

Prepared for

Hunter Water Corporation

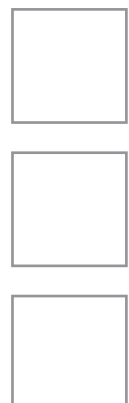
Burwood Beach WWTW Stage 2 Upgrade – Environmental Impact Assessment



Review of Environmental Factors

September 2008

Reference: 356448



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Executive Summary

This Review of Environmental Factors (REF) has been prepared by CH2M HILL Australia Pty Ltd (CH2M HILL) on behalf of Hunter Water Corporation (HWC) to support the proposed Stage 2 Upgrade to Burwood Beach Wastewater Treatment Works (WWTW).

The purpose of this REF is to assess potential environmental impacts arising from the construction and operation of the Stage 2 Upgrade to the Burwood WWTW, to satisfy HWC's duty under section 111 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Burwood Beach WWTW is HWC's largest wastewater treatment works and services the Newcastle and Lake Macquarie Local Government Areas (LGAs). The WWTW is located approximately 4 kilometres (km) to the south of the Newcastle CBD.

In recent times the WWTW has experienced process problems, particularly in wet weather. A major process review was completed in 2006 which determined that the actual plant capacity is significantly less than the original design capacity and is equivalent to the current load on the plant. A major upgrade of the plant is required to rectify process and reliability constraints and to ensure the plant operates sustainably into the future.

The objective of the Stage 2 Upgrade is to ensure the WWTW can reliably meet the existing licence conditions and operate to its design capacity. The Stage 2 Upgrade is part of a Pollution Reduction Program (PRP) agreed with the Department of Environment and Climate Change (DECC).

Further investigations and consultation are underway to determine the preferred long term sustainable strategy for the WWTW (the Stage 3 Upgrade). The Stage 3 Upgrade will be the subject of a separate Environmental Impact Assessment (EIA).

The key elements of the Stage 2 Upgrade, which are the subject of this REF include:

- Modifications to the existing grit trap
- Modifications to the existing Secondary Pumping Station
- Provision of a new pipeline to bypass the ABF tower
- Replacement of the filter media in the existing ABF tower
- Construction of a new (third) aeration tank
- Upgrade of the aeration system including a new blower building
- Construction of a new (fourth) clarifier
- Modifications to the existing RAS-WAS pumping station
- Construction of a new RAS pumping station
- Provision of new or modified RAS and WAS pipelines

- Provision of new water management systems:
 - An in-plant effluent recycling system
 - A new stormwater management system
- Upgrading of power supply and automatic control & monitoring system
- Miscellaneous works including new internal site access roads and construction of chambers, pits, manholes, etc

All works will occur within the existing WWTW boundary.

Statutory Planning

A review of legislative, regulatory environmental planning instruments, policy and guideline documents has been performed to identify HWC's statutory obligations.

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and associated Regulations provide a framework for the assessment of the environmental impact of activities in NSW. As the Project is permissible without consent, due to the operation of *State Environmental Planning Policy (Infrastructure) 2007*, the environmental assessment has been undertaken under Part 5 of the EP&A Act.

The application of other legislative, planning and policy instruments has also been considered including the *Protection of the Environment Operations Act 1997* (NSW) and the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth).

Consultation

Consultation was undertaken with statutory stakeholders at a Planning Focus Meeting (PFM) held on 4 July 2007. Those items raised that are relevant to the Stage 2 Upgrade have been addressed in this REF.

A Community Reference Group (CRG) was formed with representative members from the community in order to provide a conduit for communication on issues relating to the plant upgrade between the community and HWC. Seven meetings have been held with the CRG to date and issues raised at these meetings that are relevant to the Stage 2 Upgrade have been addressed within this REF.

Environmental Impact Assessment

The potential environmental impacts associated with construction and operation of the Stage 2 Upgrade have been assessed. The following areas have been addressed:

- Topography, drainage and flooding
- Stormwater
- Geology and soils
- Marine sediments

- Surface water quality
- Groundwater and potable water
- Terrestrial and marine ecology.

Potential constraints on the Burwood Beach WWTW site include the potential to encounter groundwater, the management of stormwater and the position of Murdering Gully Creek. These impacts will be mitigated through the installation of a sheet-pile wall and formulation of environmental management plans.

Consideration of the areas listed above did not identify any significant, adverse environmental impacts as a result of the construction and operation of the Stage 2 Upgrade, subject to implementation of the safeguards outlined in this REF.

Social Impact Assessment

The potential social impacts associated with the construction and operation of the Stage 2 Upgrade have also been assessed, these included:

- Socio-economic setting
- Land use
- Air quality and odour
- Noise
- Human health
- Hazard and risk analysis
- Indigenous heritage
- Non-indigenous heritage
- Traffic and access
- Landscape and visual considerations
- Waste minimisation and management
- Energy use and greenhouse gas emissions.

Potential social constraints associated with construction and operation of the Stage 2 Upgrade includes traffic and access, odour, noise, non-indigenous heritage and waste minimisation and management and energy use. Traffic and noise management plans will be developed to minimise impacts upon traffic and local residents during construction of the Stage 2 Upgrade and barriers will be installed around all structures on site that are older than 50 years to protect them from accidental damage.

The Waste Resource Management Hierarchy principles will be followed to minimise the generation of waste onsite during construction. Specific mitigations measures will be implemented during the ABF Tower media replacement to reduce any odour impacts.

Consideration of the areas of potential social impacts listed above did not identify any significant adverse impacts from the construction and operation of the Stage 2 Upgrade that can not be mitigated through the measures listed in this REF.

Cumulative Impacts and ESD

Cumulative impacts from the construction and operation of the Stage 2 Upgrade and other projects within the vicinity of Burwood Beach WWTW were considered. Other projects identified that may create cumulative impacts with the Stage 2 Upgrade include:

- Dudley - Charlestown Carrier Duplication Project
- Wet Weather System Upgrade
- Odour Control Upgrade.

No adverse cumulative environmental or social impacts were identified during the assessment. The review identified a number of positive cumulative environmental and social impacts that will result from the operation of the projects listed above.

The principals of ecologically sustainable development (ESD) have been applied to the design of the Stage 2 Upgrade through the integration with strategic planning policies and the application of scientific environmental assessments. The Stage 2 Upgrade will cater for current and future generations, fulfilling the principle of inter and intra generational equity.

Conclusion

It is considered that the construction and operation of the Burwood Beach WWTW Stage 2 Upgrade will not significantly, adversely affect the environment, subject to the implementation of the mitigation measures outlined in this REF.

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Abbreviations	
ABF	Activated Biofilter
ABS	Australian Bureau of Statistics
ADWF	Average Dry Weather Flow
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
ANZECC	Australian and New Zealand Environment and Conservation Council
AOTR	Actual Oxygen Transfer Rate
AS	Activated Sludge
AS	Australian Standard
ATAD	Autothermal Aerobic Digestion
BASIX	Building and Sustainability Index
BOD	Biochemical Oxygen Demand
CAPEX	Capital Expenditure
CAS	Conventional Activated Sludge
CBD	Central Business District
CEMP	Construction Environmental Management Plan
COD	Chemical Oxygen Demand
CDS	CDS Pty Ltd trading as CDS Technologies, suppliers of stormwater screening equipment
cfu	Colony-forming unit
CHAIR	Construction Hazard Assessment Implication Review
Cl	Clause
CLM Act	<i>Contaminated Land Management Act 1997</i>
CRG	Community Reference Group
d	Day
dBa	Decibels (A-weighted)
DEC	NSW Department of Environment and Conservation (now DECC)
DECC	NSW Department of Environment and Climate Change (formerly DEC), the licensing authority

DO	Dissolved Oxygen
DoH	Department of Health
DOL	Direct Online
DPI	Department of Primary Industries
DS	Dry Solids
DWE	Department of Water and Energy
ECRTN	Environmental Criteria for Road Traffic Noise
EDC	Endocrine Disrupting Compounds
EEC	Endangered Ecological Communities
EIA	Environmental Impact Assessment
ENM	Environmental Noise Level
EP	Equivalent Population
EP&A	<i>Environmental Planning and Assessment Act 1979</i>
EPA	Environmental Protection Agency, now a division within DECC
EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPI	Environmental Planning Instruments
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
ESS	Effluent Suspended Solids
ET	Equivalent Tenements
FMA	<i>Fisheries Management Act 1994</i>
FWCA	Freshwater on Coastal Floodplains
GDD	Greywater Diversion Device
GHG	Greenhouse Gas
GIS	Geographic Information System
GTS	Greywater Treatment System
GW	Groundwater
ha	Hectare
hr	Hour
HRT	Hydraulic Retention Time

HVRT	Hunter Valley Research Foundation
HWC	Hunter Water Corporation
Infrastructure Strategy	State Infrastructure Strategy 2006/7 – 20016-17
INP	Industrial Noise Policy
IWRP	Indirect Water Resources Plan
kg	Kilogram
kW	Kilowatt
L	Litre
l/s	Litres per second
LAeq	Ambient Noise Level
LEP	Local Environment Plan
LGA	Local Government Area
LMCC	Lake Macquarie City Council
LOEC	Lowest Observable Effect Concentration
LS	Liquid Stream
m	Metre
M	Million
MBAS	Methylene Blue Active Substances
MBP	Mayfield to Burwood Pipeline
MBR	Membrane Bioreactor Process
MCC	Motor Control Centre
MCRT	Mean Cell Residence Time
mg	Milligram
ML	Megalitre or Mixed Liquor
MLE	Modified Ludzack-Ettinger Process
MLSS	Mixed Liquor Suspended Solids
mm	Millimetre
MSB	Mine Subsidence Board
MSDS	Material Safety Datasheet
NCC	Newcastle City Council

NEPM	National Environmental Protection Measure
NES	National Environmental Significance
NFR	Non-Filterable Residue, also known as Suspended Solids
NGA	National Greenhouse Accounts
NGER Act	<i>National Greenhouse and Energy Reporting Act 2007</i>
NHMRC MRL	National Health and Medical Research Council's Medical Residue Limits
NOEC	No Observable Effect Concentration
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NWQMS	National Water Quality Management Strategy
OC	Organochlorine
OH&S	Occupational Health and Safety
ou	Odour Units
p.a.	Per annum
PAD	Potential Archaeological Deposit
PAG	Pressure Assisted Gravity
PAH	Polycyclic aromatic hydrocarbons
PDWF	Peak Dry Weather Flow
PFM	Planning Focus Meeting
PLC	Programmable Logic Controller
POEO	<i>Protection of the Environment Operations Act 1997</i>
PPS	Primary Pumping Station
PRP	Pollution Reduction Program
PS	Pumping Station
PST	Primary Sedimentation Tank
PVC	Polyvinyl Chloride
PWWF	Peak Wet Weather Flow
RAS	Return Activated Sludge
RBL	Rating Background Level
RE	Reclaimed Effluent
REF	Review of Environmental Factors

Regional Strategy	Lower Hunter Regional Strategy
REP	Regional Environment Plan
RF	Roughing Filter
RL	Relative Level
RMS	Root Mean Square
rpm	Revolutions Per Minute
RPZD	Reduced Pressure Zone Device
s	Second
SC	Solids Contact (~ Process)
SCA	State Conservation Area
SCADA	Supervisory Control and Data Acquisition
SEPP	State Environmental Planning Policy
SK	Spülkraft (German for 'flushing intensity')
SOTR	Standard Oxygen Transfer Rate
SPS	Secondary Pumping Station
SRT	Solids Retention Time
SS	Solid Stream
SVI	Sludge Volume Index
tCO ₂ -e	CO ₂ equivalent tons
TF	Trickling Filter
TGSCH	Themeda Grassland on Seacliffs and Coastal Headlands
TSS	Total Suspended Solids
TSC	<i>Threatened Species Conservation Act 1995</i>
TM	Trace Metals
UMP	Upgrade Management Plan
UNSW	The University of New South Wales
UMP	Upgrade Management Plan
UPS	Uninterrupted Power Supply
Urban Strategy	Newcastle Urban Strategy
Urban Water Cycle Policy	A Sustainable Urban Water Cycle Policy for Newcastle

VSD	Variable Speed Drive
WAS	Waste Activated Sludge
WMA 2000	<i>Water Management Act 2000</i>
WELS	National Water Efficiency & Standards Scheme
WET	Whole Effluent Toxicity
WWPS	Wet Weather Pumping Station
WWTW	Wastewater Treatment Works

1 Introduction

1.1 Purpose of this Report

This Review of Environmental Factors (REF) has been prepared by CH2M HILL on behalf of Hunter Water Corporation (HWC) to support the proposed Stage 2 Upgrade to Burwood Beach Wastewater Treatment Works (WWTW).

The purpose of this REF is to assess potential environmental impacts arising from the construction and operation of the Stage 2 Upgrade to the Burwood WWTW, to satisfy HWC's duty under section 111 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.2 Background

Burwood Beach WWTW is the largest of HWC's wastewater treatment facilities. It is located approximately 4km south of the Newcastle CBD adjacent to the coastal suburb of Merewether, and is surrounded by the Glenrock State Conservation Area (SCA) off Scenic Drive. A locality map is shown in Figure 1-1.

Burwood Beach WWTW treats wastewater from catchments in the Newcastle City Council Local Government Area (LGA) and a catchment in the Lake Macquarie City Council LGA. The suburbs serviced by the Burwood Beach WWTW extend to Dudley in the south, Wallsend in the west and Mayfield in the north. The catchment produces mainly domestic wastewater, with a minor component of industrial wastewater.

Burwood Beach WWTW processes the wastewater received to a secondary treatment level and discharges to an ocean outfall. The original design capacity of the plant was 220,000 equivalent persons (EP) which equates to an average dry weather flow (ADWF) of approximately 53 ML/d.

In recent times the plant has experienced process problems, particularly during and immediately after wet weather. A major process review was completed in 2006 which determined that the actual plant capacity is approximately 180,000 EP, which equates to an ADWF of 43 ML/d (CH2M HILL, 2006). This is significantly less than the original design capacity and equivalent to the current load on the plant. The capacity of the plant is limited by the following deficiencies:

- The secondary treatment process in its current form is unstable
- There is a significant hydraulic imbalance through the plant resulting in some process units operating beyond their design capacity
- There is a lack of redundancy for key process units and pieces of equipment.

A major upgrade of the plant is required to ensure that the plant operates reliably. An upgrade strategy has been developed to rectify capacity and reliability issues and to service growth in the catchment. The upgrade strategy did not include a preferred option for the management of biological solids. In response to the process problems

experienced at the plant the Department of Environment and Climate Change (DECC) has imposed a requirement on the plant's environment protection licence (EPL) in the form of a pollution reduction program (PRP) to implement the works identified in the upgrade strategy by 30 June 2010.

1.3 Upgrade Strategy

A phased strategy to upgrade the plant has been developed to comply with the requirements of the PRP and provide a sustainable plant that can service the long term needs of the catchment. The strategy comprises two stages:

- The *Stage 2 Upgrade* aims to improve the reliability of the WWTW and bring the plant up to its original design capacity. The intention of the Stage 2 Upgrade is to complete the works within the timeframe of the PRP. The Stage 2 Upgrade is the subject of this REF document.
- The *Stage 3 Upgrade* will provide the long term effluent and biological solids strategies for the plant. Further investigations and consultation are required before a decision on the preferred strategy can be made. The Stage 3 Upgrade will be the subject of a separate Environmental Impact Assessment (EIA).

The strategy has been endorsed by DECC.

1.4 Objective of the Stage 2 Upgrade

The objective of the Stage 2 Upgrade is to provide a treatment process that is capable of meeting the requirements of the WWTW's EPL. This objective will be achieved by adding process capacity and providing redundancies to achieve the original design intention of 220,000 EP.

The proposed Stage 2 Upgrade to Burwood Beach WWTW is part of a PRP agreed with the DECC. The PRP requires construction and commissioning of the upgrade by 30 June 2010.

1.5 Study Area

The study area for the Stage 2 Upgrade is located within the boundaries of the current fence line of the WWTW site.

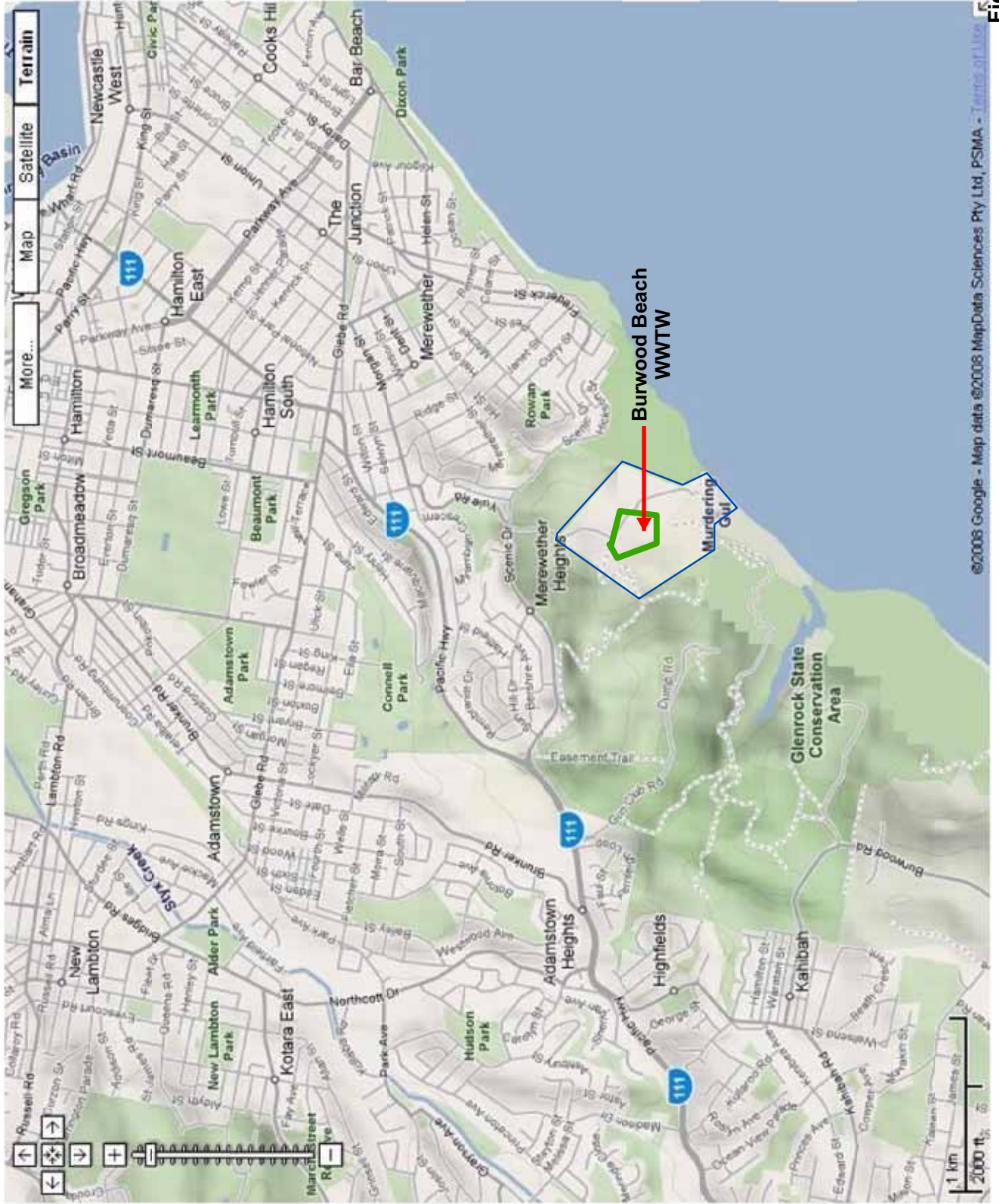
Burwood Beach WWTW is located within Newcastle City Council LGA. The suburbs surrounding the site include:

- Merewether to the northeast
- Merewether Heights to the northwest
- Adamstown Heights to the northwest
- Highfields to the west

Along the ridge to the north and west of the site are residential properties, which lie within the suburbs of Newcastle listed above. The closest residences to the site are

located on Scenic Drive and Hickson Street. These properties have views across the site to the ocean. Figure 1-2 is an aerial photo of Burwood Beach WWTW, as viewed from the southwest.

The site is at the bottom of an extended gully and is traversed by Murdering Gully Creek, which flows onto Burwood Beach. Access to the site is via a private road through the Glenrock State Conservation Area (SCA). The Glenrock SCA lies to the north, east and west of the site. The Glenrock SCA protects the last remnant of coastal temperate rainforest in the Newcastle region (NPWS, 2007).



Source: Google Maps, 2008

©2008 Google - Map data ©2008 MapData Sciences Pty Ltd, PSMA - Terrain ©2008

Figure 1.1: Site Locality



Figure 1-2 Aerial View of Existing Burwood Beach WWTW

1.6 Major Project Interactions

1.6.1 Dudley-Charlestown Carrier Duplication

The Dudley-Charlestown carrier main is being upgraded as part of the Dudley-Charlestown Wastewater Transportation System Upgrade Management Plan (UMP). The UMP aims to reduce the frequency and volume of overflows from the transportation system. A separate EIA report has been prepared for these works (Patterson Britton & Partners Pty Ltd, 2005).

The UMP includes duplication of a section of the existing Dudley-Charlestown carrier that runs through the WWTW. The duplicate carrier will run in a north-south direction between the ABF tower and the screen house, and it will discharge into a collection manhole upstream of the existing WWTW primary pumping station.

It is proposed that the new ABF by-pass pipeline (to be constructed under the Burwood Beach WWTW Stage 2 Upgrade) and the proposed Dudley-Charlestown duplicate carrier in the WWTW site should be laid in the same trench, if the timings of the two projects are compatible, to minimise construction effort and cost. This will be further investigated in the detailed design stage of the Stage 2 Upgrade, taking into account the development of UMP project.

1.6.2 Wet Weather System Upgrade

The Newcastle wastewater transportation system is being upgraded to improve its performance in wet weather. Upgrades are planned to be undertaken in two stages over a timeframe of approximately ten years. Stage 1 will focus on upgrading the

backbone of the wastewater transportation system to Burwood Beach WWTW in order to provide more capacity when the catchment experiences higher flows in heavy rainfall. The timing of these works has not been confirmed, however, the upgrade may coincide with the Stage 2 Upgrade.

Stage 2 will focus on specific improvements in the upstream catchments where customers and the environment are most affected.

A separate REF has been prepared for these works (CH2M HILL, 2001).

1.6.3 Odour Control Upgrade

The Primary Pumping Station and screenings house account for around 95% of the odours emitted from the plant. In order to reduce the odour impact of the plant and comply with DECC odour guidelines, treatment of odours from the primary pumping station and screenings house is being expedited separately to the Stage 2 Upgrade. A separate EIA has been prepared for these works (Hunter Water Australia, 2008).

The odorous air from the primary pump station and screen house will be extracted and treated in a new biofilter.

The upgrade is scheduled to be completed in June 2009 before the commencement of the Burwood Beach WWTW Stage 2 Upgrade.

1.7 Structure of the Report

This REF report structure is as follows:

- Section 1 of the report includes an introduction to the project, purpose, background, upgrade strategy, study area, objectives of the Project and major project interactions
- Section 2 of the report details the NSW statutory framework within which the Stage 2 Upgrade will be considered. It provides the approvals process followed as well as the relevant planning instruments considered. Commonwealth legislation and strategic considerations are also detailed in this section
- Section 3 provides a summary of the consultation with Government agencies and key stakeholders that have taken place to date. The details of the public exhibition of the REF are also detailed in this section
- Section 4 provides a review of the existing WWTW. The current treatment process, capacities, effluent, odour and biological solids management and disposal procedures are described
- Section 5 details the justification and reasons for the Stage 2 Upgrade. The preferred concept design is described along with the details of construction methodology to upgrade the relevant treatment processes and the operation and maintenance procedures to be implemented following construction

- Section 6 assesses the impacts of the Stage 2 Upgrade on the physical environment including the geology and soils, surface water quality and terrestrial ecology; it also proposes mitigation measures for key impacts
- Section 7 assesses the socio-economic impacts of the Stage 2 Upgrade including air quality, noise, human health and traffic. The existing environment, impacts and mitigation measures of the aspects are detailed in this section
- Section 8 details the cumulative environmental effects of the Stage 2 Upgrade and addresses the application of the principles of ecologically sustainable development (ESD) to the Stage 2 Upgrade
- Section 9 summarises the implementation of the Stage 2 Upgrade, including recommended mitigation measures. The implementation process, including timeframes, is also detailed in this section
- Section 10 provides a summary of the major adverse and beneficial impacts of the Stage 2 Upgrade and includes a conclusive statement with respect to the likely significance of impacts associated with the Stage 2 Upgrade.

2 Statutory Framework

A summary of the legislation reviewed in respect of the Stage 2 Upgrade can be seen in Table 2-1 below.

Table 2-1 Summary of Reviewed Legislation

Title of Act, Regulation considered in REF	Applicable to Project
Environmental Planning and Assessment Act	Yes
Environmental Planning and Assessment Regulation	Yes
Protection of the Environment Operations Act	Yes
Protection of the Environment (Clean Air) Regulation	Yes
Protection of the Environment (General) Regulation	Yes
Protection of the Environment (Noise Control) Regulation	No
Protection of the Environment (Waste) Regulation	Yes
Coastal Protection Act	Yes
Contaminated Land Management Act	No
Water Management Act	No
Waste Avoidance and Resource Recovery Act	Yes
Mine Subsidence Compensation Act	Yes
Heritage Act	No
National Parks and Wildlife Act	No
Threatened Species Conservation Act	No
Fisheries Management Act	No
Environmentally Hazardous Chemicals Act	Yes
Noxious Weeds Act	Yes
Environment Protection and Biodiversity Conservation Act	No
Occupational Health and Safety Act	Yes

The principal Act in NSW relating to the control and environmental assessment of development is the EP&A Act. The EP&A Act establishes a legislative framework for the assessment of development proposals.

The framework for development assessment and land use planning in NSW is primarily established under environmental planning instruments (EPIs) formed under Part 3 of the EP&A Act. EPIs comprise of:

- State Environmental Planning Policies (SEPPs)
- Regional Environmental Plans (REPs)
- Local Environment Plans (LEPs).

EPIs may identify whether a development is permissible without consent, permissible with consent or is prohibited.

Part 5 of the EP&A Act will apply in the absence of a development consent requirement and where an approval is required from a government agency to enable an activity to proceed.

Part 3A of the EP&A Act will apply where the development is determined to be a major project, either by the Minister for Planning, or by definition within a SEPP, or where the Part 5 determination determines that the upgrade will have significant impacts and an EIS would otherwise be required.

In addition to EPIs, State and Commonwealth environmental and planning legislation, such as acts relating to the protection of heritage, conservation of flora and fauna and protection of the environment, must also be considered. The following sections provide a summary of EPIs and State and Commonwealth legislation related to the Project.

A summary of other regulatory instruments and guidelines reviewed in respect of the Stage 2 Upgrade can be seen in Table 2-2 below.

Table 2-2 Summary of Other Regulatory Instruments and Guidelines

Title of Planning Instrument, Policy and Guideline considered in REF	Applicable to Project
SEPP (Infrastructure) 2007	Yes
SEPP No. 14 Coastal Wetlands	No
SEPP No. 19 Bushland in Urban Areas	No
SEPP No. 26 Littoral Rainforests	No
SEPP No. 33 Hazardous and Offensive Development	No
SEPP No. 44 Koala Habitat Protection	No
SEPP No. 55 Remediation of Land	No
SEPP No. 71 Coastal Protection	Yes
SEPP (Major Projects) 2005	No
Newcastle LEP	No
Hunter REP	Yes
State Plan	Yes
State Infrastructure Strategy	Yes
HWC Recycled Water Strategy	Yes
Lower Hunter Regional Strategy	Yes
Newcastle Urban Strategy	Yes
Newcastle Urban Water Cycle Policy	Yes
NSW Flood Policy	Yes
NSW Groundwater Quality Protection Policy	Yes
ANZECC Guidelines for Fresh and Marine Waters	Yes
National Water Quality Management Strategy	Yes

2.1 Approvals Process

The application of Clauses 106 and 107 of SEPP (Infrastructure) 2007 means that this development of the Burwood Beach WWTW Stage 2 Upgrade will fall under Part 5 of the EP&A Act, rather than Part 4, and HWC will be the consent authority for the Project.

Part 5 of the EP&A Act establishes, under section 111, a duty for determining authorities to “examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity” when determining if an activity should be undertaken. This report has been prepared to assess the potential environmental impact of the Burwood Beach WWTW Stage 2

Upgrade for the purpose of satisfying HWC's duty under section 111 of the EP&A Act.

A summary of the approval process is shown in Figure 2-1.

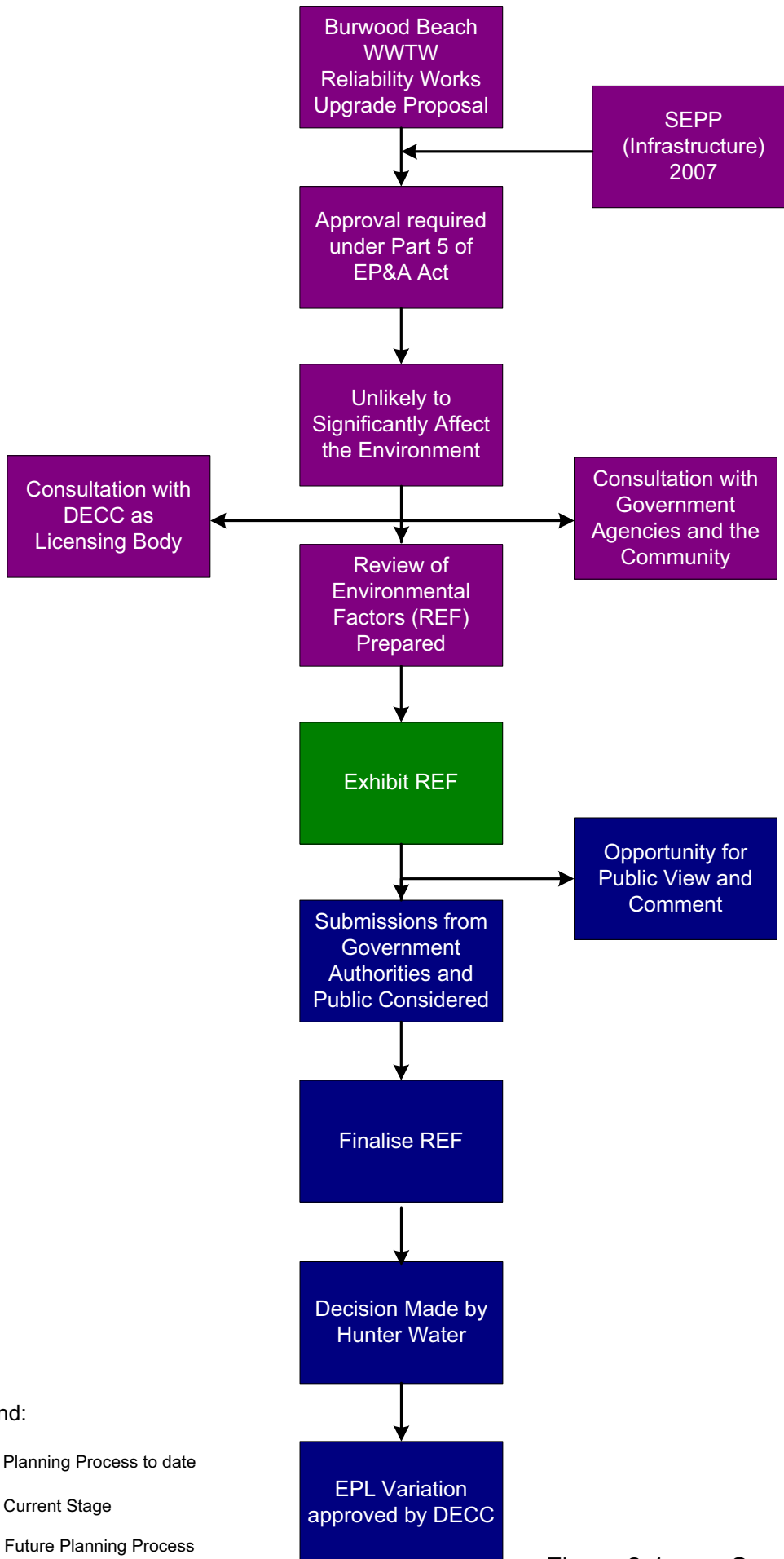


Figure 2-1 Summary of Approvals Process

2.2 Applicable Environmental Planning Instruments

2.2.1 Newcastle LEP 2003

Clause 5 of the Newcastle LEP lists the aims of the LEP, which includes an aim to improve the quality of life and wellbeing of the people of the City of Newcastle through ensuring that adequate utility services are provided (cl.5 (4(e))).

The land on which the WWTW is situated is zoned 5(a) Special Uses (refer to Figure 2-2), the objectives of which include:

- Accommodation of large scale facilities and services together with ancillary activities
- Requirement that development be integrated and reasonable, consistent in scale and character with surrounding, natural, rural or urban environments (cl. 16).

Under zoning 5(a) development that is listed under clause 13 of the LEP does not require consent. Clause 13 identifies activities that are listed under Schedule 4 as not requiring consent. These activities include development required for the purposes of sewerage undertakings including:

- Development of any description at or below the surface of the ground
- The installation of plant inside a building.

This provision does not apply to:

- The erection of buildings, the installation or erection of new or replacement plant or other structures or erections so as to materially affect their design or external appearance of buildings, or
- The formation or alteration of any means of access to a road.

Consent for the proposed Stage 2 Upgrade of the Burwood Beach WWTW would require consent from Newcastle City Council under Newcastle LEP, however, the operation of SEPP (Infrastructure) 2007 (Section 2.2.3) overrides the requirement for Council consent.

Development of the Stage 2 Upgrade will meet the aims of the Newcastle LEP as it will ensure that adequate sewerage utility services are provided to the people of Newcastle.

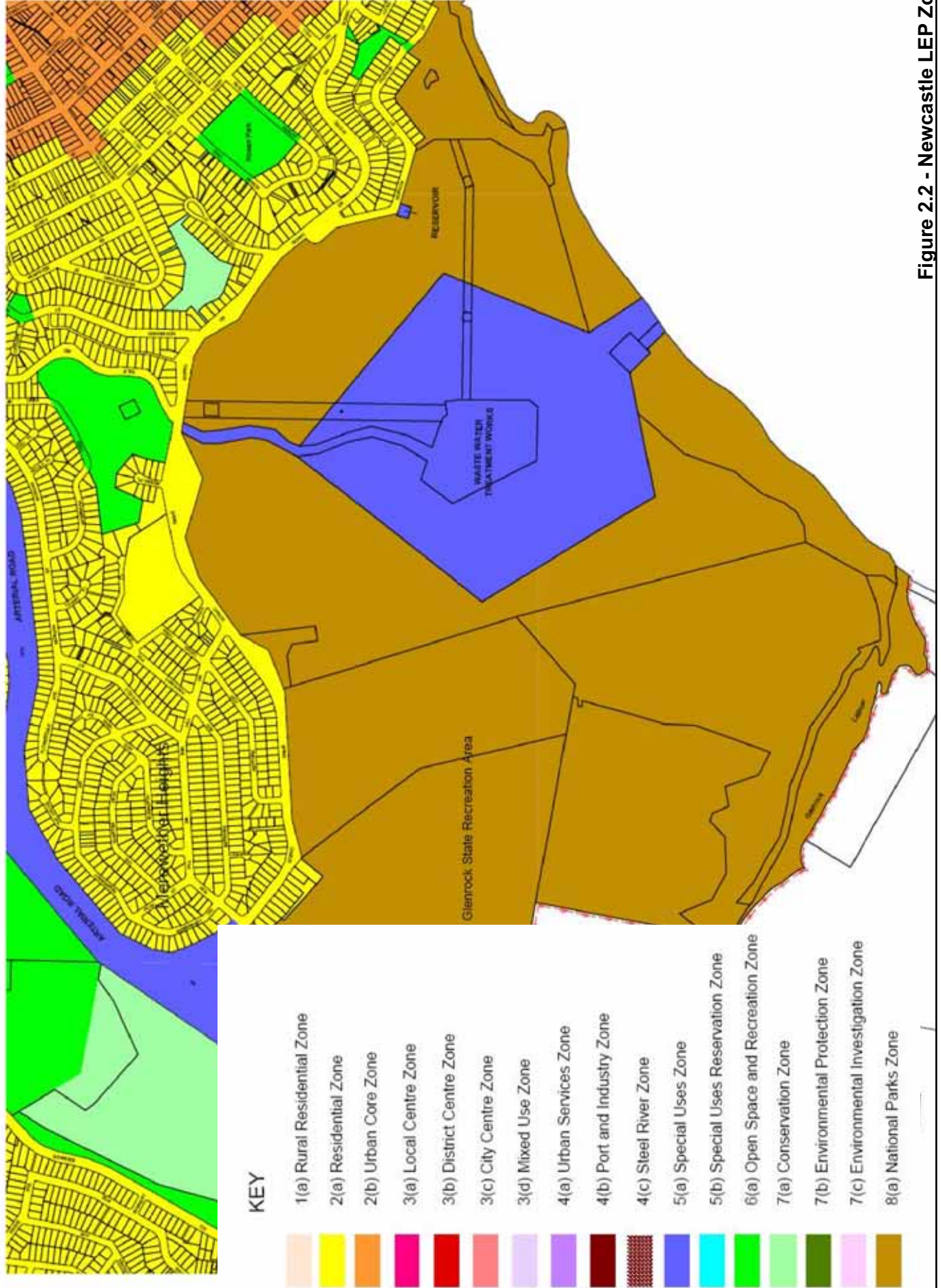


Figure 2.2 - Newcastle LEP Zoning Map

2.2.2 Hunter REP 1989

The *Hunter Regional Environmental Plan* (REP) 1989 applies to the City of Newcastle, including Burwood Beach WWTW.

The aims of the Hunter REP are:

‘(a) to promote the balanced development of the region, the improvement of its urban and rural environments and the orderly and economic development and optimum use of its land and other resources, consistent with conservation of natural and man-made features and so as to meet the needs and aspirations of the community,

(b) to co-ordinate activities related to development in the region so there is optimum social and economic benefit to the community, and

(c) to continue a regional planning process that will serve as a framework for identifying priorities for further investigations to be carried out by the Department and other agencies.’(Cl. 2)

The purpose of the Hunter REP is to guide the formation of LEPs within the Hunter Region to meet the aims and objectives specified within the REP. The REP does not create another layer of planning approval.

The Stage 2 Upgrade of the WWTW will fall within the aims of the Hunter REP as it will assist the development of the region and provide benefit to the community.

2.2.3 SEPPs

SEPP (Infrastructure) 2007

The aim of this SEPP (Infrastructure) is to facilitate the effective delivery of infrastructure across the State by:

- Improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services
- Providing greater flexibility in the location of infrastructure and service facilities
- Allowing for the efficient development, redevelopment or disposal of surplus government owned land
- Identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development)
- Identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development
- Providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing.

Clauses 106 and 107 of Part 3 of SEPP (Infrastructure) applies to sewerage systems and allows development for the purpose of sewerage treatment works or biosolid treatment works to be carried out by HWC on land within prescribed zones without the need for consent.

The land on which Burwood Beach WWTW is situated is zoned 5(a) Special Uses under the Newcastle LEP 2003, which is considered equivalent (Cl. 6(2)) to the land use zone SP1 Special Activities, listed under Division 18. The Stage 2 Upgrade is permissible without consent and falls under the Part 5 planning pathway of the EP&A Act.

SEPP No. 14 – Coastal Wetlands (SEPP 14)

The objective of SEPP 14 is to ensure that coastal wetlands are preserved and protected in the environmental and economic interests of the state. It does this by defining ‘designated development’, that is, development requiring an EIS under the EP&A Act, as any development that involves clearing, draining or filling wetlands, or constructing levees on wetlands. As no coastal wetlands will be impacted by the Project SEPP 14 does not apply.

SEPP No. 19 - Bushland in Urban Areas (SEPP 19)

The aim of SEPP 19 is to preserve bushland in urban areas because of its natural heritage, aesthetic and recreational, scientific and educational values. The specific objectives of SEPP 19 are:

- To protect the remnants of plant communities which were once characteristic of land now within an urban area
- To retain bushland in parcels of a size and configuration which will enable the existing plant and animal communities to survive in the long term
- To protect rare and endangered flora and fauna species
- To protect habitats for native flora and fauna
- To protect wildlife corridors and vegetation links with other nearby bushland
- To protect bushland as a natural stabiliser of the soil surface
- To protect bushland for its scenic values, and to retain the unique visual identity of the landscape
- To protect significant geological features
- To protect existing landforms, such as natural drainage lines, watercourses and foreshores
- To protect archaeological relics
- To protect the recreational potential of bushland
- To protect the educational potential of bushland

- To maintain bushland in locations which are readily accessible to the community
- To promote the management of bushland in a manner which protects and enhances the quality of the bushland and facilitates public enjoyment of the bushland compatible with its conservation.

Schedule 1 of SEPP 19 lists LGAs to which the SEPP applies and includes Lake Macquarie LGA, however, it does not include Newcastle LGA. The SEPP also does not apply to areas dedicated or reserved under the NPW Act 1974 (NPW Act), and therefore does not apply to the Glenrock SCA. While SEPP 19 does not apply to the development its objectives have been considered within this REF.

SEPP No. 26 – Littoral Rainforests (SEPP 26)

The aim of SEPP 26 is to provide an avenue for consideration of development that is likely to affect littoral rainforest areas, with a view to preserve their natural state. Burwood Beach WWTW is not situated on land identified in SEPP 26, thus SEPP 26 does not apply (<http://maps.environment.nsw.gov.au/stateveg/default.htm>).

SEPP No. 33 - Hazardous and Offensive Development (SEPP 33)

The aim of SEPP 33 is to allow for the assessment of the environmental and safety performance of hazardous and offensive or potentially hazardous and offensive industry. Under SEPP 33 potentially hazardous and potentially offensive industries have the following definitions:

"potentially hazardous industry" means a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:

- (a) to human health, life or property, or
- (b) to the biophysical environment,

and includes a hazardous industry and a hazardous storage establishment.

"potentially offensive industry" means a development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment.

Under the Newcastle LEP industry is defined as:

- (a) any manufacturing process, or

(b) the breaking up, dismantling, servicing or processing of any goods or any article for trade or sale or gain or as ancillary to any business,

but does not include an extractive industry or a waste management facility or works.

As the development of Burwood Beach WWTWs does not fall within the definition of 'industry' SEPP 33 does not apply to the development.

SEPP No. 44 – Koala Habitat Protection (SEPP 44)

The aims of SEPP 44 are to encourage the proper conservation and management of areas of natural vegetation that provide habitat to koalas by:

- Encouraging the identification of areas of core koala habitat
- Requiring the preparation of management plans before development consent can be granted in areas of core koala habitat
- Encouraging the inclusion of areas of core koala habitat in environment protection zones.

Schedule 1 of SEPP 44 lists Newcastle local government area as an area to which SEPP 44 applies. The policy applies to land that is greater than 1 hectare in area for which a development application has been made to Council.

The flora and fauna assessment undertaken by Hunter Wetlands Research Pty Ltd found no koala habitat present within the Burwood Beach WWTW site. SEPP 44 therefore does not apply.

SEPP No. 55 – Remediation of Land (SEPP 55)

SEPP 55 promotes a consistent, state-wide approach to the remediation of contaminated land in order to reduce the risk of harm to human health and the environment. This requires the knowledge and identification of any contaminated land so it may be remediated prior to its use.

Clause 7 of SEPP 55 requires consent authorities to have consideration to the following issues, prior to consenting to development:

- a) whether the land is contaminated
- b) if the land is contaminated, whether the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out
- c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

HWC, as a determining authority under the EP&A Act has no specific duty to consider the issues listed in SEPP 55, however, it is recommended that an intrusive

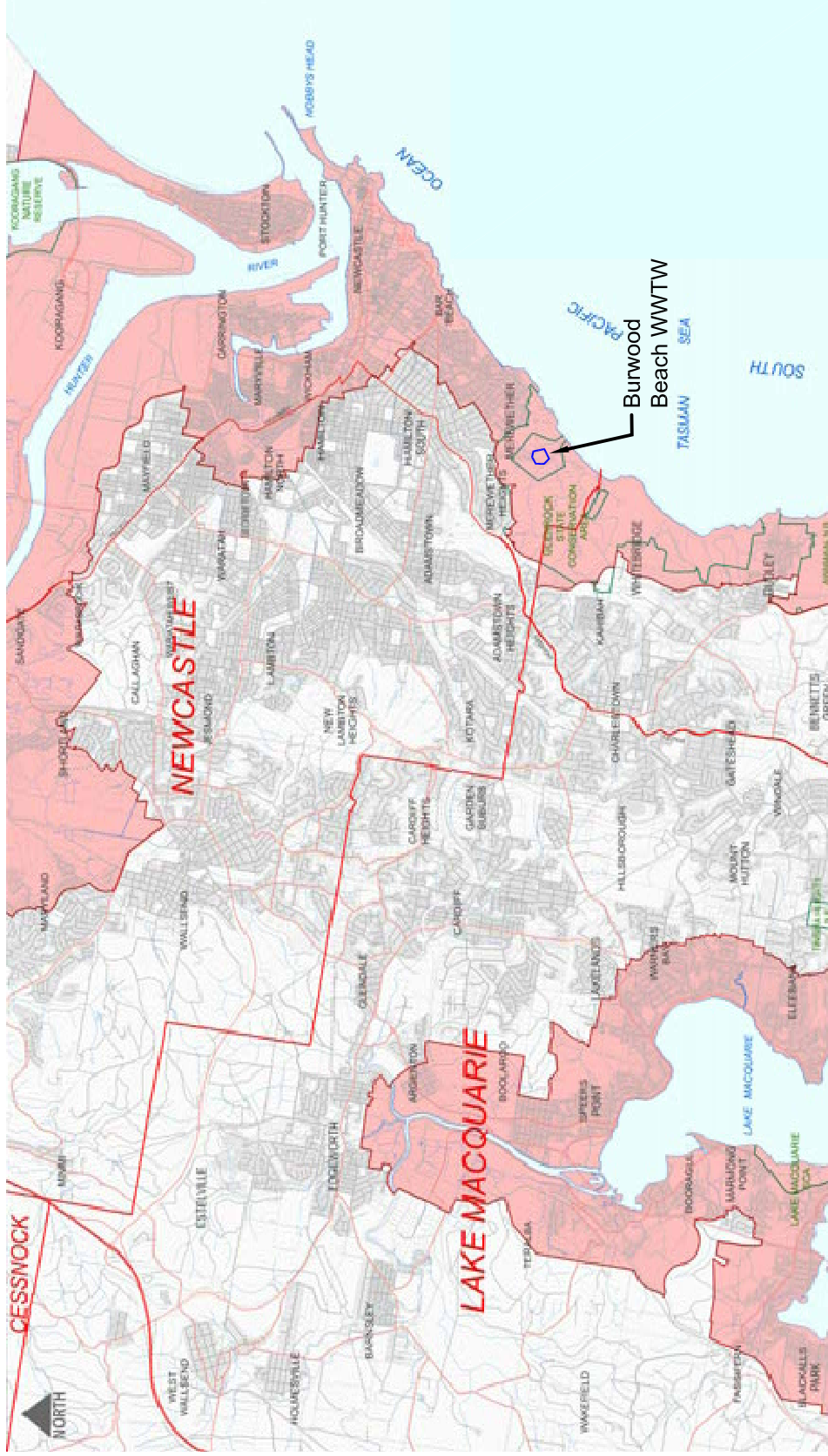
investigation be undertaken, during detailed design, across the excavation area to determine the existence of screenings disposal trenches. In this way the design may account for any contamination and ensure that the development is suitable for the land in its current or remediated state. Potential land contamination at Burwood Beach WWTW is discussed in Section 6.3.

SEPP No. 71 – Coastal Protection (SEPP 71)

SEPP 71 applies to development within the coastal zone, as defined in the *Coastal Protection Act 1979*. Figure 2-3 shows the location of Burwood Beach WWTW within the coastal zone, thus SEPP 71 applies to the Stage 2 Upgrade.

SEPP 71 sets out a number of matters that must be taken into consideration when determining whether to grant consent to a development application. Development of the Stage 2 Upgrade does not require a development application under Part 4 of the EP&A Act, however this REF addresses the intent of SEPP 71 and is generally in accordance with its requirements. Matters that have been considered in accordance with SEPP 71 include (parentheses indicate where they are addressed in this REF document):

- The principles of ESD (Section 8.2)
- The preservation of the beach and marine environments including coastal vegetation, rock platforms and the visual amenity of the area (Sections 6.2, 6.6 & 7.10)
- The likely impacts of the Stage 2 Upgrade on water quality of coastal water bodies (Section 6.5)
- Measures to reduce the potential for conflict between land-based and water-based coastal activities (Section 7.2)
- The cumulative impacts of the Stage 2 Upgrade on the environment (Section 8.1)
- Measures to ensure that water and energy usage by the Stage 2 Upgrade is efficient (Section 7.12).



 -Coastal Zone

Figure 2.3 - Coastal Zone

SEPP (Major Projects) 2005

SEPP (Major Projects) defines development to which Part 3A of the EP&A Act applies. Clause 26 of Schedule 1 lists the development of sewerage treatment works that cater for more than 10,000 EP as development to which Part 3A applies, however, this does not apply to development carried out by public authorities. SEPP (Major Projects) does not apply to the Burwood Beach WWTW Stage 2 Upgrade.

2.3 State Legislation

A number of environmental, conservation and heritage statutes may apply to the Project. The following section is a summary of the statutes that have the potential to affect the Project.

Environmental Planning and Assessment Act 1979

The EP&A Act is the primary act relating to environment and planning in NSW. It is discussed in Section 2.1, above.

Environmental Planning and Assessment Regulation 2000

Clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regs) lists factors to be taken into account when consideration is being given to the likely environmental impacts associated with a proposed development that is to be assessed under Part 5 of the EP&A Act. Clause 228(b(i)) states that the REF should be carried out in accordance with general guidelines in force under Clause 228. This REF has therefore been carried out in accordance with *Is an EIS Required – Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (DUAP, 1996).

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (NSW) (POEO Act) commenced operation on 1 July 1999. The aims of the POEO are:

- To protect, restore and enhance the quality of the environment in NSW by having regard to: the need to maintain ESD
- To reduce risks to human health and prevent the degradation of the environment by the use of mechanisms that promote pollution prevention and cleaner production
- The reduction to harmless levels of the discharge of substances likely to cause harm to the environment
- The elimination of harmful wastes
- The reduction in the use of materials and the re-use or recycling of materials
- The making of progressive environmental improvements, including the reduction of pollution at source.

Chapter 3 of the POEO Act provides for a single licensing arrangement to replace the different licences and approvals that were required under separate Acts relating to air pollution, water pollution, noise pollution and waste management. Schedule 1 of the POEO Act lists activities for which a licence is required and includes sewerage treatment processing. Section 120 of the POEO Act also makes it an offence to cause pollution to waters without a licence.

Under the POEO Act the EPA is made the regulatory authority for activities carried out by State or public authorities, activities that require a licence under Schedule 1 of the POEO Act and other activities for which a licence regulating water pollution is required. HWC currently hold environment protection licence (EPL) No. 1683, which allows for the release of certain assessable pollutants through the offshore pipeline.

Clause U1 of EPL 1683 contains a PRP requirement for the WWTW to be upgraded to ensure that the treatment processes are capable of meeting the requirements of the EPL. The condition requires construction and commissioning of the Stage 2 Upgrade to be complete by 30 June 2010.

No new licence will be issued as a result of the Project. An application to temporarily amend the existing licence will be submitted to the EPA by HWC for work associated with the ABF Tower (Refer to Section 5.3.5). Discharge water quality and its associated impacts are discussed in Section 6.5.

The *Protection of the Environment (General) Regulation 1998* (POE(General) Regs) contains provision to regulate discharges from premises, the measuring of discharges and sets out how to calculate fees in relation to environment protection licences, and makes provision for adjustment or refunds of those fees. HWC pays load based licence fees for the discharge of treated wastewater and solids to the ocean in accordance with the POE(General) Regs and will continue to do so once the Stage 2 Upgrade is complete.

The *Protection of the Environment (Clean Air) Regulation 2002* (POE(Clean Air) Regs) contains provisions on the emission of air impurities from motor vehicles and the compulsory fitting and maintenance of anti-pollution requirements. All vehicles operating on site at Burwood Beach WWTW will comply with the POE(Clean Air) Regs.

The *Protection of the Environment (Waste) Regulation 2005* (POEO(Waste) Reg), as amended 28 April 2008, makes provision for, amongst other things, the tracking of waste between generators, transporters and receivers of waste and record keeping associated with such waste movements. The Regulation also provides particular requirements for the management of asbestos wastes.

The amendments to the regulations mean that fill excavated from a site, that does not fall under the definition of virgin excavated material (VENM) or building rubble, is now considered waste and must be classified in accordance with the *Waste Classification Guidelines* (2008) prior to disposal. The DECC has recently issued a

number of exemptions to the POEO (Waste) Reg in accordance with Clauses 51 and 51A of the regulations. One such exemption is that for excavated natural material. The exemption (as amended on the 25 July 2008), allows natural excavated material to be applied to land, so long as it complies with the chemical concentrations and other attributes listed in Table 2 of the exemption.

Waste tracking and recording should be undertaken onsite in accordance with the EPL and POE (Waste) Regulation requirements. Should any asbestos waste materials be identified through the performance of site works they should be managed in accordance with the special requirements of clause 42 of the POE (Waste) Regulation.

Coastal Protection Act 1979

The *Coastal Protection Act 1979* was introduced to provide protection for the coastal environment of NSW for the benefit of present and future generations. The objectives of the Act include:

- The protection, enhancement, maintenance and restoration of the environment of the coastal region
- Encouragement of the orderly and balanced utilisation and conservation of the coastal region
- Promotion of public pedestrian access to the coastal region
- Co-ordination of the policies and activities of the NSW Government and public authorities relating to the coastal region.

The Act establishes a coastal zone (see Figure 2-3), within which planning and development is subject to a Ministerial Direction for coastal protection, the NSW Coastal Policy and SEPP 71 (Section 2.2.3).

Development of the Stage 2 Upgrade will meet the objectives of the *Coastal Protection Act 1979* as it will maintain the environment of the coastal region, is being undertaken in accordance with the policies of the NSW Government, and will allow for continued public access to Burwood Beach.

Contaminated Land Management Act 1997

The *Contaminated Land Management Act 1997* (CLM Act) establishes a process for investigating and remediating land areas where contamination presents a significant risk of harm to human health or the environment, and sets out criteria for determining whether such a risk exists.

The Act gives the DECC power to declare an investigation site and order an investigation, declare a remediation site and order remediation or, alternatively, agree to a voluntary proposal to investigate or remediate a site. The Act sets out accountabilities for managing contamination if a significant risk of harm is identified. The Act also allows the EPA to accredit site auditors who determine what land uses a site is suitable for.

Based on a desk-top assessment and site observations (See Section 6.3), the study area was not considered to have the potential to cause a significant risk of harm. As areas that may potentially contain contamination will not be disturbed further investigations are not required for the undertaking of Stage 2 Upgrade and the CLM Act has not been triggered.

Water Management Act 2000

The *Water Management Act 2000* (WMA) provides for the integrated and sustainable management of NSW waters. Section 344 of the WMA makes it unlawful for a person to carry out a controlled activity within waterfront land, which is defined as land within 40 metres of a water body, without a controlled activity approval. A controlled activity is defined under section 91 as 'the erection of a building or the carrying out of a work (within the meaning of the EP&A Act 1979)... or the carrying out of any other activity that affects the quantity or flow of water in a water source.' A water source is defined as including the coastal waters of New South Wales.

Clause 39A(1) of the *Water Management (General) Regulation 2004* grants an exemption from the requirement for a controlled activity approval to public authorities, including HWC. HWC will not require an approval under the WMA to carry out the Stage 2 Upgrade.

Waste Avoidance & Resource Recovery Act 2001

Waste disposal in NSW falls under the *Waste Avoidance and Resource Recovery Act 2001*. The relevant objectives of this Act to the Project are:

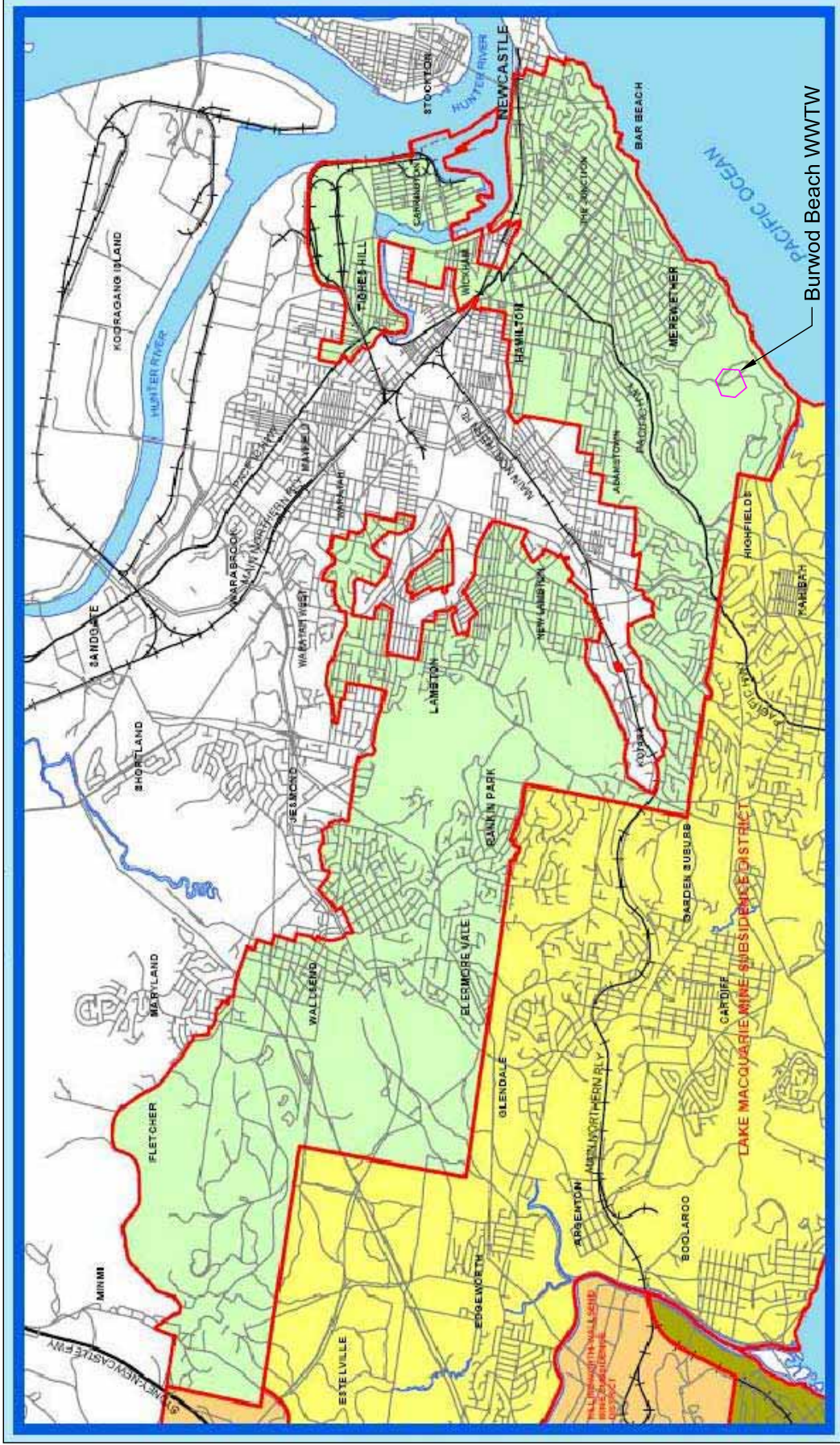
- To encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ESD
- To ensure that resource management options are considered against a hierarchy of the following order:
 - avoidance of unnecessary resource consumption
 - resource recovery (including reuse, reprocessing, recycling and energy recovery)
 - disposal
 - to provide for the continual reduction in waste generation
 - to minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste
 - to ensure that industry ensures with the community the responsibility for reducing and dealing with waste
 - to assist in the achievement of the objectives of the POEO Act.

To meet these objectives the Act sets in place a hierarchy of waste management of avoidance, recovery and disposal in descending order. The development of Burwood Beach WWTW Stage 2 Upgrade will generate waste which should be managed in accordance with the hierarchy set out in the Act. For further discussion on waste refer to Section 7.11.

Mine Subsidence Compensation Act 1961

The *Mine Subsidence Compensation Act 1961* creates the Mine Subsidence Board (MSB) which is responsible for reducing the risk of mine subsidence damage to properties. The Governor has the power to declare any area a Mine Subsidence District. Figure 2-4 shows the location of Burwood Beach WWTW within the Newcastle Mine Subsidence District. The Act gives the MSB the power to assess and control the types of buildings and renovations that can be erected within Mine Subsidence Districts.

The MSB has issued a number of conditions which the Project must comply with in order to gain a certificate of compliance from the MSB. Further discussion on mine subsidence is provided in Section 6.3.



 - Newcastle Mine Subsidence District

 Burwood Beach WWTW

Figure 2.4 - Mine Subsidence District

Heritage Act 1977

The *Heritage Act 1977* aims to properly identify and conserve items of local and state historical significance. This can be in relation to a building, work, relic, moveable object or precinct and significant in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the place or item. The Act creates a State Heritage Register which lists places and items of particular importance to the state. Items are added to the State Heritage Register by the Planning Minister on the recommendation of the Heritage Council.

Under Section 139 of the Heritage Act, approval from the NSW Heritage Office is required to disturb or excavate land where the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed.

Searches of the State Heritage Register have been undertaken to identify heritage items/sites in the LGA that may be impacted on by the Project. Other searches that have been undertaken include State Heritage Inventory and Register of the National Estate register searches.

Heritage investigations have been undertaken as part of this assessment and are discussed in Section 7.8, it was determined that no approvals are required.

National Parks and Wildlife Act 1974

Burwood Beach WWTW is located adjacent to Glenbrook SCA, which has been listed under the *National Parks and Wildlife Act 1974* (NPW Act). Under the NPW Act the Director General of the DECC has the care, control and management of all state conservation areas (s31).

Burwood Beach WWTW and the Stage 2 Upgrade site are situated approximately 250 metres from the boundary of the SCA and will not impact upon the area. This aspect of the NPW Act is considered to not be applicable to the upgrade.

Sites of archaeological and cultural Aboriginal significance are also protected under the NPW Act. It is an offence to damage or destroy them without prior permission from the Director General of the National Parks and Wildlife Service.

An Aboriginal archaeological survey of the WWTW site where disturbance is expected was undertaken for this assessment. The results of the survey are presented in Section 7.7. It was considered unlikely that any archaeological artefacts would be disturbed during the Stage 2 Upgrade.

Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) sets out provisions for planning and assessment of impacts on threatened species, populations and ecological communities.

Development applications that require consent from Council or any other statutory authority are required to be assessed in accordance with Section 5A of the EP&A Act, as amended by the TSC Act and *Fisheries Management Act 1994*.

The TSC Act lists a number of factors to be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats. Schedules 1 and 2 of the TSC Act lists species, populations or ecological communities of native flora and fauna considered to be threatened in New South Wales.

If a development may potentially affect any flora or fauna species, population or ecological community listed by the TSC Act, an Eight Part Test is required. The Eight Part Test, referred to in Section 94(2) of the TSC Act and Section 5A of the EP&A Act, determines whether the proposed works represent a significant impact. If a significant impact is determined, a Species Impact Statement and licence is required under the TSC Act. The Stage 2 Upgrade will not affect any terrestrial flora or fauna species, thus the TSC Act is not triggered.

The impact of the Project on threatened species, communities and their habitats is described in Section 6.7, it was determined that no approvals are required.

Fisheries Management Act 1994

The *Fisheries Management Act 1994* provides for the conservation of fish stocks and key fish habitat. Part 7 of the FMA provides for the protection of aquatic habitats. Section 205 prohibits a person from harming marine vegetation, including mangroves, sea grasses and any other marine vegetation declared by the *Fisheries Management (General) Regulation 2002*, except under the authority of a permit.

Part 7A of the Act provides for the conservation of aquatic threatened species and prohibits the harming of any critical habitat species listed as threatened under the FMA without a permit. The Stage 2 Upgrade will not change the aquatic environment, thus a permit will not be required under the FMA.

The impact of the Project on aquatic ecology is discussed in Section 6.8.

Environmental Hazardous Chemical Act 1985

This Act controls the use and handling of specific chemicals and disposal of chemical wastes so as to control any effects on the environment. The Act establishes an inventory of chemicals that can be used in NSW. It is an offence to use or receive any chemical not on the inventory without prior approval from the EPA through a specific application.

The EPA can also declare substances to be chemical wastes. The authority can also issue 'chemical control orders', which regulate the storage, handling, transport and disposal of these wastes. A register of all chemical wastes and chemical control orders is kept by the EPA.

The use, storage, transportation and disposal of all chemicals and chemical waste are discussed further in Section 7.11, it was determined that no approvals are required.

Noxious Weeds Act 1993

The *Noxious Weeds Act 1993* is the principal statutory mechanism for the control of noxious weeds throughout NSW. For a plant to be declared a noxious weed it must be considered to pose a serious threat to humans, agriculture and/or the environment. Consideration must also be given to the feasibility of control and enforcement of those methods. Plants are declared noxious by order of the Minister for Primary Industries.

Consideration of potential occurrence and management implications of noxious weeds is addressed in Section 6.7.

Occupational Health and Safety Act 2000

The New South Wales *Occupational Health and Safety Act 2000* (OHS Act) aims to protect the health, safety and welfare of people at work. This replaces the 1983 Act and contains new provisions that require employers to consult with employees on health, safety and welfare matters. The Act lays down general requirements for health, safety and welfare, which must be met at all places of work in New South Wales. The Act covers self-employed people as well as employees and employers.

The objectives of the OHS Act 2000 are as follows:

- (a) to secure and promote the health, safety and welfare of people at work
- (b) to protect people at a place of work against risks to health or safety arising out of the activities of persons at work
- (c) to promote a safe and healthy work environment for people at work that protects them from injury and illness and that is adapted to their physiological and psychological needs
- (d) to provide for consultation and co-operation between employers and employees in achieving the objects of this Act
- (e) to ensure that risks to health and safety at a place of work are identified, assessed and eliminated or controlled
- (f) to develop and promote community awareness of occupational health and safety issues
- (g) to provide a legislative framework that allows for progressively higher standards of occupational health and safety to take account of changes in technology and work practices
- (h) to deal with the impact of particular classes or types of dangerous goods and plant at, and beyond, places of work.

The Stage 2 Upgrade will be carried out in accordance with the OHS Act, through the preparation and implementation of documented safe works methods statements and the performance of workplace risk assessments where necessary.

2.4 Commonwealth Legislation

2.4.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a person must not, without an approval under the Act, take an action that has or will have, or is likely to have, a significant impact on a matter of National Environmental Significance (NES). An action includes a project, development, undertaking or an activity or series of activities. An action does not require approval if it is a lawful continuation of a use of land that was occurring before the commencement of the Act. An enlargement, expansion or intensification of a use is not a continuation of a use.

The flora and fauna assessment found that the activities were not likely to have a significant impact on matters of National Environmental Significance (NES) or Commonwealth lands and therefore will not need Commonwealth approval (refer to Section 6.7).

2.5 Strategic Considerations

2.5.1 State Policy – State Plan: A New Direction for NSW

The NSW Government's *State Plan: A New Direction for NSW* (2006) (State Plan) sets priorities for Government action and a means to deliver on the priorities by setting targets under the State Plan. The State Plan is structured in terms of five areas of Government activity:

1. Rights, Respect and Responsibility, which addresses the justice system and community involvement
2. Delivering Better Services, which addresses the provision of health, education and transport services
3. Fairness and Opportunity, which addresses services that promote social justice and reduce disadvantage
4. Growing and Prosperity Across NSW, which addresses activities that promote productivity and economic growth
5. Environment for Living, which addresses planning, environmental protection, arts and recreation.

Of these areas of activity "Growing and Prosperity" and "Environment for Living" are the two relevant areas for consideration in relation to the Stage 2 Upgrade at Burwood Beach WWTW.

One of the priorities under Growing and Prosperity is to maintain and invest in infrastructure in a manner so as to balance the need for development of major projects with the maintenance of existing infrastructure. Construction and operation of the Stage 2 Upgrade will strike a balance between the maintenance of existing infrastructure and the development of new infrastructure as development of the works will retain the existing sewerage treatment system, while introducing a number of new elements, averting the need for the plant to be rebuilt. In addition, development of the Stage 2 Upgrade will cater for growth within the Newcastle and Lake Macquarie LGAs, allowing for the development of major projects within these areas.

One of the priorities under Environment for Living is the provision of a secure and sustainable water supply for all users. Use of recycled water within the plant will be maximised through the Stage 2 Upgrade. This will reduce the WWTW's reliance on potable water, increasing the amount available to other users.

2.5.2 State Infrastructure Strategy

The *State Infrastructure Strategy 2006/7 – 20016/17* (Infrastructure Strategy) outlines the NSW Government's strategy for investing in infrastructure over the next 10 years. The Infrastructure Strategy grants HWC \$108 million for water and sewerage system improvements and growth. The Infrastructure Strategy identifies Burwood Beach WWTW upgrade as a major project to which funding has been allocated. The Infrastructure Strategy notes that the population of the Hunter Region is predicted to increase by 8.2% by 2016, equating to an increase of approximately 50,000 people.

2.5.3 Lower Hunter Regional Strategy

The *Lower Hunter Regional Strategy* (Regional Strategy) applies to the LGAs of Newcastle, Lake Macquarie, Port Stephens, Maitland and Cessnock.

The primary purpose of the Lower Hunter Regional Strategy (Regional Strategy) is to ensure that adequate land is available and appropriately located to sustainably accommodate the projected housing and employment needs of the Region's population until 2031. The Regional Strategy is based on a predicted population increase of 160,000 people to 2031. The Regional Strategy encourages water consumption for domestic, industrial and stock purposes to be within the sustainable limits of the water sources and water-sensitive urban design. Appendix 2 of the Regional Strategy lists major infrastructure projects to which the strategy applies. Burwood Beach WWTW upgrade design is included within this list.

2.5.4 Other Applicable Policies and Guidelines

NSW Groundwater Quality Protection Policy

The *NSW Groundwater Quality Protection Policy* is a component policy of the *NSW State Groundwater Policy*. The focus of the Quality Protection Policy is to protect aquifers and the ecosystems from which the waters are recharged or discharged. It

requires that consideration be given to all factors affecting the stability, vulnerability and productivity of groundwater systems.

These considerations have been applied in the assessments discussed in Section 6.6.

ANZECC Guidelines for Fresh and Marine Waters, 2000

The Australia and New Zealand Environment and Conservation Council (ANZECC) was established to provide a forum for member governments to exchange information and experience and develop co-ordinated policies in relation to environment and conservation issues. ANZECC has issued a number of policies, guidelines and standards that are widely recognised and accepted as environmental benchmarks.

The criteria outlined in *ANZECC Guidelines for Fresh and Marine Waters* were applied in the assessment and management of water quality (refer to Section 6.5).

National Water Quality Management Strategy

The *National Water Quality Management Strategy* (NWQMS) is a joint initiative of the Commonwealth, State and Territory Governments under the auspices of the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) and ANZECC.

The NWQMS aims to deliver a nationally consistent approach to water quality management guided by the principles of ESD. The NWQMS provides a series of national guidelines for water quality management. This assessment has referred to the following guideline '*National Water Quality Management Strategy. Guidelines for Sewerage Systems: Effluent Management*' (Natural Resource Management Ministerial Council, 1997).

3 Consultation

This section of the REF provides for the following:

- An overview of the consultation undertaken with stakeholder groups, government agencies, local government and the local community
- An explanation of the next steps in the consultation process in terms of the exhibition period.

Stakeholder and community feedback will be taken into account in deciding whether the Stage 2 Upgrade should be modified or proceed as proposed. Communication with stakeholders and the community will be ongoing through the detailed design and construction phases of the Stage 2 Upgrade.

3.1 Government Agency Consultation

3.1.1 Planning Focus Meeting

A formal Planning Focus Meeting (PFM) was held on 4 July 2007 at Burwood Beach WWTW. A briefing paper, describing the Project and its potential environmental impacts was provided to all the attendees (see Appendix A).

The aim of the PFM was to provide background information about the Stage 2 and Stage 3 Upgrade Works to the key regulatory stakeholders and allow them to bring up any areas of concern that they believe should be addressed in the REF.

Table 3-1 contains a list of organisations and government agencies that attended the PFM.

Table 3-1 Organisations Represented at the PFM

Organisation
Hunter Water Corporation (HWC)
Department of the Environment and Climate Change (DECC)
Department of Health (DoH)
Newcastle City Council (NCC)
Lake Macquarie City Council (LMCC)
Mine Subsidence Board (MSB)
Department of Primary Industries (Fisheries) (DPI)

The attendees were given an overview of Burwood Beach WWTW and the current treatment process and operating parameters. The main components of the Stage 2 and Stage 3 Upgrade were briefly outlined along with the key environmental impacts. A question and answer session was then held for the attendees to raise any areas of concern to be addressed in the REF. Table 3-2 contains a summary of the issues raised during the PFM relating to the Stage 2 Upgrade and the section of the REF where the issue is addressed.

Table 3-2 Summary of Issues Raised During PFM

Issue Raised By:	Issue:	REF Section (if applicable):
DPI	Expressed a preference that Murdering Gully and the fence line not be moved.	Murdering Gully and the fence line are not moving
MSB	The Concept Design and the REF would have to eliminate the risk of mine subsidence or satisfy the MSB that the workings are stable for the long term via geotechnical parameters.	Section 6.3
DoH	Studies on mitigation of odours including the time of year planned for the upgrade (prevailing winds, temperature and humidity) should also be considered.	Section 7.3
DECC	REF should address the classification of the media as waste once it is removed and where it is to be disposed of.	Section 7.11
DECC	Threatened species, cultural heritage should be addressed in the REF.	Sections 6.7, 7.7.
DoH	REF should address the potential impacts of licence exceedances occurring while the ABF is decommissioned.	Sections 7.3 & 5.4.1
NCC	Coastal policies, including SEPP 71 should be addressed to make sure that there are no clauses that will cause concern or alteration of process.	Section 2.2.3
LMCC	The REF should demonstrate that the appropriate technology has been selected as failure to properly address technological problems in the past has caused a problem with the plant and meant that it was unable to process the originally designed 220,000 EP.	Section 5.2

NCC	Expressed a preference for the diversion of Murdering Gully to be avoided if possible.	Murdering Gully and the fence line are not moving
NCC	The risk of bushfire should be considered (including access for fire fighting) in the REF and bushfire management should be taken into account in the Concept Design and building design.	Section 7.6
LMCC	Greenhouse Gas Assessment should be included in the REF	Section 7.12 and Appendix I
Raised during site walkover	Spoil management during construction should be considered in the REF	Section 6.3
LMCC	In respect of the work on the ABF Tower the REF should demonstrate that correct and appropriate technology is being used.	Section 5

3.1.2 Consultation with MSB

The results of a geotechnical investigation and mine subsidence risk assessment, undertaken by Douglas Partners (Douglas Partners, 2008), were submitted to the MSB. The MSB responded that they had no objections to the report and the investigations carried out and that HWC should seek the MSB's approval for the erection of improvements at the appropriate time. The MSB's response is contained in Appendix B.

3.1.3 Consultation with DECC

Consultation was undertaken with DECC regarding the implementation of the plant upgrade. DECC endorsed the completion of the Stage 2 Upgrade ahead of the determination of the long term strategy for the site so that HWC could meet their obligations under EPL and in particular the PRP.

Approval from DECC for a temporary variation to the existing will be sort to undertake the ABF media replacement works prior to these works commencing.

3.2 Community Consultation

3.2.1 Community Reference Group

A Community Reference Group (CRG) was established in July 2007. The objectives of the CRG were:

- To create a forum for discussion and exchange of information on topics related to the upgrading of the Burwood Beach WWTW
- To assist the Project Team at HWC to identify, understand and address local issues related to the project so they can be addressed in the EIA for the project
- To act as a two-way communication link between the Project Team and all stakeholders.

Representatives from a broad cross-section of the community were invited to form the CRG, with individuals selected on the basis of their links and access to the broader community and specific groups of stakeholders. Table 3-3 contains a list of the organisations represented in the CRG.

Table 3-3 Members of the Community Reference Group

Organisation
Independent Chair
Hunter Community Environment Centre
Property Council
Australian Surf-Rider Foundation
Commercial Fisherman’s Co-operative
Merewether Surf Life Saving Club
Merewether Heights Public School and Carers Committee
Local business
Surfing Community

Seven meetings have been held with the CRG to date. The main issues raised during the CRG meetings relevant to the Stage 2 Upgrade (and the section of the REF where they have been addressed) include the following:

- Wet weather flows (refer to Section 6.5)
- Ocean Outfall Impacts (refer to Section 6.4, 6.5, 6.8)
- ABF Tower Upgrade (refer to Section 5.3.5, 7.3)
- Odour Control Upgrade (refer to Section 8.1.3, 1.6)
- Environmental Monitoring Program (refer to Section 6.5,6.8)
- Health Risk Assessment (refer to Section 7.5)

- Mayfield to Burwood Pipeline (MBP) (refer to Section 1.6.2, 8.1.2)
- Greenhouse Gas Assessment (refer to Section 7.12)

3.2.2 Public Exhibition of REF

The REF will be on public exhibition for a 4 week period. The REF will be available on HWC's website at www.hunterwater.com.au or on CD or hardcopy by request.

During the exhibition period, formal written submissions from the public and Government agencies will be invited. These submissions will be compiled and then summarised in the final REF report where details of any resulting changes to the Project or mitigation measures will be included.

To support the public exhibition of the REF HWC will undertake the following:

- Update the HWC website with details of the public exhibition and how the community can comment on the report
- Place an advertisement in the Newcastle Herald
- Provide presentations on the Project to interested community groups.

4 Existing WWTW

4.1 Existing Treatment Process

The current treatment process at Burwood Beach WWTW comprises the following:

- A primary pump station (5,900 L/s capacity)
- A screen house comprising 8 x mechanical rotating drum screens and screenings handling equipment
- Vortex type Pista grit chambers (2 off)
- A secondary pump station (1,400 L/s capacity)
- An ABF tower
- Aeration tanks (diffused aeration) (2 off)
- Secondary clarifiers (3 off)
- A RAS/WAS pump station

A schematic process flow diagram for the existing treatment works is shown in Figure 4-1. Key aspects of the process are outlined below. Further, Figure 4-2 presents an aerial photo of the site, with key elements of the works labelled.

4.1.1 Liquid Treatment

All flows into the Burwood Beach WWTW is pumped via the primary pump station to the screen house. All flows receive preliminary treatment (ie screening and grit removal).

All dry weather flows are then pumped to the secondary treatment process which consists of the ABF tower and the activated sludge process (ie aeration tanks and secondary clarifiers). The secondary process removes carbonaceous material and oil and grease from the wastewater and provides some stabilisation of the biological solids prior to ocean disposal.

In wet weather, flows greater than 1,400 L/s bypass the secondary treatment process and are discharged directly to the ocean outfall after receiving preliminary treatment.

4.1.2 Effluent Disposal

The treated effluent is discharged through an extended ocean outfall. The ocean outfall is a 2.1m diameter reinforced concrete which extends 1.5km from the shore. The effluent discharges via a diffuser system at a depth of approximately 20m.

The biological solids generated by the treatment process are discharged through a separate pipeline and diffuser in the extended ocean outfall.

4.1.3 Odour Treatment

The current odour control facilities at Burwood Beach WWTW comprises of a soil filter bed that treats odorous gas from the ABF tower. A new biofilter to treat odorous gas from the PPS and screen house will be constructed in 2009 prior to commencement of Stage 2 Upgrade construction.

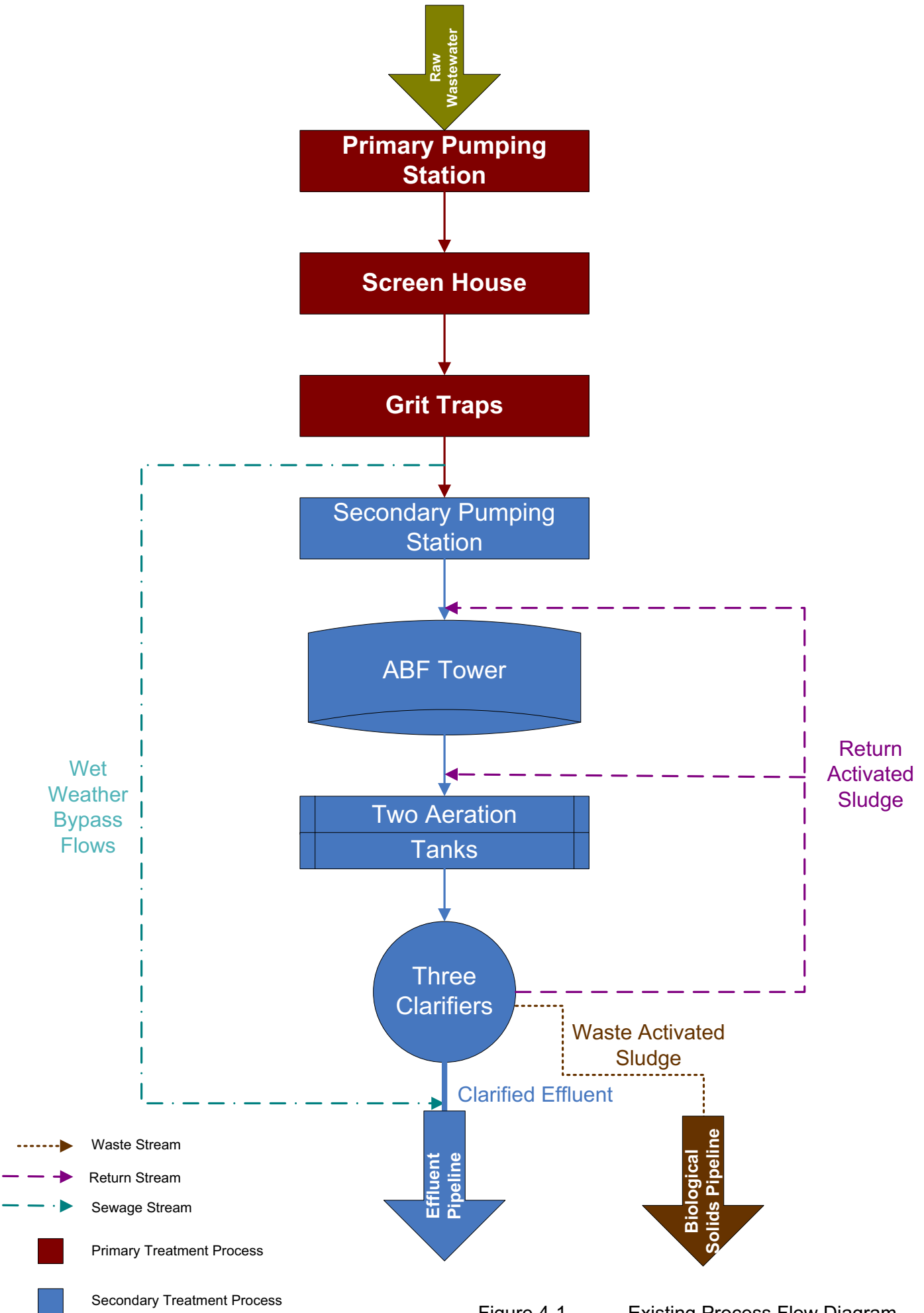
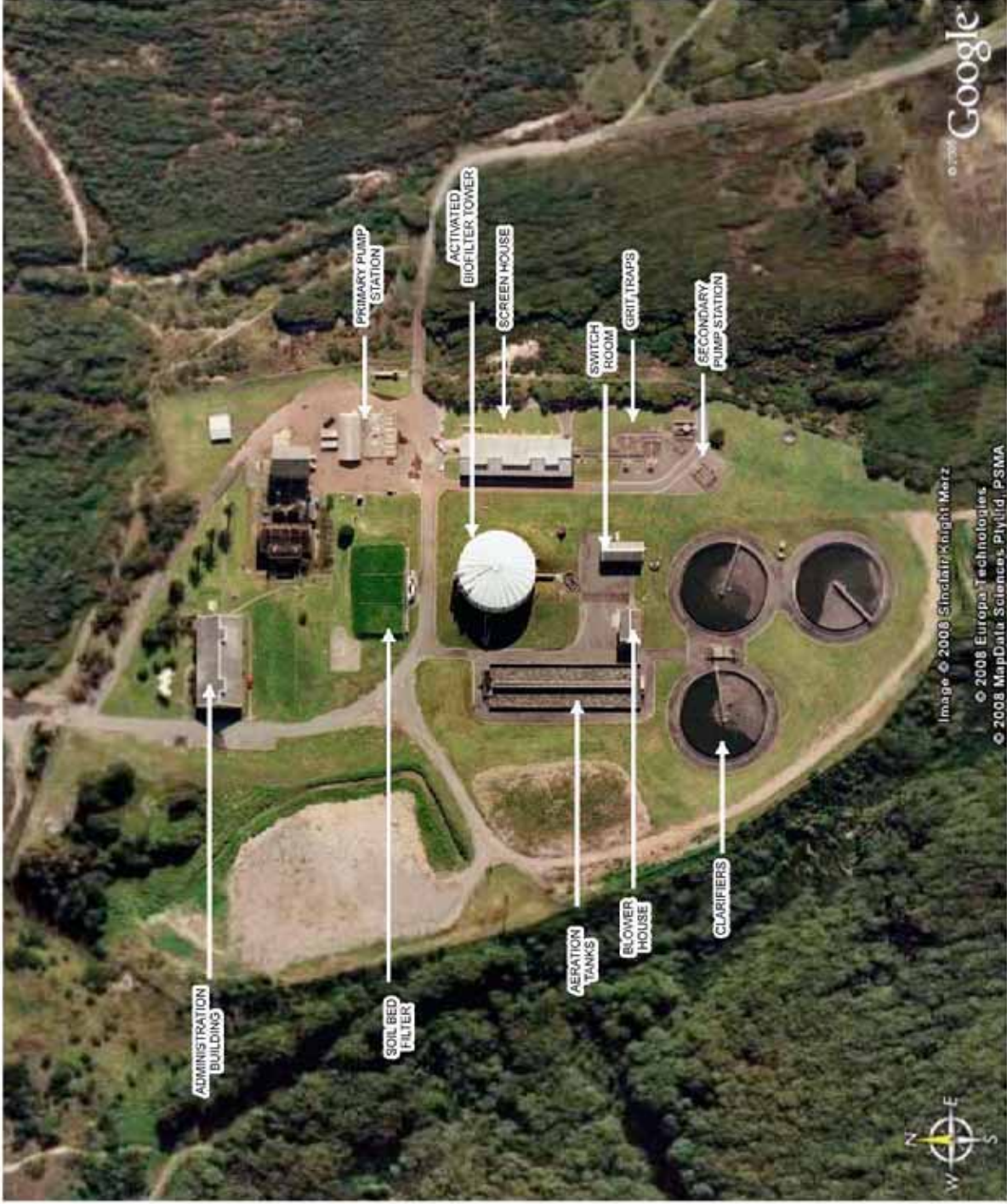


Figure 4-1

Existing Process Flow Diagram



Source: (Base Image) Google Earth, 2008

Figure 4.2: Existing Site Layout

4.2 Environment Protection Licence

The operation of Burwood Beach WWTW and the associated wastewater transportation system is licensed by the DECC. The plant is licensed to discharge wastewater and biological solids to ocean within the limits and requirements stipulated in EPL (No. 1683). The key licence requirements are summarised below:

- Operating Conditions
 - The portion of sewage inflows to the WWTW less than 1,400 L/s must receive screening, de-gritting, biological treatment, and clarification prior to discharge
 - The portion of sewage inflows to the sewage treatment plant that is 1,400 L/s or more must receive screening and de-gritting prior to discharge.
- Concentration Limits
 - The concentration limits for the combined secondary effluent and wet weather bypass flows are identified in Table 4-1, below
 - Of note is that the original design criterion for Total Suspended Solids (TSS) at Burwood Beach WWTW was 50 mg/L. This is substantially greater than the 50th percentile limit of 35 mg/L stipulated in the EPL. The existing plant was not designed to meet the current EPL requirements.

Table 4-1 Burwood Beach WWTW Concentration Limits

Pollutant	Units	50-percentile	90-percentile	3-day geometric mean
Oil and Grease	mg/L	5	10	15
Total Suspended Solids	mg/L	35	50	60

- Volume Limits
 - The maximum permitted wastewater discharge flow is 510 ML/d (which is equivalent to approximately 5,900 L/s) and the maximum permitted biological solids discharge flow is 5 ML/d (about 58 L/s).
- Load Limits
 - The annual load limits are identified in Table 4-2, below.

Table 4-2 Burwood Beach WWTW Load Limits (for Open Coastal Waters)

Assessable Pollutant	Load Limit (kg)
Cadmium	124.4
Chromium	223.5
Copper	2,080
Lead	1,472
Mercury	8.9
Nitrogen (total)	778,257
Oil and Grease	341,290
Pesticides and PCBs	7.2
Selenium	14
Total Suspended Solids	4,717,189
Zinc	3,943

A full copy of the licence can be viewed on the DECC website (<http://www.environment.nsw.gov.au/prpoeo/licences/L1683.pdf>).

4.3 Current Flows and Loads

At the time of the WWTW's capacity review (CH2M HILL, 2006) the current flows and loads to the WWTW were estimated as:

- Average dry weather flow (ADWF): 42.4ML/d (491L/s)
- Peak dry weather flow (PDWF): 73ML/d (845L/s)
- Peak wet weather flow (PWWF): 363.7ML/d (4,210L/s)
- Average Total BOD load: 7,641kg/d
- Trade waste BOD load: 1,165kg/d

4.4 Existing Performance Problems

A process review of the plant has found the following capacity and operating issues at Burwood Beach WWTW:

- Grit removal - the grit traps cannot operate to their design capacity due to hydraulic issues, resulting in inadequate grit capture during wet weather periods
- Secondary Pumping Station - the SPS currently comprises 3 pumps with nominal capacities of "300L/s", "600L/s", and "1,000L/s". Control problems have resulted in all three pumps operating simultaneously, causing flows in excess of 1,400L/s to the secondary treatment plant and significant process issues. The

SPS also has insufficient redundancy in that if the “1,000L/s” pump fails, the SPS will be unable to deliver the required 1,400L/s

- ABF Bypass Pipeline - There is currently a 1050mm diameter ABF bypass pipeline. This pipeline is not used due to the difficulties in controlling the bypass flows caused by hydraulic imbalances of the pipelines
- ABF Tower - The ABF tower is covered for odour control. The current configuration results in occupational health and safety issues associated with facility maintenance
- Aeration Tanks - Uneven flow distribution to the aeration tanks due to hydraulic imbalances has resulted in excessively higher oxygen demands on the already overloaded aeration system during peak daily loads
- Aeration System - The existing aeration system cannot deliver enough air to the aeration tanks, which results in low dissolved oxygen levels in the tanks and excessive foaming
- Secondary Clarifiers - Uneven flow distribution into the three clarifiers has resulted in the clarifiers being overloaded during peak loads. In addition, the clarifiers have unstable performance, with problems in consistently meeting the 90th percentile effluent TSS discharge limit. The clarifiers also have insufficient redundancy, in that all clarifiers are required to be on-line to meet the high loading rate
- RAS & WAS Pumping Systems - The existing RAS-WAS station does not provide the level of process control required due to the varying flows from the clarifiers. The station also has insufficient capacity and redundancy if one pump fails
- Stormwater Management System - Stormwater from potentially contaminated areas on-site and is not segregated from clean runoff. Potentially contaminated areas include the areas around the clarifiers and the aeration tanks. Both areas have been subject to flooding from foam overflows. Polluted runoff is conveyed off-site without treatment
- Automatic Control System - The existing control system is no longer commercially supported.

4.5 Operating Hours and Staffing

Burwood Beach WWTW operates 24 hours a day, 7 days a week. The WWTW is manned from 7:00am to 3:30pm Mondays to Fridays and 7:00am to 11:00am on Saturdays, Sundays and Public Holidays. There are typically three personnel on site during these times. Unmanned plant operation and control is via the contact centre, and operators are called out when required.

5 Proposed Stage 2 WWTW

5.1 Need and Alternatives

5.1.1 Need for the Upgrade

The original design capacity of Burwood Beach WWTW is 220,000 EP, however a capacity review undertaken by CH2M HILL in 2006 determined that the actual plant capacity is approximately 180,000 EP, which equates to an ADWF of 43 ML/d, which is the current load on the plant.

The plant has recorded a number of exceedances of its EPL during recent licensing periods due to poor performance of the high-rates secondary treatment process. The exceedances have occurred during periods of process failure and have ultimately resulted in licence non-compliance of the 90-percentile Total Suspended Solids (TSS) concentration limit.

While no significant environmental impacts have resulted from such periods of poor performance the DECC has placed a PRP on the plant's EPL which requires upgrading works to be completed by 30th June 2010.

Capacity Review

The main findings of the Capacity and Process Performance Review (CH2M HILL, 2006) included the following:

- That significant redundancy issues exist within the secondary wastewater treatment process which means that plant and equipment cannot be taken off-line for significant periods of time without the risk of DECC license failures.
- Due to uneven flow distribution, the maximum capacity of the three secondary clarifiers could be as low as 1188 L/s which is less than the 1400 L/s that must receive biological treatment under the DECC license.
- That the current inflow to Burwood Beach WWTW is approaching the hydraulic capacity of the secondary wastewater treatment process.

Growth

A Flow and Loadings Assessment of the Burwood Beach WWTW catchment was undertaken by CH2M HILL in 2005. The population in the catchment was projected using the median growth rates developed by the Hunter Valley Research Foundation (2003). The assessment concluded that flows to the plant could reach the plant's nominal capacity of 53 ML/d around 2029.

5.1.2 Alternatives

“Do Nothing”

The “do nothing” option is not acceptable as the plant will be in breach of the PRP on the plant's license to complete the upgrade works by 30 June 2010.

If the WWTW was not upgraded, more instances of EPL exceedances (particularly with respect to TSS) could be expected in the future, as inflows to the plant increase further over time. This would increase the potential for the discharge having an impact on the marine environment and pollution events to occur at surrounding beaches.

Concurrent Implementation of Stage 3 Upgrade

Consideration was given to combine the Stage 2 and Stage 3 Upgrade works. However, further investigations and consultation is required before the scope of the Stage 3 Upgrade works can be determined. It was determined that the completion of these steps should not unnecessarily inhibit the achievement of performance improvements associated with implementation of the Stage 2 Upgrade.

The proposal is therefore to proceed immediately with the Stage 2 Upgrade, which is to improve the reliability and restore the original intended capacity of the WWTW. The Stage 2 Upgrade is the first in a two step upgrade strategy to provide a sustainable plant at the site to meet the long term needs of the community and the environment. The Stage 2 Upgrade will not jeopardise or constrain decisions for the future Stage 3 Upgrade.

The proposal has been endorsed by DECC.

A comprehensive concept development of the proposed Stage 2 Upgrade has been undertaken and this is documented in *Burwood Beach Stage 2 Upgrade – Concept Design Report* (CH2M HILL, 2008). The following sections summarise the key features of the Stage 2 Upgrade.

5.2 Design Criteria

5.2.1 Objectives

The key design objectives of the Stage 2 Upgrade include:

- *Capacity* - The upgraded WWTW should have capacity to cater for the flows expected at year 2030, which is the planning horizon for the Stage 2 Upgrade.
- *Reliability* - The upgraded WWTW must be able to meet reliably all of the effluent quality requirements of the EPL by adopting a robust liquid treatment process train.
- *Operational redundancy and flexibility* should be built in to allow for regular maintenance and unforeseen equipment failure, without compromising effluent quality and plant operability.

5.2.2 Design Flows

The Stage 2 Upgrade will restore the original design hydraulic capacity of 53 ML/d ADWF which is now expected to occur at 2030. The design flows for the Stage 2 Upgrade are listed in Table 5-1. While the original hydraulic capacity of the treatment

plant will be restored, an increase in biological treatment capacity above its original design limit will be needed, since the wastewater will be more concentrated than previously assumed (CH2M HILL, 2005).

Table 5-1 Design Flows for Stage 2 Upgrade

Parameter	Flow rate (L/s)
Design ADWF	610
Design PDWF– biological (2.4 times ADWF)	1,470
Design PDWF – hydraulic (1.72 times ADWF)	1,050
Design Full Treatment Flow	1,400
Design PWWF	5,900

5.2.3 Effluent Quality

The Stage 2 Upgrade has been designed to produce effluent with the following key requirements:

- Oil and grease to meet a 50th percentile limit of 5mg/L and a 90th percentile limit of 10mg/L
- Total suspended solids (TSS) to meet a 50th percentile limit of 35mg/L and a 90th percentile limit of 50mg/L.

The Stage 2 Upgrade will meet the effluent quality requirements of DECC EPL No. 1683.

5.2.4 Recycled Water Quality

The in-plant effluent recycling system will meet the following key recycled water quality criteria:

- E. Coli < 100 cfu/100mL
- pH 6 - 9
- BOD < 20 mg/L
- TSS < 30 mg/L
- Residual disinfectant 0.2 mg/L chlorine

5.2.5 Schematic Process Flow Diagram

The proposed Stage 2 Upgrade will not involve any new treatment processes. The current ABF and high-rate activated sludge process will remain the core secondary (biological) treatment technologies. Key features of the Stage 2 Upgrade are:

- To improve biological treatment performance reliability, it is proposed to bypass up to 30% of the wastewater from the ABF tower, to ensure that sufficient organic load will be provided to the aeration tanks (the activated sludge process).

- To enhance process control, it is proposed to allow mixed liquor from the aeration tanks to be discharged (or wasted) to the ocean as well as biological solids from the clarifiers.
- To ensure sufficient biological treatment capacity as well as operational redundancy, it is proposed to provide one additional aeration tank and one additional clarifier as part of the Stage 2 Upgrade.
- To replace the old filter media in the existing ABF tower

A simplified schematic process flow diagram for the upgraded WWTW is shown in Figure 5-1. The key elements of the upgraded plant include:

- A new (the third) aeration tank
- A new (the fourth) clarifier
- A new pipeline to bypass some flow from the ABF tower
- A new pipeline system to discharge waste mixed liquor from the aeration tanks to the existing biological solids pipeline in the ocean outfall
- New filter media in the ABF tower.

For the purposes of clarity, other ancillary elements and supplementary works (such as pump station upgrades) are not shown in this figure, but are described in Section 5.3. The following paragraphs describe the processes.

All flows into the Burwood Beach WWTW will be pumped via the primary pump station to the screen house. All flows receive preliminary treatment (ie screening and grit removal).

All dry weather flows are then pumped to the secondary treatment process which consists of the ABF tower and the activated sludge process (ie aeration tanks and secondary clarifiers).

The SPS will pump the majority (at least 70%) of the flow up to the ABF tower and the balance (up to 30%) directly to the three aeration tanks. In the ABF tower, the flow trickles through the filter media and gravitates into a flow splitter leading to the aeration tanks.

The flow then settles in circular clarifiers with the supernatant discharged to the ocean outfall. RAS from the clarifier underflow is pumped to either the ABF or the aeration tanks, while WAS from the clarifiers is disposed of via a separate pipeline within the ocean outfall leading to a dedicated diffuser.

For enhanced process control, the upgraded plant will allow mixed liquor from the aeration tanks to be discharged to the ocean via the existing biological solids outfall pipeline.

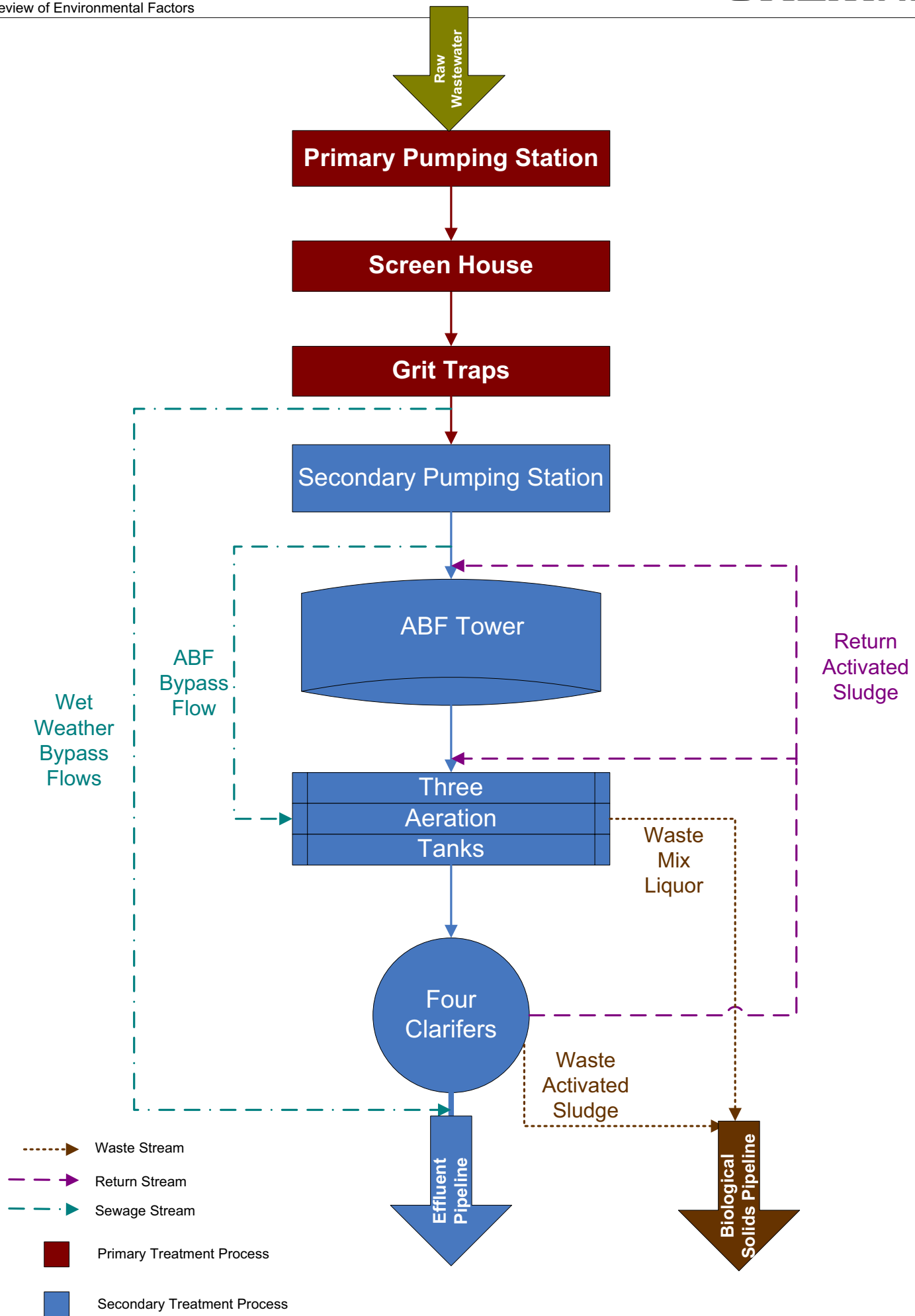


Figure 5-1

Proposed Process Flow Diagram

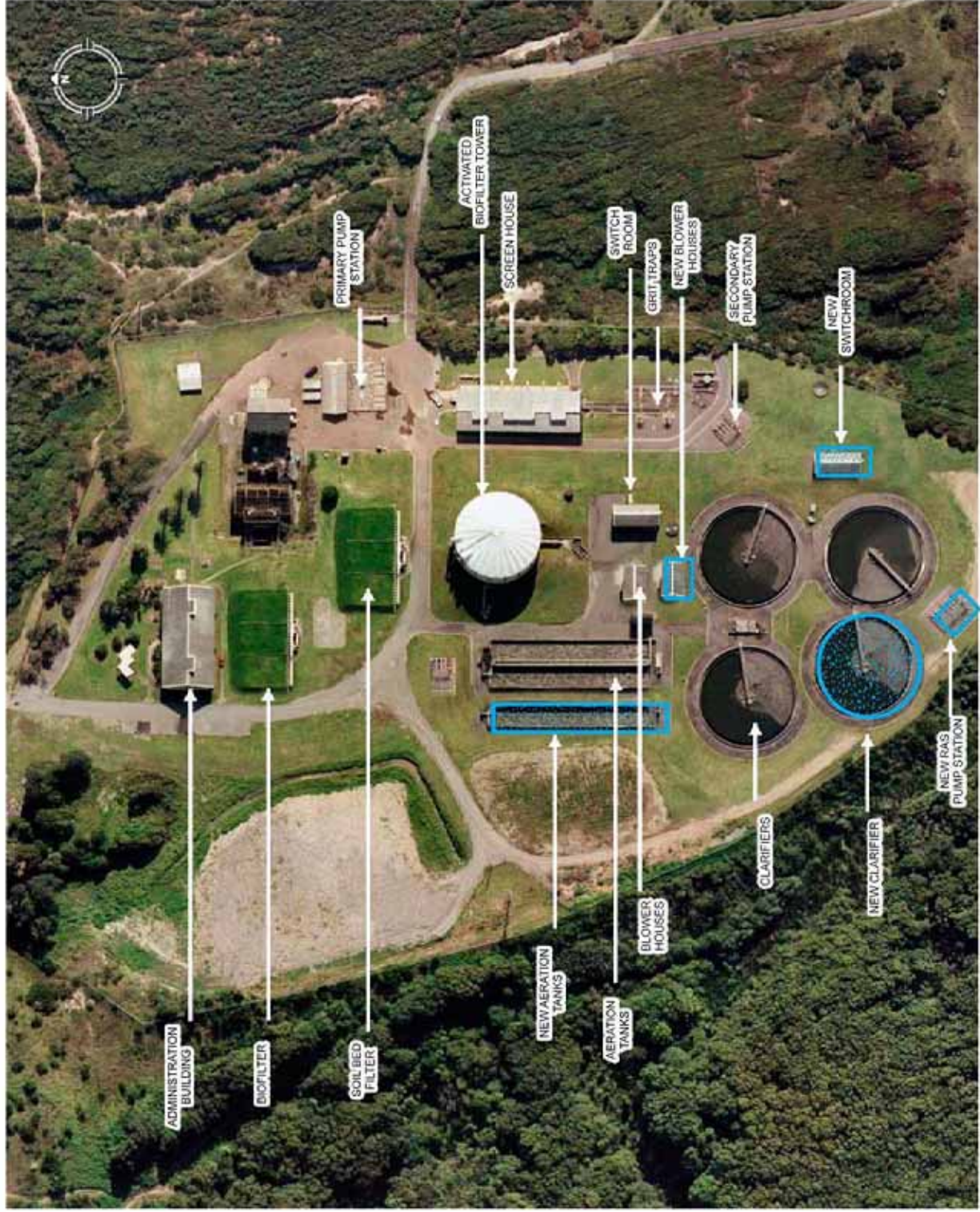
5.3 Scope of Stage 2 Upgrade

5.3.1 Overview

The proposed Stage 2 Upgrade works comprise:

- Modifications to the existing grit trap
- Modifications to the existing Secondary Pumping Station
- Provision of a new pipeline to bypass the ABF tower
- Replacement of the filter media in the existing ABF tower
- Construction of a new (third) aeration tank
- Upgrade of the aeration system including a new blower building
- Construction of a new (fourth) clarifier
- Modifications to the existing RAS-WAS pumping station
- Construction of a new RAS pumping station
- Provision of new or modified RAS and WAS pipelines
- Provision of new water management systems:
 - An in-plant effluent recycling system
 - A new stormwater management system
- Upgrading of power supply and automatic control & monitoring system
- Miscellaneous works
 - New internal site access roads
 - Construction of chambers, pits, manholes, etc

An overview of the Stage 2 Upgrade is provided in Figure 5-2. Descriptions of the proposed works are provided in the following sections.



Source: (Base Image) Google Earth, 2008

Figure 5-2: Burwood Beach WWTW Post Stage 2 Upgrade Site Layout

Ref: 356448

September 2008

5.3.2 Grit Removal

To improve the grit trap performance (i.e., grit capture efficiency), the floor level of the grit-trap outlet channel will be raised by approximately 810 mm, in line with the equipment manufacturer's recommendations. A flume will also be installed in each channel downstream to control water level in the grit trap.

5.3.3 Secondary Pumping Station

The existing pumps will be replaced with three identical pumps each with a nominal capacity of 800 L/s. Two units operating in parallel will provide the desired maximum flow all the time. The third pump will be a standby unit under normal operation to provide redundancy.

5.3.4 ABF Tower Bypass

A new bypass pipeline will enable bypass of up to 30% of inflow around the ABF tower.

5.3.5 ABF Media Replacement

The ABF tower media will be replaced and a new roof fitted. The works will entail the following:

- Replacement of the current pine media with a new self-supporting media system (e.g., plastic media or similar)
- Modifications to the wastewater distribution arms and ventilation system, in light of the media system selected
- A new roof for the ABF tower, (based on the assumption that it will not be feasible to re-fit the existing roof once removed) with the new roof incorporating features to improve maintenance operations on the distributor arm.

It is expected that the media replacement exercise will take approximately six months to complete. For this time period a licence variation will be requested in order to reduce the portion of sewage flowing into the secondary treatment system to 1,100L/s.

5.3.6 Aeration Tanks

An additional reinforced concrete aeration tank will be constructed of an identical configuration with similar equipment and fittings to the two existing aeration tanks. The new aeration tank will be positioned to the west of existing Aeration Tank 2.

A new "three-way flow splitter chamber" immediately upstream of the aeration tanks will also be constructed to distributed flows from the ABF tower and the SPS evenly to the three aeration tanks.

5.3.7 Aeration System

With the addition of the third aeration tank, one new blower will be provided to achieve a “3+1” configuration. That is, three duty and one standby blower. In addition to the need to provide more blower capacity for the upgraded secondary treatment plant, it is also proposed to upgrade the existing blowers to reduce occupational and environmental noise emissions. Two acoustically treated blowers will be located in the existing blower building.

A new blower building will be constructed adjacent to the existing one to house two new acoustically treated blowers. The new building will be of similar size and features as the existing blower building.

5.3.8 Secondary Clarifiers

A new (fourth) clarifier will also be constructed of similar size and capacity to the existing clarifiers. The new clarifier will be located adjacent to the three existing ones at the south-western corner of the site.

A new “four-way flow splitter chamber” immediately downstream of the aeration tanks will also be constructed to distribute flows from the three aeration tanks evenly to the four clarifiers.

5.3.9 WAS Pumping System

The existing RAS-WAS pumping station will be modified to become a dedicated WAS pumping station. The WAS pump will be retained and the RAS pumps removed.

5.3.10 RAS Pumping System

A new RAS pumping station will be constructed at the southern side of the WWTW. The station will contain six equal-sized pumps equipped with variable speed drive for improved process control. The pumps will be arranged in two groups, each with a “two-duty plus one-standby” configuration.

5.3.11 Effluent Recycling System

The Stage 2 Upgrade will create additional non-potable water demand of about 1,100kL per day, mainly for applications such as aeration tank process sprays and hose points. To minimise consumption of potable water, an in-plant effluent recycling system will be constructed to service these non-potable water demands. This is consistent with HWC policy of exploring opportunities for cost-effective beneficial use of recycled water at upgraded WWTWs

The proposed effluent recycling system will involve chlorination (using sodium hypochlorite solution) of the secondary treated effluent, which is then piped to the various application points on site. The chlorination system will have a design capacity of 15.5 L/s (achieving 4-log removal of E. coli), and it will be supported by a 126 m³ balancing tank.

5.3.12 Stormwater Management System

The stormwater management system will be upgraded. The upgraded system will segregate potentially polluted and unpolluted stormwater runoff. The WWTW site will be divided into several sub-catchment areas for the purposes of stormwater management. First-flush runoff (from the first 10 mm of rainwater) from areas that could be potentially polluted by accidental spillage of raw sewage, grits, or screenings will be captured in a first-flush stormwater tank located near the SPS. The captured first-flush water will drain to the SPS, where it will be pumped to the secondary treatment system.

The proposed stormwater management system upgrade also includes the provision of catchment separators (similar to speed humps of 100 mm to 150 mm height) site wide and provision of earth levees and flood flaps.

5.3.13 Electrical and Control System

A new switchroom will be provided in a location central to the main load centres (Secondary Pumping Station, Blower House, and RAS Pumping Station), as shown in Figure 5-2. The new secondary switchroom will be a single storey brick building, measuring about 18 m by 4.5 m in plan. Also adjoining the new switchroom will be two new transformer enclosures, each 4 m by 4 m in plan.

The existing PLC system will be replaced with a new dual-redundant Quantum system and the plant SCADA system will be updated to reflect the Stage 2 Upgrade. The PLC system at Burwood Beach WWTW will be upgraded as required to the latest version.

5.3.14 Access Roads

The following site access roads will be constructed or relocated as part of the Stage 2 Upgrade:

- Construction of a connecting road between the existing road to the south of the plant (towards the beach) and the road providing access to the screenings building and grit chambers
- Construction of an access road around part of the new fourth clarifier located within the site boundary
- Relocation of road area around the aeration tanks to accommodate the installation of the new (third) aeration tank
- Construction of a connecting road between the paved area around Clarifier 1 to the blower house

5.4 Construction

5.4.1 Duration

The construction and commissioning of the Stage 2 Upgrade will take approximately 18 months to complete. This timeframe permits phasing of construction activities to allow uninterrupted operation of all main treatment units as far as possible.

Nevertheless, subject to detail construction planning, temporary shutdown of partial treatment units may be required to allow connection of new and old facilities, for example. Any such shutdowns, if required, will be planned to occur during periods of minimum flows, such as Sunday mornings, to minimise the potential for environmental impact.

The construction program includes a period of up to 6-months for the ABF media replacement works. The ABF tower will only be taken offline after the third aeration tank and fourth clarifier have been constructed and commissioned.

5.4.2 Site Compound and Temporary Lay Down Area

An area within the WWTW site will be set aside as the Site Compound, in which temporary offices and amenities for the construction contractors and other site personnel will be provided.

In addition, the construction contractor will need “lay down” areas to receive and stockpile construction materials, conduct on-site assembly or fabrication, and other construction-related activities.

It is proposed to locate the site compound and lay down area on a piece of vacant land at the north-western corner of the WWTW site, as shown in Figure 5-3.

5.4.3 Site Access

All construction vehicles will be entering the site from the main entrance to the WWTW. Access will not change from current practices. The main access to the site is outlined in Figure 5-4.

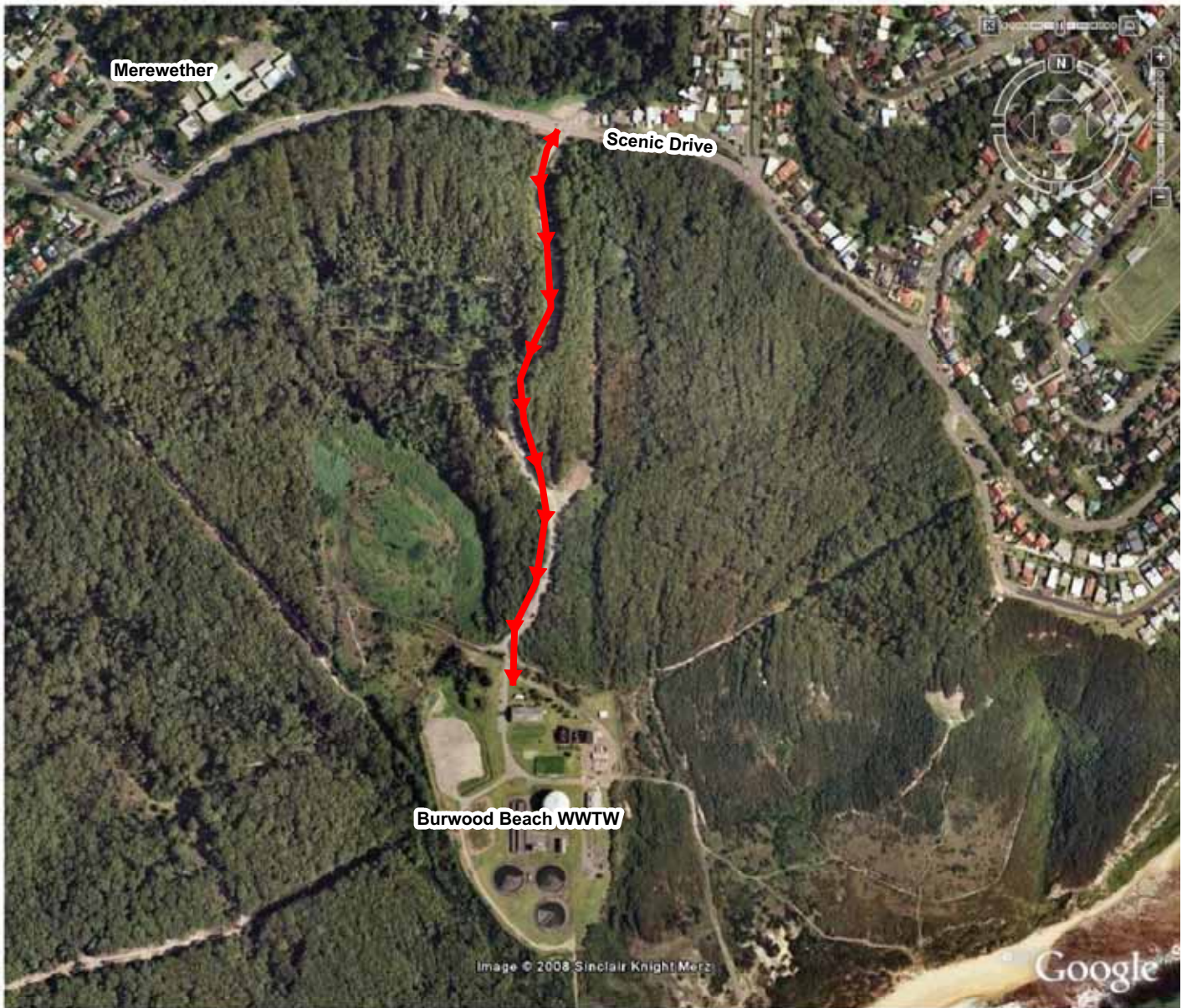


Source: Google Earth, 2008

Legend

- Approximate Location of Construction Compound and Temporary Laydown Area

Figure 5.3: Construction Compound and Temporary Laydown Area



Legend



Access Road to
Burwood WWTW

Figure 5.4 - Access to Burwood Beach WWTW

5.4.4 Construction Hours

Construction works associated with the Stage 2 Upgrade will take place normally between the hours of 7am to 6pm Mondays to Fridays and 8am to 1pm on Saturdays.

However, there will be times when night time works and shut downs will need to be undertaken outside these hours. Specific mitigation measures (discussed in Section 7.4 and 7.3) will be implemented during these times in order to reduce the impact on surrounding residents. Residents will also be notified by HWC of any intended night time works. Notifications will details the varied construction hours and timeframes over which these night works/shut downs are proposed to occur.

5.4.5 Rehabilitation – Landscaping

Final landscaping will be undertaken at the completion of the construction works. Some areas will be rehabilitated with suitable grasses during the phased construction work to minimise erosion and sedimentation issues.

5.5 Operation

5.5.1 Treatment Plant Operating Strategy

Normal Operating Strategy

All flows into the Burwood Beach WWTW will be pumped via the primary pump station to the screen house. All flows receive preliminary treatment (ie screening and grit removal).

All inflows up to 1,400 L/s will receive secondary treatment. For this mode of operation at least the ABF tower, two aeration tanks, and three clarifiers will be online.

The SPS will pump the majority (at least 70% or 980 L/s) of the secondary treatment flow to the ABF tower and the balance (up to 30% or 420 L/s) directly to the three aeration tanks.

In the ABF tower, the flow trickles through the filter media and gravitates into a flow splitter leading to the aeration tanks. The flow then settles in circular clarifiers with the clarified supernatant (effluent) discharged to the ocean outfall.

RAS will be drawn from the clarifier underflow at a rate of 250 L/s per clarifier and will be pumped to the ABF. RAS can also be pumped to the aeration tanks if required.

WAS will be drawn as mixed liquor from the aeration tanks and discharged via a separate pipeline within the ocean outfall to a dedicated diffuser system. WAS can also be drawn from the clarifier undertow if required.

Operating Strategy during ABF Media Replacement

The secondary treatment processes at Burwood Beach WWTW are designed to operate with the ABF tower online at all times under normal conditions. The proposed ABF media replacement works are expected to take up to 6 months to complete. During this period, taking the ABF tower offline will be unavoidable.

To minimise impact on the secondary treatment processes, it is proposed that ABF media replacement be only conducted after the additional (third) aeration tank and additional (fourth) clarifier have been installed and commissioned.

Modelling undertaken as part of the Stage 2 Upgrade concept design has highlighted that the installed aeration capacity in the four aeration tanks will be marginally inadequate for the scenario of “secondary inflow 1,400 L/s, with all 3 aeration tanks and all 4 clarifiers online, but ABF tower offline”. Calculations suggest that, when the ABF is taken offline, the secondary treatment process should be reasonably stable, if the inflow is limited to 1,100 L/s.

Accordingly, a temporary variation to the EPL conditions will be requested from DECC for the period when the ABF tower is taken offline to allow replacement of the filter media. Specifically, the amount of wastewater requiring secondary treatment will be reduced to 1,100 L/s during this period.

5.5.2 Effluent Management

Effluent from Burwood Beach WWTW will continue to be discharged through the existing ocean outfall and diffuser system.

5.5.3 Biological Solid Management

Biological solids from Burwood Beach WWTW will continue to be discharged through a dedicated pipeline in the existing ocean outfall and dedicated biological solids diffuser system.

5.5.4 Operation Hours

The Burwood Beach WWTW operates 24 hours a day, 7 days a week, and it will continue to do so following completion of the Stage 2 Upgrade.

The site is currently manned between the hours of 7am - 3:30pm Monday - Friday and 7am - 11am Saturday, Sunday and Public Holidays by three staff members. Alarm systems are currently in place throughout the site that signals the Contact Centre for any issues onsite including overflows and power failures. Operators are called to the site as required.

The upgraded WWTW will be designed to allow management of the secondary plant (excluding the screen house) by one operator on no longer than a single 7-hour shift, on a 5 days per week basis, under normal conditions.

5.5.5 Maintenance Works

Maintenance crews for civil, structural, mechanical, and electrical repair works will be called in as, and when, needed. Other site property and building maintenance, including mowing, edging, and slashing, is sub-contracted out, as required.

5.6 Environmental Monitoring and Auditing

5.6.1 Monitoring

Environmental monitoring is conducted on site on a regular basis. The Burwood Beach WWTW is a site of a Bureau of Meteorology rainfall station and data is collected on a daily basis.

The Environmental Monitoring Programme (EMP) for the ocean outfall includes:

- Beach testing every 6 days in accordance with NSW Beachwatch Protocols
- Discharge quality monitoring weekly-monthly for metals and organics
- Benthic surveys every two years
- Toxicity bioassays every two years
- Oceanography, sediment contamination, and bioaccumulation as required.

The EMP will continue following the Stage 2 Upgrade.

5.6.2 Auditing

HWC Environmental Management System (EMS) includes performing environmental audits of their sites, however, WWTW are currently not included in this environmental auditing program.

HWC does have ISO:14001 accreditation and the annual inspection of the Burwood Beach WWTW conforms to the auditing requirements of this standard. Issues raised as a result of this inspection are entered into an actions database and are resolved accordingly.