soil management plan would be developed and implemented prior to construction of the SPS. The Department supports this proposed action and a condition regarding the carrying out of tests for soil contamination is recommended in Condition of Approval No 39.

The report on the proposed relocation of SPS WL1 indicated that it is possible that shallow lenses of groundwater may be encountered during excavation. These will be pumped out of the excavation area and be treated before disposal.

With directional drilling works, the CEMP will include procedures for spill prevention and clean up (in the event of spillage) to minimise the risk of impacts on groundwater.

During operation, the potential for adverse impact would occur only in the event of a leakage from the sewerage scheme structures. A number of design and management measures are proposed to prevent leakages. These include fitting of underground tanks with waterproof membranes, adequate containment system for chemical and fuel storage at the SPSs and the new STP, and regular inspections and maintenance of the collection system.

The Department considers that potential impacts on groundwater from construction and operation of the sewerage scheme can be adequately managed through these measures. Other approval conditions relating to soil and water management, overflow management and contingency plans should ensure any impacts on groundwater are minimised.

6.10 ADMINISTRATIVE, ENVIRONMENTAL MANAGEMENT AND MISCELLANEOUS CONDITIONS

The Department recommends a number of other Conditions of Approval as follows:

- Conditions of Approval Nos 1 to 12. These cover administrative, compliance and auditing requirements;
- Conditions of Approval Nos 13 to 18. These require preparation of construction and operation environmental management plans and specify the requirements for an Environmental Management Representative;
- Conditions of Approval Nos 19 to 23. These cover broad communication and consultation with the community including advertising the construction activities and establishing a complaints management system;
- Condition of Approval No 55 which requires that SWC adopt energy efficient work practices;
- Conditions of Approval Nos 56 to 59. These cover the management of property damage;
- Condition of Approval No 68 which requires that SWC prepare waste management and re-use plans for construction and operation;
- Condition of Approval No 69 which requires that SWC manage alterations to utilities and services; and
- Condition of Approval No 71 which presents location criteria for ancillary facilities such as construction compounds.

7 CONSIDERATION OF AMENDMENTS TO THE PROJECT

SWC has made a number of amendments to the exhibited proposal which are discussed in Sections 4 to 6 of this report.

The Department is satisfied that the amended Project is likely to be an improvement on the current situation and the impacts of the Project are acceptable, subject to the implementation of the Conditions recommended in Section 9.

The amendments made by SWC subsequent to the EIS exhibition mostly reflect the results of detailed design and consideration of representations. Although SWC has not formally exhibited the changes for public comment, it has in some cases discussed the changes with potentially affected residents and businesses. A summary of the changes and the Department's evaluation is set out in Table 8 below.

The key changes are:

- deferral of effluent re-use;
- relocation of the STP;
- relocation of SPS WL1 to the Wallacia Golf Course site.

Overall, the Department is satisfied that the proposed changes do not fundamentally alter the Project and will generally reduce environmental impacts.

Scheme Changes	Consideration and Conclusion
1. deferral of the effluent re-use scheme	▪ re-use at this stage is not critical for the scheme because of the high costs of providing infrastructure to potential effluent users and the relatively small volume of discharges to the Warragamba River. However, with potential Government policy and pricing changes for river extraction/water use, the suitability and viability of effluent re-use will need to be re-investigated in future. As a condition of approval, the Department requires that SWC carry out this investigation and submit a report to the Director-General by June 2006. ▪ the Department considers that the water quality analysis focused on the full discharge proposal and lacked a comparative analysis with the EIS scheme involving major re-use. However, it accepts SWC's assessment that the full discharge scheme would result in an improvement in water quality and river health over the existing situation. ▪ the DEC acknowledges that the proposed scheme should result in lower in-stream nutrient concentrations and nutrient load at Warragamba River than at present. However, it requires a further analysis from SWC (as part of the Project's POEO Act Licence application) of the impact of nutrient load on local waterways within the catchment. ▪ the Department notes that there would be reduced impacts from not constructing the effluent re-use pipeline to Chittick's Dairy farm. Also, there would be operational impacts at the farm. Potential impacts of that re-use scheme were not evaluated in this report.
2. relocation of the STP site in Warragamba	▪ two sites were investigated to replace the original site for the new STP which contains an endangered ecological community (Shale Sandstone Transition Forest). The first of these sites would require less vegetation clearing as it is already mostly cleared. However, it is closer to

	residences and was not favoured by SWC. The current proposed site was considered to be the better site as it is further away from residences and potential odour and noise impact would be minimised. ▪ potential impact on an endangered ecological community (Shale Sandstone Transition Forest) will be minimised in the current proposed site. ▪ during operation of the scheme, odour and noise are not expected to adversely affect surrounding residences based on the modelling results provided by SWC and subject to the implementation of the recommended measures.
3. relocation of SPS WL1	▪ potential flooding risks (a problem at the original site) will be reduced at the new site; ▪ the new site raises particular impacts of its own but could be mitigated effectively. These impacts involve a larger amount of excavated material, stockpiling, and a greater number of truck movements during the excavation phase. There is also a potential for runoff from the construction site to enter Jerrys Creek at the base of the slope due to the moderately sloping ground at the golf course site. ▪ the Wallacia Golf Club, Bushfire Brigade and neighbouring residents at the new SPS site were consulted by SWC. The Golf Club and the Bushfire Brigade are satisfied about the proposal in principle. Majority of the residents understand the need for the site/proposal and raised no objections. SWC advised that on-going consultation with these property owners will be maintained as the project progresses.
4. alteration of the route and construction method for the effluent discharge pipeline	▪ the new effluent discharge point (a short distance above Warragamba River) will avoid the potential erosion problem of the previous discharge point which is 40-50 m high above Middle Gully. It will also avoid the safety problems associated with maintenance of this pipeline at the previous steep location. ▪ directional drilling, instead of open trenching or placement of pipelines on piers, will have lesser impact on threatened species, vegetation and soil disturbance.
5. provision of a pressure sewerage system within the Silverdale Industrial Estate	▪ construction of this alternative system overcomes the difficulty of constructing a gravity sewer system in the upper reaches of Megarritys Creek. ▪ proposed system will have a lesser environmental impact , ie removes the need to clear vegetation and reduces noise impacts and duration of construction activity.
6. elimination of SPS SV3	▪ removes the potential impacts associated with the construction and operation of this SPS, ie clearing of bushland and potential impact on the relatively undisturbed Sydney Sandstone Ridgetop Woodland, visual amenity and overflows.
7. relocation of SPS MU2	▪ will require some tree clearing at the new site which SWC undertakes to replace. ▪ as in the original nearby site, construction noise is likely to exceed construction noise criteria and will require mitigation measures. ▪ to ensure safety and minimise disturbance to the school, construction of the SPS should be carried out during the school holidays.

8. revised ultimate population projection and STP capacity	▪ revised scheme allows for some future growth in development of the villages. ▪ SWC undertaking that the conceptual design and site layout for the new STP would make allowance for the expansion and an ultimate flow situation of 1.35 ML/day (based on total ADWF). Project approval is on the basis of this load capacity and advice from SWC that this increase in future load will not increase the physical size of the new STP as proposed in the EIS and Supplement Report.

Table 9: Consideration of Amendments to Exhibited EIS Proposal

8 CONCLUSIONS AND RECOMMENDATIONS

SWC proposes to construct a reticulated sewerage scheme for Mulgoa, Wallacia and Silverdale. The original scheme involves transfer of sewage to a new Warragamba STP, decommissioning of the existing Warragamba STP and an effluent re-use scheme at Chittick's Dairy.

The public exhibition of the EIS resulted in sixteen representations. Key issues raised in the representations were:

- flora and fauna;
- effluent re-use and management;
- population load projections;
- system capacity and service area;
- sewage overflows and containment options of collection system;
- operation of the new Warragamba STP; and
- soil and water management.

Since the receipt of the Representations Report in June 2001, SWC has conducted additional flora and fauna investigations in response to the Department's concern about an endangered ecological community present within the site of the new STP. This led to the relocation of the STP site. This amendment and seven others were proposed in a Supplement Report and Addendum received by the Department respectively in December 2003 and in March 2004. The changes to the EIS scheme consist of:

- deferral of the effluent re-use scheme;
- relocation of the STP site in Warragamba;
- alteration of the route and construction method for the effluent discharge pipeline;
- provision of a pressure sewerage system within the Silverdale Industrial Estate;
- elimination of SPS SV3;
- relocation of SPS MU2;
- revised ultimate population projection and STP capacity;
- relocation of SPS WL1.

A summary of the likely impacts of the proposed changes to the scheme compared with the previous proposal is outlined in the Table 8.

The proposed changes mostly reflect the results of detailed design and consideration of representations. The changes do not fundamentally alter the Project are generally expected to result in lesser environmental impact.

The Department has undertaken an assessment of the likely environmental impacts of the Project. In particular, it considered key issues associated with flora and fauna, system performance and overflow management, full effluent discharges and water quality and potential expansion of the servicing area. Other issues examined were air quality, noise, traffic and transport, heritage, visual impact, soil and water management, hydrology and flooding, groundwater and hazards and risks. The Department's review concluded that, provided

comprehensive mitigation measures were implemented, the adverse impacts of the Project could be reduced to an acceptable level.

The Department recommends that SWC prepare comprehensive environmental management plans for the construction and operation stages of the Project. The Plans are to describe how the mitigation measures contained in the EIS, Representations Report and the recommended Conditions of Approval are to be practically implemented.

The Department's assessment concludes that, provided the recommended Conditions of Approval are adopted, the Project could be approved by the Minister.

9 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. The recommended conditions were developed from the Department's assessment of the EIS, the Representations made to the EIS, the Proponent's Representations Report, the Supplement to the Representations Report, Addendum to the Supplement and any further supplementary investigations or advice.

DEFINITIONS

Activity	The Activity described in Schedule 1 of this Approval
Approved Activity Area	The footprint of the Activity covered by the Conditions of Approval
Conditions of Approval (the Conditions)	The Minister's Conditions of Approval for the Activity
Construction	Includes all work in respect of the Activity **other** than survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys, minor clearing (except where threatened species, populations or ecological communities would be affected), establishing site compounds (in locations meeting the criteria of these Conditions), office work, servicing equipment, activities not involving noise and vibration or other activities certified by the EMR to have minimal environmental impact (e.g. minor access roads, minor adjustments to services/utilities, etc.)
Department, the	Department of Infrastructure, Planning and Natural Resources
Definition of times	Daytime is 7am to 6pm Monday to Saturday, and 8am to 6pm Sundays and Public Holidays Evening is 6pm to 10pm Night-time is 10pm to 7am Monday to Saturday, and 10pm to 8am Sundays and Public Holidays
Directly Affected Landowner	Property owner identified in any of the EIS, Representations Report or CEMP to require a mitigation measure to ameliorate an identified impact to their property
Director-General, the	Director-General of the Department (or delegate)
Director-General's Agreement	A written advice from the Director-General (or delegate)
Director-	A written approval from the Director-General (or delegate)

General's Approval	Where the Director-General's approval is required under any Minister's Condition the Director-General will endeavour to provide a response within one month of receiving an approval request. The Director-General may ask for additional information if the approval request is considered incomplete. When further information is requested the time taken for the Proponent to respond in writing will be added to the one month period.
Director-General's Report	The report provided to the Minister by the Director-General of the Department under section 115C of the EP&A Act
Dry weather	As defined in the POEO Act Licence for Warragamba STP
Effluent	Treated sewage from the new Warragamba STP
EIS	Priority Sewerage Program Environmental Impact Statement prepared by CH2M Hill for Sydney Water Corporation, dated December 1999
Minister, the	Minister for Infrastructure and Planning
Operation	Means the Operation of the Activity but **does not** include commissioning trials of equipment or temporary use of parts of the Activity during Construction
POEO Act Licence	The Environment Protection Licence for the Mulgoa, Wallacia & Silverdale Sewerage Scheme including the new Warragamba STP at the junction of Silverdale Road and Nortons Basin Road
Proponent	Sydney Water Corporation
Publicly Available	Available for inspection by a member of the general public (for example available on an internet site or at a display centre)
Reasonable and feasible	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW/Australian context. **Feasible** relates to engineering considerations and what is practical to build. **Reasonable** relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and nature and extent of potential improvements
Relevant Councils	Penrith City Council and Wollondilly Shire Council
Relevant Government Departments	A government authority with a licensing or approval role for the Activity's construction or operation. This refers to the DEC, the RTA, and the Department.
Representations Report	Mulgoa, Wallacia & Silverdale Priority Sewerage Program Representations Report prepared by the Sydney Water Corporation, dated April 2001

River	Has the meaning given under the *Water Management Act 2002*. In summary this is "any watercourse, whether perennial or intermittent and whether comprising a natural channel or a natural channel artificially improved". A detailed description of river or waterway types is available in the classification provided in the *Policy and Guidelines for Bridges, Roads, Causeways, Culverts and Similar Structures* (NSW Fisheries 1999)
Sensitive Receiver	Residence, education institution (e.g. school, TAFE college), health care facility (e.g. nursing home, hospital) and religious facility (e.g. church)
Structure	Any fixed artificial object including residences, farm sheds, fences, dams, cable support structures, etc.
Supplement Report	Mulgoa, Wallacia and Silverdale Priority Sewerage Scheme Supplement to the Representations Report, dated November 2003

ABBREVIATIONS

ADWF	average dry weather flow
ARI	average recurrence interval
ASS	acid sulfate soils
BOD	biochemical oxygen demand
CLG	Community Liaison Group(s)
CEMP	construction environmental management plan
dB(A)	Decibel, "A" weighted scale
DEC	Department of Environment and Conservation
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMR	Environmental Management Representative
ENCM	Environmental Noise Control Manual
EPA	Environment Protection Authority (now part of the DEC)
EP&A Act	*Environmental Planning and Assessment Act 1979*
L_{A90}	The noise level exceeded for 90% of a monitoring period, also referred to as the background noise level
$L_{Aeq\ (15\ mins)}$	Equivalent sound pressure level over a 15 minute interval
$L_{A10\ (15\ mins)}$	Sound pressure level exceeded for 10 per cent of the time over a 15 minute period
mg/L	milligrams per litre
ML/day	Megalitres a day
OEMP	Operation Environmental Management Plan
PDWF	peak dry weather flow
POEO Act	*Protection of the Environment Operations Act 1997*
RTA	Roads and Traffic Authority
SPS	sewage pumping stations
STP	sewage treatment plant

ADMINISTRATIVE CONDITIONS

General

1. The Activity must be carried out consistent with the:

   (a) the procedures, safeguards and mitigation measures identified in the EIS and Representations Report, as modified by the Supplement to the Representations Report and Addendum to the Supplement ("Relocation of Sewage Pumping Station WL1 in Wallacia"); and
   (b) these Conditions.

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

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

3. Nothing in this approval permits the Proponent to implement land application of treated effluent as part of this Activity, except for revegetation of the STP site. This condition does not prohibit the inclusion of an effluent off-take point at the STP to facilitate supply of treated effluent by road tanker.

Compliance

General

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

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

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

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

Staging Report

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

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

Pre-Construction Compliance Report

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

   The *Pre-Construction Compliance Report* must include:

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

Pre-Operation Compliance Report

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

   The *Pre-Operation Compliance Report* must include:

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

Construction Compliance Reports

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

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

The *Construction Compliance Reports* must include information on:

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

The *Construction Compliance Reports* must also be made Publicly Available.

Environmental Impact Audits

Environmental Impact Audit Report - Construction

11. An *Environmental Impact Audit Report - Construction* must be prepared and submitted to the Director-General a maximum three months after the Activity in its entirety begins Operation. The *Environmental Impact Audit Report - Construction* must also be submitted to other Government departments upon the request of the Director-General.

The *Environmental Impact Audit Report - Construction* must:

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

Environmental Impact Audit Report - Operation

12. An *Environmental Impact Audit Report - Operation* must be submitted to the Director-General a maximum 24 months after the Activity in its entirety begins Operation and at any additional periods that the Director-General may require. The *Environmental Impact*

Audit Report - Operation must also be submitted to other Government departments upon the request of the Director-General.

The *Environmental Impact Audit Report - Operation* must:

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

ENVIRONMENTAL MANAGEMENT

Construction Environmental Management

Environmental Management Plan

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

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

The CEMP must:

(a) identify the Construction activities associated with the Activity including Construction sites and the staging and timing of proposed works;
(b) cover any other relevant environmental elements identified by the Proponent, or its contractor, from their environmental due diligence investigations;
(c) contain the Construction Sub Plans required by the Conditions of Approval;
(d) be prepared following consultation with Relevant Government Departments and Relevant Councils;
(e) be Publicly Available;
(f) include a community consultation and notification strategy (including local community, Relevant Government Departments, Relevant Councils), and complaint handling procedures;
(g) include environmental management details such as:
    i. identification of the statutory obligations which the Proponent is required to fulfil during Construction, including all approvals and licences;

ii. an environmental management structure indicating the responsibility, authority and accountability for personnel relevant to the CEMP;
iii. the role of the EMR;
iv. details of the how the Construction personnel induction and training program will be managed;
v. emergency response procedures;

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

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

Operation Environmental Management

Operation Environmental Management Plan

14. An Operation Environmental Management Plan (OEMP) must be prepared in accordance with the Conditions of Approval, all relevant Acts and Regulations and accepted best practice management procedures. The OEMP must be certified by the EMR to comply with the Conditions of Approval.

The OEMP must:

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

ii auditing and corrective actions procedures;
iii OEMP review procedures.

If the Proponent has an Operation Environmental System which is applicable to this Activity then that system may be used as an alternative to the OEMP required under this Condition provided all key operational issues identified in the EIS, Representations Report and the Director-General's Report are addressed.

Environmental Management Representative

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

(a) qualifications and experience of the EMR including demonstration of capability to undertake environmental auditing;
(b) role and responsibility of the EMR;
(c) authority and independence of the EMR from the project team including details of the Proponent's internal reporting structure; and
(d) resourcing of the EMR role. The EMR must be available:

i for sufficient time to undertake the EMR role This timing shall be agreed between the Proponent and the EMR and advised to the Department in the request for approval;
ii at any other time requested by the Department; and
iii during any Construction activities identified in the CEMP to require the EMR's attendance.

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

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

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

18. The EMR is authorised to:

(a) consider and advise the Department and the Proponent on matters specified in the Conditions of Approval and compliance with such;
(b) determine whether work falls within the definition of Construction where clarification is requested by the Proponent;
(c) certify the CEMP;
(d) certify the OEMP;

(e) review the Proponent's induction and training program for Construction personnel and monitor its implementation;
(f) periodically monitor the Proponent's activities to evaluate compliance with the CEMP. Periodic monitoring must involve site inspections of active work sites at least fortnightly;
(g) provide a written report to the Proponent of non-compliance with the CEMP. Non-compliance must be managed as identified in the CEMP;
(h) direct the Proponent to stop work immediately if, in the view of the EMR, an unacceptable impact on the environment is occurring or is likely to occur. The EMR may also require that the Proponent initiate reasonable actions to avoid or minimise adverse impacts;
(i) review corrective and preventative actions to ensure the implementation of recommendations made from audits and site inspections;
(j) certify that minor revisions to the CEMP are consistent with the approved CEMP; and
(k) provide regular (as agreed with the Department) reports to the Department on matters relevant to the carrying out the EMR role including notifying the Director-General of any stop work notices.

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

COMMUNICATION AND CONSULTATION

Advertisement of Activities

19. Before construction commences, and then at maximum six monthly intervals, the Proponent must advertise in relevant local newspapers the nature of the works proposed for the next six months, areas in which these works are proposed, Construction hours and a contact telephone number.

The Proponent must ensure that the local community and businesses are advised (by means such as newsletters, leaflets, newspaper advertisements, community notice boards, etc.) of the Activity's progress. Information to be provided must include:

(a) details of any traffic disruptions and controls;
(b) construction of temporary detours; and
(c) work approved to be undertaken outside the normal Construction hours, in particular noisy works, before such works are undertaken.

20. The Proponent must establish an Activity internet site before Construction commences and maintain the internet site for a minimum 12 months after Construction ends. This internet site must contain:

(a) periodic updates of work progress, consultation activities and planned work schedules. The site must indicate the date of the last update and the frequency of the internet site updates;
(b) a description of relevant approval authorities and their areas of responsibility;

(c) a list of reports and plans that are Publicly Available under this Approval and details of how these can be accessed; and
(d) the 24 hour toll-free complaints contact telephone number.

Community Liaison Plan

21. As part of the CEMP the Proponent must describe the community consultation for the Activity.

22. The Proponent must consult all Directly Affected Landowners regarding any reasonable and feasible measures to minimise impacts. Measures identified in the EIS, Representations Report or Supplement to the Representations Report (as relevant) and the CEMP must be implemented according to a program agreed between the Directly Affected Landowner and the Proponent.

Complaints Management System

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

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

Information on all complaints received, including the means by which they were addressed and whether resolution was reached with or without mediation, must be included in the Construction Compliance Reports and must be made available to the Director-General on request.

FLORA AND FAUNA

Construction

24. As part of the CEMP, the Proponent must prepare a Flora and Fauna Management Sub Plan in consultation with Relevant Government Departments and Relevant Councils. The Sub Plan must include:

(a) methods to reduce and manage impacts on flora and fauna (terrestrial and aquatic) and their habitat which may be directly or indirectly affected by the Activity;
(b) performance goals against which to measure the success of the methods;
(c) ecological details including:
    i plans showing: vegetation communities highlighting important fauna habitat areas and threatened species locations; areas to be cleared; and a clearing program. The plan must cover the Approved Activity Area and extend to vegetation in adjoining areas where this is both contiguous with the Approved Activity Area and contains important fauna habitat areas and/or threatened species;
    ii procedures for vegetation clearing and soil management during Construction;
    iii strategies for minimising vegetation clearance within the Approved Activity Area and protection of vegetated areas outside that area;
    iv a habitat tree management program including fauna recovery procedures, potential for relocation of hollow bearing trees, compensatory management measures (such as replacement of lost hollows with nesting boxes);
    v where possible, strategies for re-using individuals or populations of any threatened plant species that would otherwise be destroyed by the Activity in rehabilitation works;
(d) rehabilitation details including:
    i identification of the locally native species to be used in rehabilitation and landscaping works, including flora species suitable as a food resource for threatened fauna species;
    ii the source of all seed or tube stock to be used in rehabilitation and landscaping works including the identification of seed sources within the Approved Activity Area. Seed of locally native species within the Approved Activity Area should be collected before Construction commences to provide seed stock for revegetation;
    iii methods to re-use topsoil and cleared vegetation;
    iv methods to ensure topsoils, and where relevant subsoils, are stripped, stored and placed back in their original sequence;
    v measures to re-use surplus vegetation such as donation to community groups or distribution to the local community;
    vi strategies for the translocation of relevant understorey species that would otherwise be directly impacted upon by the Activity from the Approved Activity Area into rehabilitation areas;
    vii a program for the active management and maintenance of all preserved, planted and rehabilitated vegetation (including aquatic vegetation) including watering regimes, fencing, replacement of vegetation that may have died and weed management;

Rehabilitation shall apply in particular, but not limited, to the following areas:

- areas identified to the east of the STP site on Figure 2 of Appendix B of the Supplement to the Representations Report;
- the excavation corridor for the transfer pipeline from Silverdale Road to the STP;
- ancillary construction sites including the bored pipeline entry and exit pit; and
- landscape plantings disturbed within the Mulgoa Primary School grounds.

(e) a Weed Management Plan including:
   i weed identification;
   ii weed eradication methods and protocols for the use of herbicides;
   iii methods to treat and re-use weed infested topsoil.

   The Plan shall apply in particular, but not limited, to the following areas:
   - Blaxland Crossing;
   - Bushland area along Jerrys Creek and Megarittys Creek;
   - Cumberland Plain Woodland remnants along Mulgoa Road.

(f) a program for reporting on the effectiveness of terrestrial and aquatic flora and fauna management measures against performance goals. Management methods must be reviewed where found to be ineffective.

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

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

As part of the OEMP, the Proponent must prepare a Bushland Restoration and Maintenance Report. The Report must describe long-term regeneration, weed control, fire management and monitoring strategies.

HERITAGE

Indigenous Heritage Management

26. An Indigenous Heritage Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with the relevant Councils, Local Aboriginal Land Councils and DEC and include:

(a) details of the archaeological investigations to be undertaken (if any) and any associated licences or approvals required;
(b) procedures to be implemented if previously unidentified Aboriginal objects are discovered during Construction; and
(c) an education program for all personnel on their obligations for Aboriginal cultural materials.

Aboriginal Objects

27. If during the course of Construction the Proponent becomes aware of any unexpected Aboriginal object(s), all work likely to affect the object(s) must cease immediately and the DEC informed in accordance with the *National Parks and Wildlife Act 1974*.

Historical Relics

28. An Historical Relic Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with the Heritage Office and Relevant Councils and include:

    (a) procedures to be implemented if previously unidentified historical relics are discovered during Construction; and
    (b) an education program for all personnel on their obligations for historic relics.

29. If during the course of Construction the Proponent becomes aware of any unexpected historical relic(s), all work likely to affect the site(s) must cease immediately and the Heritage Council notified in accordance with the *Heritage Act 1977*.

NOISE AND VIBRATION

Construction Noise and Vibration Management Sub Plan

30. The Proponent must prepare a detailed Construction Noise and Vibration Management Sub Plan as part of the CEMP. The Sub Plan must be prepared in consultation with the Relevant Councils and must include:

    (a) identification of each work area, site compound and Construction depot;
    (b) identification of the specific activities that will be carried out and associated noise sources for each work area, site compound and Construction depot;
    (c) identification of all potentially affected noise sensitive receivers;
    (d) the Construction noise objective specified in the Conditions of Approval;
    (e) the Construction vibration criteria specified in the Conditions of Approval;
    (f) determination of appropriate noise and vibration objectives for identified noise sensitive receivers;
    (g) noise and vibration monitoring, reporting and response procedures;
    (h) assessment of potential noise and vibration from the proposed Construction methods including noise from Construction vehicles and any traffic diversions;
    (i) analysis of feasible noise mitigation measures such as:
        i maximising the separation distance between noisy plant items and sensitive receivers;
        ii Construction timetabling, in particular for works outside standard hours, to minimise noise impacts. This may include time and duration restrictions and respite periods;
        iii avoiding using noisy plant simultaneously and/or close together, adjacent to sensitive receivers;
        iv orienting equipment away from sensitive receivers;
        v carrying out loading and unloading away from sensitive receivers;
        vi use of dampened tips on rock breakers;
        vii use of portable enclosures around mobile and fixed plant where noise impacts are likely to be unacceptable;
        viii using noise source controls, such as the use of residential class mufflers, to reduce noise from all plant and equipment including bulldozers, cranes, graders, excavators and trucks;
        ix selection of plant and equipment based on noise emission levels;

x use of alternative Construction methods;
xi alternative arrangements with directly affected landowners or residents of such properties such as temporary relocation;
xii selecting site access points and roads as far as possible away from sensitive receivers; and
xiii use of spotters, Closed Circuit Television Monitors and 'smart' reversing alarms in place of traditional reversing alarms.

(j) a description of management methods and procedures and specific noise mitigation treatments that will be implemented to control noise and vibration during Construction;
(k) justification for any activities outside the Construction hours specified in the Conditions of Approval. This includes identifying areas where Construction noise would not be audible at any sensitive receiver;
(l) internal noise audit systems including recording of daily hours of Construction, progressive impact assessments as the work proceeds and site inspections by the EMR;
(m) procedures for notifying residents of Construction activities that are likely to affect their noise and vibration amenity;
(n) contingency plans to be implemented in the event of non-compliances and/or noise complaints; and
(o) education of Construction personnel about noise minimisation.

Construction Hours

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

Works may be undertaken outside these hours where:

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

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

Construction Noise Objective

32. Construction noise shall aim to meet the following guideline levels:
- For a construction period of four weeks and under, the L_{10} level, measured over a period of not less than 15 minutes when the construction site is in operation, must not exceed the background level by more than 20 dB(A).
- For a construction period of greater than four weeks and not exceeding 26 weeks, the L_{10} level, measured over a period of not less than 15 minutes when the

construction site is in operation, must not exceed the background level by more than 10 dB(A).

- For a construction period greater than 26 weeks, the L_{10} level, measured over a period of not less than 15 minutes when the construction site is in operation, must not exceed the existing background noise level by more than 5 dB(A).

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

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

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

Construction Noise Management

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

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

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

35. The Proponent must consult with education institutions and minimise the impact of noise generating Construction works in their vicinity. The Proponent must ensure that Construction works audible at an institution are not timetabled during important events, such as examination periods, unless arrangements acceptable to the affected institutions are made at no cost to the affected institutions.

Vibration Criteria

36. Vibration caused by Construction and received at any residence or structure outside the Approved Activity Area must be limited to:

    (a) for structural damage vibration, be limited to German Standard DIN 4150 Part 3 *Structural Vibration in Buildings. Effects on Structures* and/or BS7365-2:1993 Evaluation and Measurement of Vibration in Buildings. Where there is an inconsistency between these standards, the more stringent criteria shall apply.

(b) for human exposure to vibration, be limited to the evaluation criteria presented in British Standard BS 6472- *Guide to Evaluate Human Exposure to Vibration in Buildings* (1Hz to 80 Hz) for low probability of adverse comment.

These limits apply unless otherwise approved in the Construction Noise and Vibration Management Sub Plan.

Operation Noise Management

Operational Noise Monitoring

37. The Proponent must monitor the STP's operating noise at maximum intervals of six months for a minimum 12 months after Operation commences. Should monitoring indicate noise levels exceeding the amenity criteria specified in Table 3 of the Supplement to the Representations Report, the Proponent must implement further noise mitigation measures in consultation with the DEC.

PHYSICAL ISSUES

Soil and Water Quality Management Sub Plan

38. As part of the Construction EMP, the Proponent must prepare a Soil and Water Management Sub Plan in consultation with the DEC, the Department and Relevant Councils. The Sub Plan must:

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

Contaminated Soil

39. Prior to construction of the sewage pumping station at the Warragamba STP site, the site must be investigated to confirm the presence or absence of contamination. If contamination is present, the site must be managed in accordance with the relevant legislative requirements approved by the DEC before the likely disturbance. The investigations and proposed measures shall be detailed in the Soil and Water Management Plan required in Condition 38.

Directional drilling

40. The Proponent must address management of Drilling Slurry for all directional drilling sites as part of the CEMP. The CEMP must cover monitoring of cutting fluid returns and actions to be taken in the event of losses in drilling fluid.

41. The Proponent shall conduct detailed geotechnical investigations such as core samples in the area of the proposed directional drill boreholes to determine the soundness of the strata. Details of the geotechnical investigations shall be included as part of the CEMP.

Effluent Discharge

42. After Operation commences, the average dry weather flow discharge to the Warragamba River is not to exceed 1.35 ML/day. This condition does not apply if the scheme is subject to a system licence issued by the DEC under the POEO Act, provided that any such licence specifically addresses the dry weather flow requirements consistent with the Supplement to the Representations Report.

43. Effluent discharged to Warragamba River must attain the effluent quality targets nominated in Table 1 of the Supplement to the Representations Report. The targets must be attained following Optimisation of the STP Process or within a maximum 18 months of Operation commencing whichever is shorter. These criteria are summarised in the **Effluent Quality Table.** The criterion unit for all parameters is milligrams per litre and testing protocols are as specified in the POEO Act Licence. This condition does not apply if the scheme is subject to a system licence issued by the DEC under the POEO Act, provided that any such licence specifies parameter limits as identified in the Effluent Quality Table below, at the same or lower concentration limits.

Effluent Quality Table

Parameter	50 Percentile concentration limit	90 Percentile concentration limit
Total Nitrogen (TN)	7.5	10
Total Phosphorus (TP)	0.15	0.3
Ammonia nitrogen (NH_3-N)	0.5	1
Biological Oxygen Demand (BOD)	5	10
Faecal Coliforms (FC)	150	

44. The Proponent shall ensure that Total Nitrogen (TN) and Total Phosphorous (TP) loads discharged from the Activity are consistent with the predictions in Section 3.2 of Appendix A of the Supplement to the Representations Report[1]. This condition does not apply if the scheme is subject to a system licence issued by the DEC under the POEO Act, provided that any such licence specifies TN and TP load limits and following any further analysis as required by the DEC.

[1] Appendix A of the Supplement to the Representations Report predicted that TN would be approximately 3096 kg/year and TP would be approximately 64 kg/year.

Effluent Re-use

45. The Proponent must provide an Effluent Re-use Report to the Director-General by 30th June 2006 (or within any other timeframe agreed to by the Director-General) on the potential for implementation of a re-use scheme for effluent from the new Warragamba STP. The report must include details of the:

    (a) information on the implementation of the Proponent's Recycled Water Program across the Proponent's STP catchments and where the Mulgoa, Wallacia and Silverdale catchment features in this program;
    (b) POEO Act Licence requirements;
    (c) sites considered for effluent application and their status of implementation, and reasons for rejection of those sites considered to be unsuitable for effluent application;
    (d) for any sites identified by the Proponent as suitable for effluent application, the Proponent shall prepare a suitability analysis including water balances, nutrient budgets, commercial viability, environmental and public health benefits and potable water savings. The analysis will also include:
        i. quantity of effluent to be re-used;
        ii. monitoring requirements; and
        iii. amount of licensed extraction from the Hawkesbury-Nepean River potentially replaced by the effluent supply.

    The Effluent Re-use Report must consider the:

    (a) Statement of Joint Intent for the Hawkesbury-Nepean River System;
    (b) outcomes of the Healthy Rivers Commission Inquiry into the Hawkesbury-Nepean River;
    (c) Integrated Effluent Management Strategy for Hawkesbury-Nepean STPs;
    (d) Final Report of the Hawkesbury-Nepean River Management Forum titled "Water and Sydney's Future" (March 2004);
    (e) Water Management Plan for the Hawkesbury-Nepean River;
    (f) the environmental issues and goals set out in relevant guidelines including EPA (1995) *Environmental Guidelines for Industry – The Utilisation of Treated Effluent by Irrigation* and the National Water Quality Management Strategy (2000) *Guidelines for Sewerage Systems – Use of Reclaimed Water*, or as updated; and
    (g) requirements specified by the Operating Licence issued to the Proponent under the Sydney Water Act 1994.

Overflow Management

46. Each Sewage Pumping Station shall be designed to contain a minimum of four (4) hours peak dry weather flow. This condition does not apply if the scheme is subject to a system licence issued by DEC under the POEO Act, provided that any such licence specifically addresses sewage storage requirements at the SPSs consistent with the EIS.

47. The Mulgoa, Wallacia and Silverdale Sewerage Scheme is to be designed and constructed such that when it is operational:

    a) dry weather overflows from the sewerage reticulation system (excluding sewage pumping stations) are not to occur, if a cause of the overflow is a failure to operate

and maintain any part of the system in a proper and efficient manner;

b) no sewage overflows are to occur from sewage pumping stations in dry weather;

c) there shall be no more than 10 wet weather overflows in a ten year period from the sewerage reticulation system within the catchments of the Warragamba River and Nepean River. The adequacy of this standard for wet weather overflows shall be monitored for environmental performance and reported as part of the Environmental Impact Audit Report – Operation.

This condition does not apply if the scheme is subject to a system licence issued by the DEC under the POEO Act, provided that any such licence specifically addresses the sewerage system's overflow performance consistent with the EIS.

For the purpose of this condition, the Mulgoa, Wallacia and Silverdale Sewerage Scheme does not include the reticulation system of Warragamba village.

Flooding

48. All electrical equipment associated with the SPSs shall be located above the 100 ARI flood level.

Spoil and Fill Management

49. All material excavated from the works must be re-used or recycled where suitable and cost-effective. The Proponent must ensure that the re-use of material generated from Construction activities is maximised in preference to importing fill.

Air Quality

Dust Management Sub Plan

50. A Dust Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must identify:

(a) potential sources of dust;
(b) dust management objectives consistent with DEC guidelines;
(c) a monitoring program to assess compliance with the identified objectives;
(d) mitigation measures to be implemented, including measures during weather conditions where high level dust episodes are probable (such as strong winds on hot, sunny days); and
(e) a progressive rehabilitation strategy for exposed surfaces with the aim of minimising exposed surfaces.

Construction

51. Construction vehicles using public roads must be maintained to prevent any loss of load, whether in the form of dust, liquid or soils. Construction vehicles must be maintained to minimise tracking of any mud, dirt or other material onto any street which is opened and accessible to the public. In the event of any spillage, the Proponent must remove the spilled material as soon as practicable within the working day that the spillage is known.

52. The Proponent must ensure that all plant and equipment used in connection with the Activity are:

    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient manner.

Odour Management

53. The Proponent must prepare an Odour Management Plan for the final design layout of the STP as part of the OEMP. The Odour Management Plan must:

    (a) be prepared in consultation with the Relevant Councils;
    (b) identify all point and diffuse sources of odour at the STP and establish odour emission concentrations and rates from each source;
    (c) present the results of odour dispersion modelling for the operations of the STP. Odour dispersion modelling must be carried out in accordance with the EPA document *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales* (August 2001, or as amended); and
    (d) contain details of a monitoring program to be implemented to verify the modelling.

54. The Proponent must outline in the OEMP any contingency measures to deal with odour occurrences at SPSs.

Greenhouse Gases

Construction Stage

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

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

SOCIAL AND ECONOMIC ISSUES

Property Damage and Access

56. Subject to landowner agreement, building condition surveys must be conducted on all structures within:

    a) 200 metres of blasting; or
    b) 50 metres of Construction activities that generate vibration impacts; or
    c) any other locations identified by the EMR.

    Building condition surveys must be undertaken at least 30 days before Construction occurs within the distance limits described in this Condition.

The owners of all properties for which building condition surveys are to be conducted must be advised at least 14 days before the survey of its scope and methodology and of the process for making a property damage claim. A copy of the survey must be given to each affected owner at least three weeks before Construction that could affect the property commences. A register of all properties surveyed must be maintained by the Proponent indicating whether the owner accepted or refused the survey offer. A copy of the register must be provided to the Director-General upon request.

57. Building condition surveys need not be undertaken if a risk assessment indicates structures will not be affected. The risk assessment must be undertaken before Construction commences by geotechnical and construction engineering experts with appropriate registration on the National Professional Engineers Register.

58. The Proponent must consult all Affected Landowners regarding any practical and cost-effective measures to minimise impacts. Mitigation measures should be implemented according to a program discussed between the Affected Landowner and the Proponent if consistent with the Conditions of Approval.

59. The Proponent where liable must ensure rectification of property damage caused by the Activity's Construction or Operation. Alternatively, the Proponent may negotiate compensation for the property damage with the landowner.

Access to Properties

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

Traffic and Roadworks

61. Road dilapidation reports must be prepared for all roads likely to be used by Construction traffic before Construction commences and after Construction is complete. Copies of the reports must be provided to the Relevant Councils. Any damage resulting from Construction, aside from that resulting from normal wear and tear, must be repaired at the cost of the Proponent.

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

62. The Proponent must prepare a Construction Traffic Management Sub Plan as part of the CEMP in consultation with Relevant Councils and/or the Police and the RTA. The Sub Plan must include:

    (a) identification of all public roads to be used by Construction traffic, in particular roads proposed for the transport of large quantities of Construction materials. The timing and duration of road usage must be stated;
    (b) management methods to ensure Construction traffic uses identified roads. This must include actions to be taken in sensitive traffic areas such as in the vicinity of the Mulgoa Public School and Wallacia Public School;

(c) identification of all public roads which may be partially or completely closed during Construction. Consideration must be given to programming Construction works to minimise road closures during peak periods;
(d) impacts on existing traffic (including pedestrians, vehicles, cyclists and disabled persons);
(e) temporary traffic arrangements including property access;
(f) access to Construction sites including entry and exit locations and measures to prevent vehicles queuing on public roads;
(g) a response plan for any Construction traffic incident; and
(h) appropriate review and amendment mechanisms.

63. Prior to commencement of construction works at the STP, the need to widen Nortons Basin Road up to the STP access road to ensure traffic safety in this area must be assessed.

LANDSCAPE DESIGN

Pre-Construction Report

64. The Proponent must prepare a Landscape Design Report for the new STP before Construction commences. The Proponent must provide the Landscape Design Report to the Director-General before Construction commences or within any other time agreed to by the Director-General. The Report must include design treatments for the following:

(a) landscape elements and built elements, including the proposed treatments, finishes and materials of exposed surfaces (including colour specifications and samples); and
(b) lighting.

The Report must also include the following information:

(a) a schedule of species to be used in landscaping and revegetation of the STP site;
(b) details of the timing and progressive implementation of landscape works; and
(c) procedures and methods to monitor and maintain landscaped or rehabilitated areas at the STP site.

Construction

65. All rehabilitation works must be monitored and maintained by a suitably qualified landscape specialist at the Proponent's expense for a period of three years following completion of any revegetation or as otherwise identified in the Landscape Design Report. The Proponent must implement any required remedial measures to maintain rehabilitation works to their design standard.

66. Before Construction commences, the Proponent must consult with all residents and landowners in the vicinity of each SPS regarding the final siting of the SPS and proposed rehabilitation works and screening following construction works. Mitigation measures should be implemented according to a program discussed with the Affected Landowner and the Proponent if consistent with the Conditions of Approval.

MISCELLANEOUS REQUIREMENTS

Hazards and Risk Management

67. As part of the Construction and Operation EMPs, the Proponent must prepare and implement a Hazards and Risk Management Sub Plan. These Sub Plans must include:

    (a) details of the hazards and risks associated with the Activity. This must include the need at the STP to ensure appropriate separation distances between the Spent Pickle Liquor and Sodium Hypochlorite tanks, pumps and pipes to minimise the likelihood of accidental contact of one chemical with the other; and
    (b) pro-active and reactive mitigation measures including contingency plans to be implemented in the event an identified hazard occurs.

Waste Management and Recycling

68. As part of the Construction and Operation EMPs the Proponent must prepare Waste Management and Re-use Sub Plans. The Sub Plans must address the management of wastes in accordance with the NSW Government's Waste Reduction and Purchasing Policy. The Sub Plans must identify requirements for:

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

Utilities and Services

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

70. The Proponent must consult with relevant councils and/or the RTA regarding the proposed attachment of any pipeline to bridge crossings within the local government area to ensure that their requirements are met.

Location of Construction Facilities

71. The sites for Construction compounds and ancillary sites, such as temporary concrete batching plants, must satisfy the following criteria unless otherwise identified in the CEMP:

(a) be located within the Approved Activity Area;
(b) have ready access to the local road network;
(c) be located to minimise the need for heavy vehicles to travel through residential areas;
(d) be sited on relatively level land;
(e) be separated from nearest residences by at least 200 m (or at least 250 m for a temporary concrete batching plant);
(f) not be within 100 m of, or drain directly to, SEPP 14 wetlands;
(g) not be located within 100 m of a river;
(h) be located above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented;
(i) have low conservation significance for flora, fauna or heritage and must not require any vegetation clearing beyond that already required for the Activity; and
(j) not affect the land use of adjacent properties.

The location of any Construction compounds and ancillary sites must be detailed in the CEMP and must include an analysis against the above criteria.

SCHEDULE 1: DESCRIPTION OF ACTIVITY

The Activity is the Mulgoa, Wallacia & Silverdale Sewerage Scheme as described in the:

1. Environmental Impact Statement (EIS) for the Mulgoa, Wallacia & Silverdale Priority Sewerage Program prepared by CH2M Hill for the Sydney Water Corporation dated December 1999 and the Representations Report for the Mulgoa, Wallacia & Silverdale Priority Sewerage Program prepared by the Sydney Water Corporation dated April 2001; as modified by the

2. Supplement to the Representations Report dated November 2003 and Addendum to the Representations Report – Relocation of Sewage Pumping Station WL1 in Wallacia dated March 2004.

FIGURES

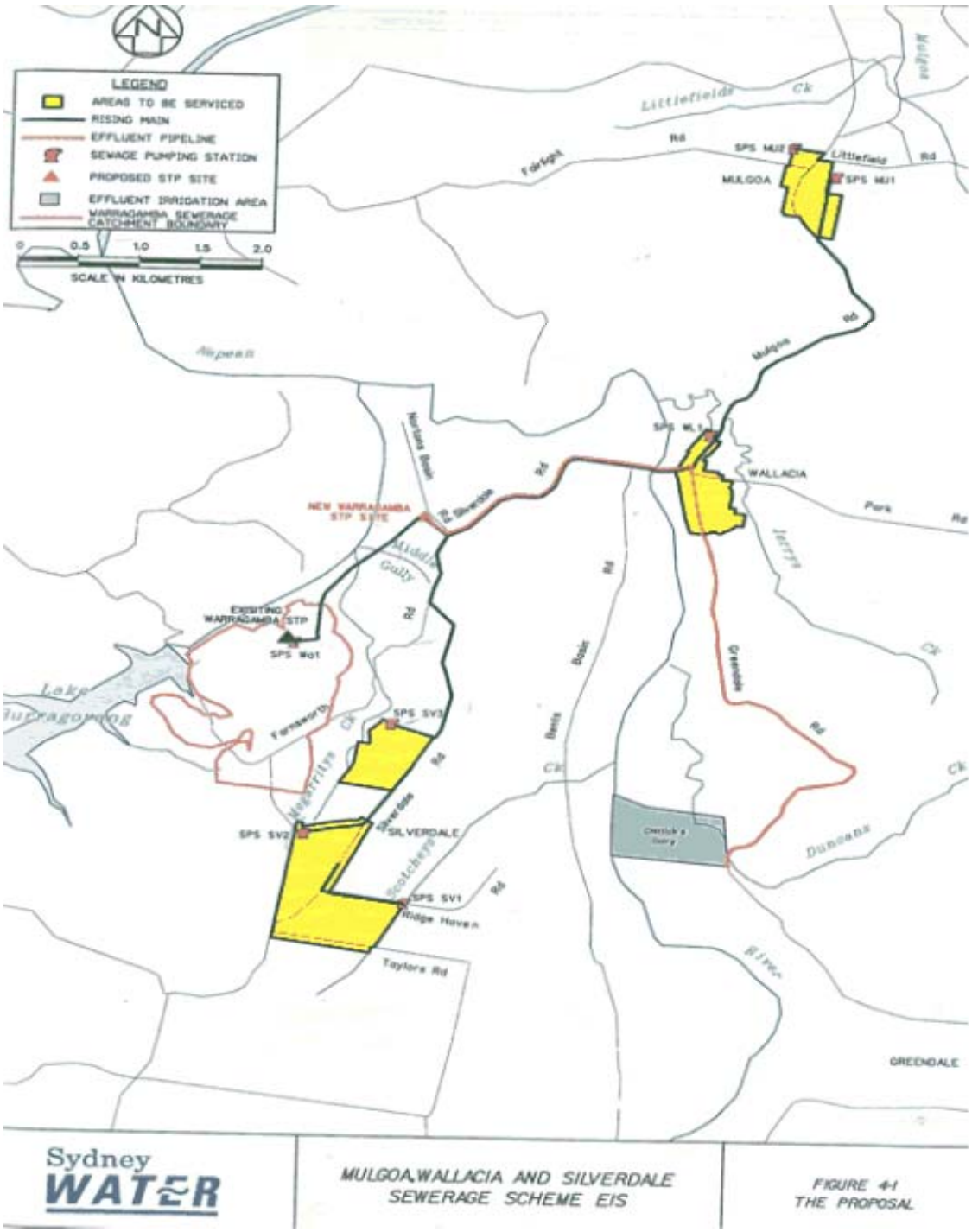

Figure 1: The Original Proposed Scheme

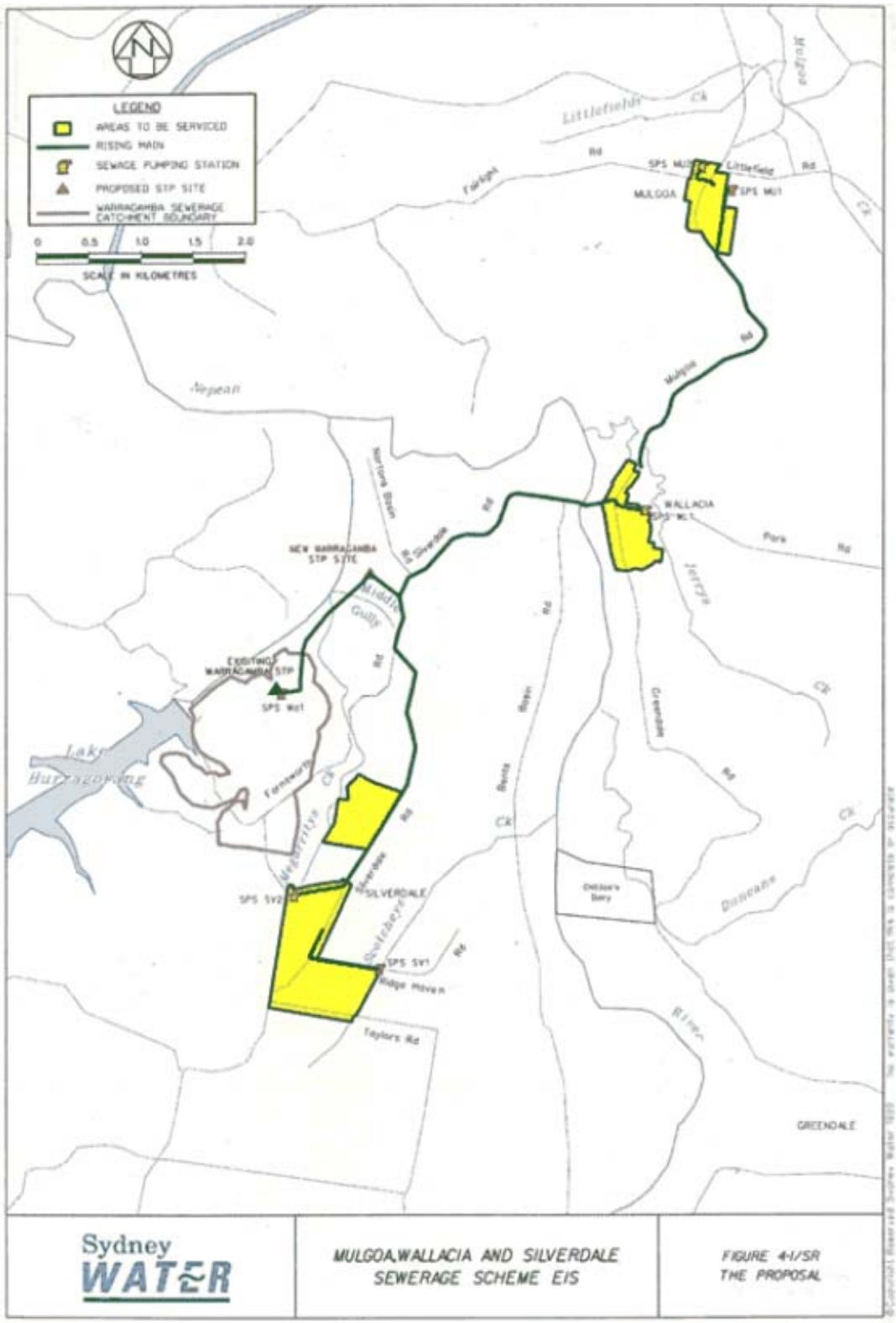

Figure 2: The Revised Proposed Scheme

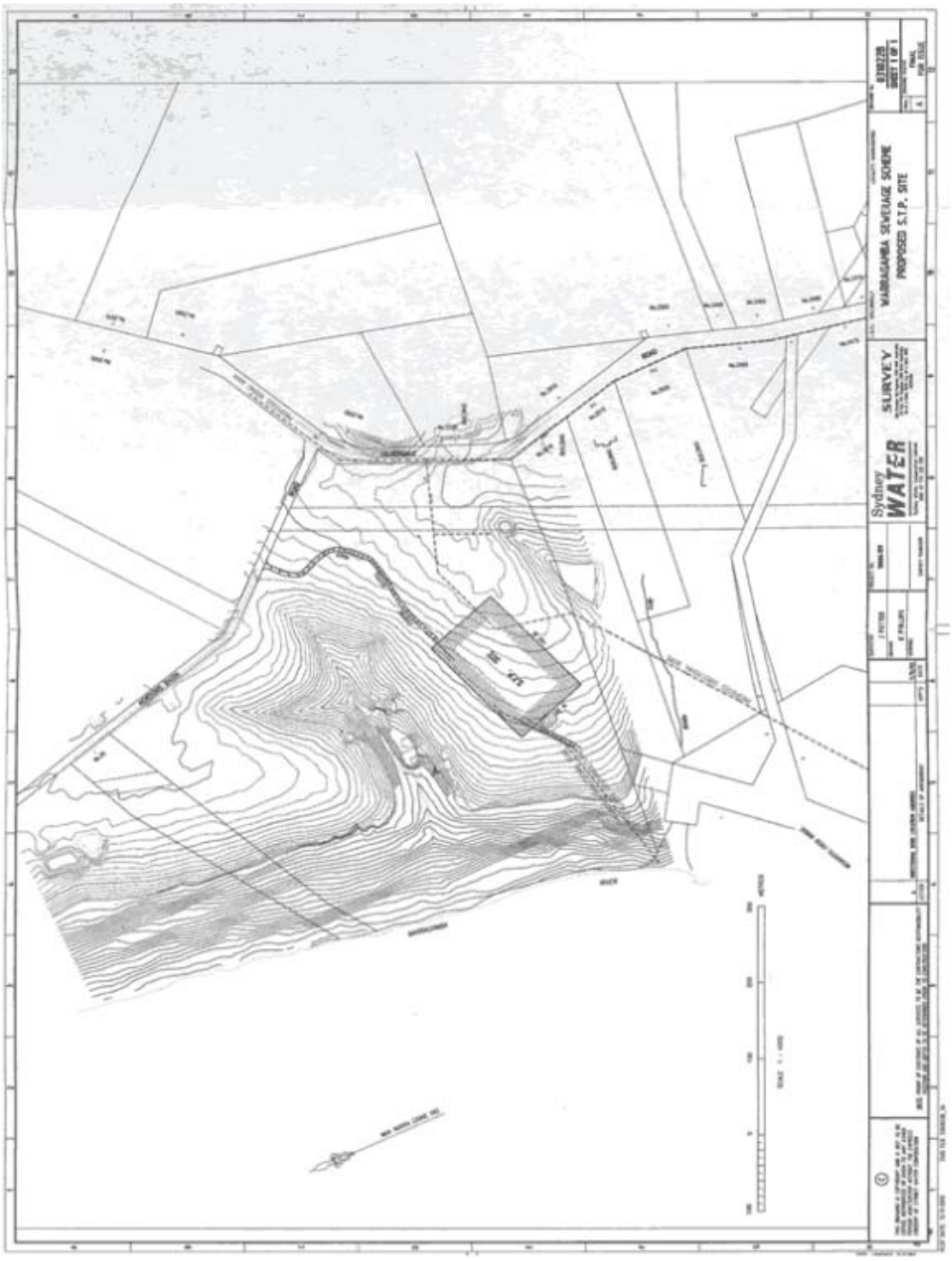

Figure 3: Proposed STP site in Warragamba

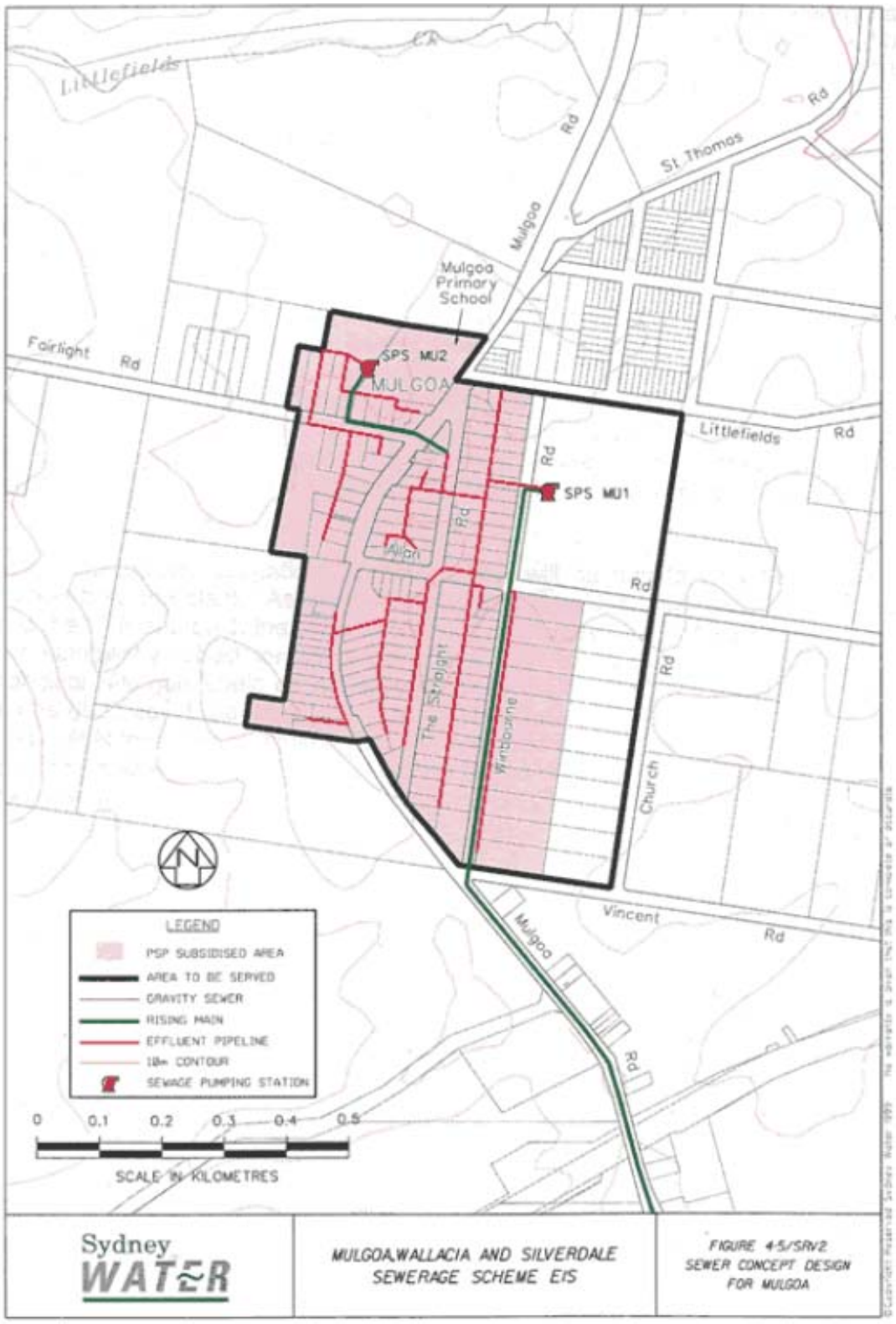

Figure 4: Sewer Concept Design for Mulgoa

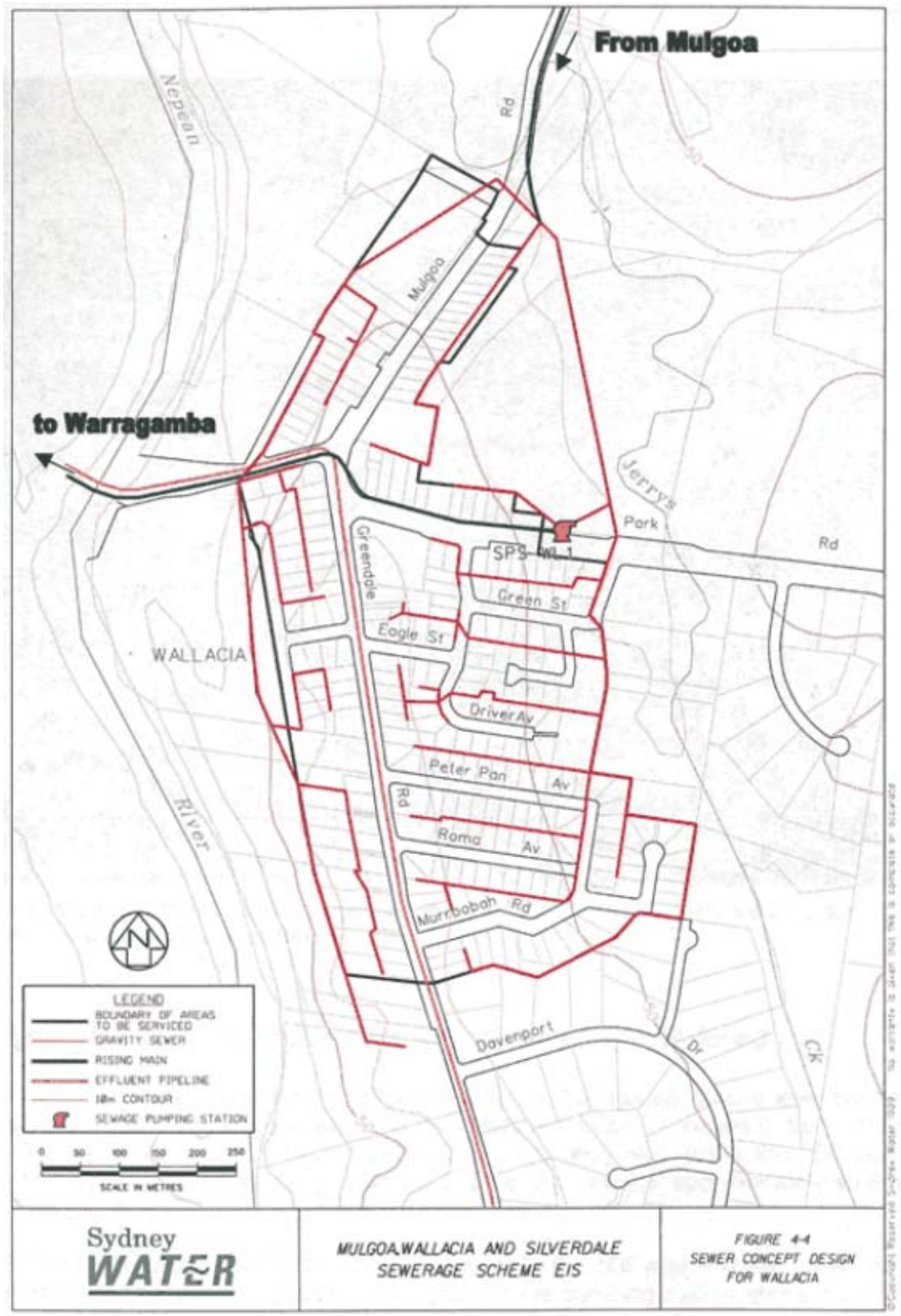

Figure 5: Sewer Concept Design for Wallacia (Revised)

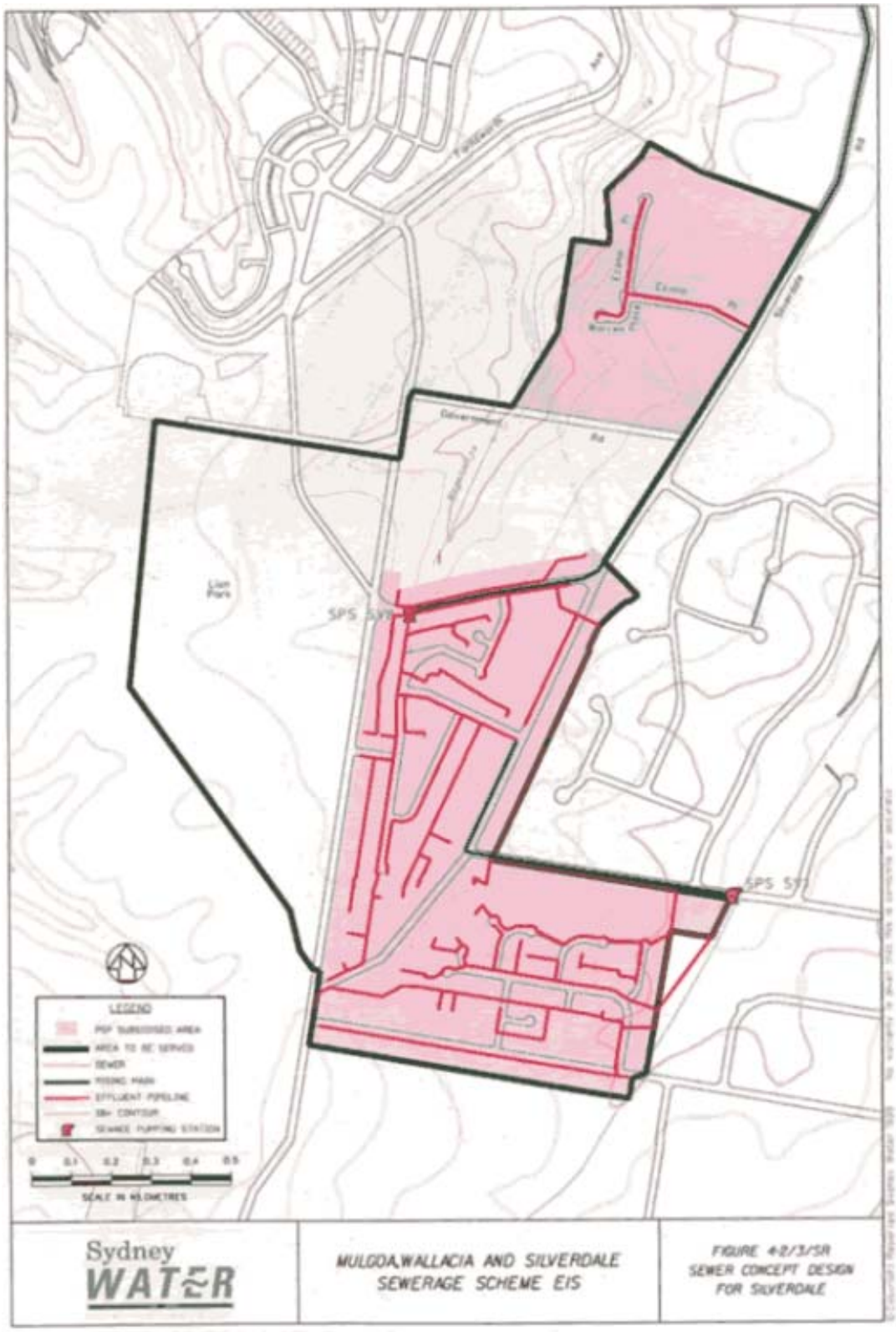

Figure 6: Sewer Concept Design for Silverdale

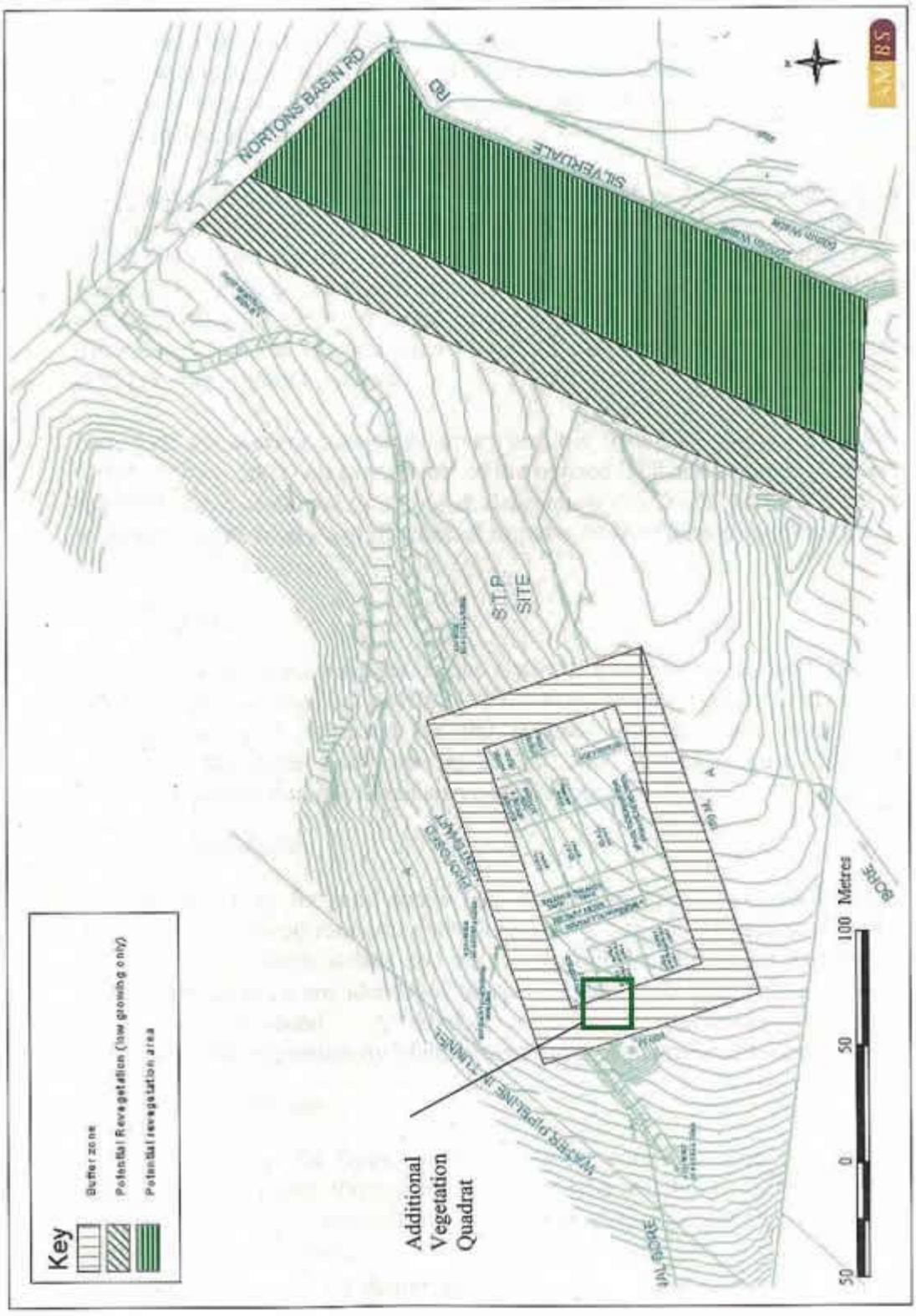

Figure 7: Areas Recommended for Vegetation in the Warragamba STP