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Sydney WATER

Water and wastewater servicing of the West Dapto Urban Release Area and Adjacent Growth Areas

Environmental Assessment

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Certification

I certify that I have prepared the contents of this Environmental Assessment and to the best of my knowledge the information contained in the Assessment is neither false nor misleading.

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Executive summary

The Proposal

The West Dapto Urban Release Area (WDURA) and Adjacent Growth Areas (AGAs) are located approximately 15 km to the south west of Wollongong. The area is planned to accommodate approximately 30,000 dwellings and 420 ha of non-residential development to cater for population growth in the Illawarra Region up to 2048. The rezoning and land release sequencing of WDURA and AGAs will ultimately be determined by the Department of Planning and Infrastructure, in consultation with relevant local councils, agencies and developers. Development of the early release Precincts commenced in April 2012.

Sydney Water supplies water and wastewater services to approximately 4.4 million people in Sydney, Illawarra and the Blue Mountains. Sydney Water is responsible for the planning to deliver drinking water and wastewater services for the WDURA and AGAs.

The Proposal to provide new water and wastewater services includes:

- constructing approximately 80 km of drinking water pipelines
- constructing approximately 45 km of wastewater pipelines
- constructing one new water and three new wastewater pumping stations and upgrades to three existing wastewater pumping stations
- constructing five new drinking water reservoirs at three sites
- potentially amplifying and/or upgrading Wollongong Water Recycling Plant and Shellharbour Wastewater Treatment Plant.

Purpose and key aspects of the Environmental Assessment

Sydney Water is seeking approval from the Minister for Planning and Infrastructure under the provisions of Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to supply water and wastewater services to the WDURA and AGAs. The provisions of Part 3A of the EP&A Act still apply to this Proposal because the Proposal is a “transitional project” under the repealing legislation.

This Environmental Assessment (EA) has been prepared to support Sydney Water’s application for Concept Plan Approval for the overall Proposal and an application for Project Approval for components required to service the early release Precincts (Kembla Grange, Sheaffes/Wongawilli and West Horsley). The Proposal relies on extending the existing water and wastewater systems in the Illawarra Region, specifically transferring flows to the Wollongong Water Recycling Plant (WRP) and the Shellharbour Wastewater Treatment Plant (WWTP). The Wollongong WRP and Shellharbour WWTP have existing approvals to receive and treat average dry weather flows up to 59 and 20 ML/day respectively (DUAP 2001 and Sydney Water 2003a). The Proposal seeks to increase these capacities to 62.2 and 22.2 ML/day respectively, although this is not expected to be required until some time after 2031. The EA includes some assessment of the approved impacts to confirm the previous assessments and to compare any changes where there are potential increases.

This EA assesses the Proposal’s impact on a range of key environmental issues to address the environmental assessment requirements of the Director-General of the Department of Planning and Infrastructure (DP&I 2011) and issues raised during consultation with relevant government agencies. These include:

- water quality
- soils and geology
- riparian and aquatic habitats
- terrestrial flora and fauna
- Aboriginal and non-Aboriginal heritage

- noise and vibration
- air quality.

Sydney Water has extensive experience delivering water and wastewater services and the studies and risk assessments show that the Proposal poses a low risk to the environment when constructed and operated using existing controls. These include:

- operating the Proposal in accordance with Sydney Water's Customer Contract, Operating Licence and Environment Protection Licences
- constructing the Proposal in accordance with standard practices and methods used successfully on other similar greenfield developments.

The landscape in the Proposal area will change significantly as rezoning and development progresses. Land use would change from predominantly rural residential, agriculture, and some industrial areas, to varying densities of residential use. Town centres will also be established to complement the existing and proposed residential development. In addition to water related services, infrastructure such as roads, electricity, gas and communications will be substantially expanded as part of the urban development. Of the 3,500 ha of land within the WDURA and AGAs, approximately 800 ha was assessed for the Proposal. In the context of potential impacts arising from the planned large scale urban development of the WDURA and AGAs, the Proposal is considered to have a relatively minor impact on the environment.

Justification and conclusion

Water related services are essential to allow the WDURA and AGAs to be developed. The Environmental Assessment demonstrates that the Proposal is consistent with objectives of key planning and environmental strategies and legislation. Sydney Water has designed the Proposal to avoid environmental sensitivities and has also committed to a range of mitigation measures to minimise adverse environmental impacts.

The Environmental Assessment demonstrates that the Proposal is in the public interest and can be managed to meet appropriate environmental performance requirements. On balance, the benefits of the Proposal are considered to outweigh the residual adverse impact.

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Abbreviations

ABS	Australian Bureau of Statistics
ADWF	Average Dry Weather Flow
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AGAs	Adjacent Growth Areas
AGS	Australian Geometrics Society
APIA	Australian Pipeline Industry Association
ARI	Average Return Interval
AS	Australian Standard
ASS	Acid Sulfate Soils
ASSMAC	Acid Sulfate Soils Management Advisory Committee
ANZECC	Australian and New Zealand Environment and Conservation Council
AWD	Australian Wetlands Database
BASIX	Building Sustainability Index
BS	British Standard
BVT	BioMetric Vegetation Type
CBD	Central business district
cfu	Coliform Forming Units
CMA	Catchment Management Authority
Coastal Protection SEPP	State Environmental Planning Policy 71 – Coastal Protection
dB(A)	A-weighted decibels
DEC	Department of Environment and Conservation (then DECC, then DECCW, now OEH)
DECC	Department of Environment and Climate Change (then DECCW, now OEH)
DECCW	Department of Environment, Climate Change and Water (now OEH)
DEWHA	Commonwealth Department of Environment, Water, Heritage and the Arts (now Department of SEWPaC)
DG	Director-General (of DP&I)
DGR	Director-General's Requirement
DIPNR	Department of Infrastructure Planning and Natural Resources (then DoP, now DP&I)
DLWC	Department of Land and Water Conservation
DoH	NSW Department of Health (now NSW Ministry of Health)
DoP	Department of Planning (now DP&I)
DPI	Department of Primary Industries
DP&I	Department of Planning and Infrastructure
DTIRIS	Department of Trade and Investment, Regional Infrastructure and Services
DUAP	Department of Urban Affairs and Planning (then DoP, now DP&I)
EA	Environmental Assessment
ECRTN	Environmental Criteria for Road Traffic Noise
EEC	Endangered Ecological Community
ELA	Eco Logical Australia

ELDP	Employment Land Development Program
EPA	Environment Protection Authority
EPI	Environmental Planning Instrument
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
FM Act	*Fisheries Management Act (1994)*
FRM	Filterable Reactive Phosphorus
GCC	Growth Centres Commission (now part of DP&I)
GDE	Groundwater dependant ecosystems
GIS	Geographic information system
GSG	Geology, Soils and Groundwater
GSP	Growth Servicing Plan
HDD	Horizontal directional drilling
HRC	Healthy Rivers Commission
ICNG	Interim Construction Noise Guideline
ICOMOS	International Council on Monuments and Sites
Infrastructure SEPP	State Environmental Planning Policy (Infrastructure) 2007
INP	Industrial Noise Policy
IPART	Independent Pricing and Regulatory Tribunal of New South Wales
ISS	Integrated Servicing Strategy
IUDC	Illawarra Urban Development Committee
IUDP	Illawarra Urban Development Program
IWWS	Illawarra Wastewater Strategy
kL	Kilolitre
kN	Kilonewton
kW	Kilowatt
L	Litre
LEP	Local Environmental Plan
LES	Local Environmental Study
LGA	Local Government Area
LIA	Lake Illawarra Authority
LLCC	Lowest life cycle cost
LOR	Limit of reading
Major Development SEPP	State Environmental Planning Policy (Major Development) 2005
MBR	Membrane bioreactor
MCA	Multi criteria analysis
MDP	Metropolitan Development Program
mg	milligram
mg/L	milligrams per litre
ML/d	Mega Litre per day

MoH	NSW Ministry of Health (formerly NSW Department of Health (DoH))
N	Nitrogen
NHMRC	National Health and Medical Research Council
NIAC	Northern Illawarra Aboriginal Corporation
NOW	NSW Office of Water
NPWS	National Parks and Wildlife Service
NPW Act	*National Parks and Wildlife Act 1974*
NRMMC	Natural Resource Management Ministerial Council
NSW	New South Wales
NTC	National Transport Commission
NTU	Nephelometric turbidity unit
OEH	Office of the Environment and Heritage (formerly EPA, then DECC, then DECCW)
P	Phosphorous
PAD	Potential Archaeological Deposit
PDWF	Peak dry weather flow
PEA	Preliminary Environmental Assessment
PER	Project Environmental Representative
PHA	Preliminary Hazard Analysis
POEO	*Protection of the Environment Operations Act 1997*
PRV	Pressure relief valve
Psu	Practical salinity unit
PWWF	Peak wet weather flow
RAP	Registered Aboriginal Party
RBL	Rating Background Level
RCMS	Riparian Corridor Management Study
REG	Renewable Energy Generation
REP	Regional Environmental Plan
RMS	Roads and Maritime Services (formerly RTA)
RNE	Register of the National Estate
RTA	Roads and Traffic Authority (now RMS)
Rural Lands SEPP	State Environmental Planning Policy – Rural Lands 2008
SCC	Shellharbour City Council
SCIVI	South Coast and Illawarra Vegetation Investigation
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SEPP	State Environmental Planning Policy
SHI	State Heritage Inventory
SHR	State Heritage Register
SKM	Sinclair Knight Merz
TEL	The Ecology Lab
TSC Act	*Threatened Species Conservation Act 1995*
TIDC	Transport Infrastructure Development Corporation (now Transport Construction Authority – TCA)
TP	Total phosphorus
TU	Terrain Units

Water Management Act	*Water Management Act 2000*
WCC	Wollongong City Council
WDURA	West Dapto Urban Release Area
WFP	Water Filtration Plant
WQO	Water Quality Objective
WRP	Water Recycling Plant
WSAA	Water Services Association of Australia
WPS	Water Pumping Station
WWPS	Wastewater Pumping Station
WWTP	Wastewater Treatment Plant

Glossary

1 in 100 year flood: A 1 in 100 year flood event is defined as a 1% chance that in any one year a flood of this size or larger will occur.

50th percentile: this has the same meaning as 'median'. This means that 50 per cent of the results will be below this value, and 50 per cent will be above it.

Acid Sulfate Soil: Naturally occurring soils that contain iron sulfides which can oxidise on exposure to air and generate sulfuric acid.

ADWF: Average Dry Weather Flow. The average flow of wastewater delivered to the WRP or WWTP in the absence of rainfall.

Australian Height Datum: the datum used for the determination of elevations in Australia. The determination used a national network of benchmarks and tide gauges, and set mean sea level as zero elevation.

Ambient noise: The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.

Ammonia: (NH_4^+) represents the most reduced form of inorganic nitrogen available, and is preferentially utilised by plants and aquatic micro-organisms. The main sources of ammonia in aquatic ecosystems are found to be from human and animal wastes and also by release during the decomposition of organic material by bacteria

ANZECC: Australian and New Zealand Environment and Conservation Council provides a forum for the development of national land use policies to protect environmental quality and for the setting of national objectives for air, land and water quality.

ANZECC Guidelines: Australian Water Quality Guidelines for Fresh and Marine Waters published by ANZECC in 2000. These guidelines provide reference levels for comparison with water quality results.

ARI Average Recurrence Interval. The average time interval between events e.g. the average time between rainfall events that deliver at least 10 mm of rain within 24 hours.

Assessment period: The period in a day over which assessments are made.

Background noise: Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L_{90} noise level (see below).

BASIX: Building Sustainability Index. The index ensures homes are designed to use less drinking water and generate less greenhouse gas emissions by setting energy and water reduction targets for house and units.

Bioaccumulate: The process by which chemical substances are taken up by living things and retained and concentrated as they move up through the food chain

Biodiversity: Variety and number of different species living in an ecosystem or a defined geographic area.

Biosolids: Solids from wastewater treatment processed into products suitable for beneficial uses such as agriculture or forestry.

Biosoil®: biosolid product

Bund: an area designed to prevent inundation or breaches (eg area to contain liquid spills).

Bypass: When wastewater bypasses wastewater treatment facilities and is not fully treated. It is caused usually by plant failures or wet weather flows exceeding plant capacity.

Catchment: The area of land draining to a waterway. May also refer to areas served by a wastewater or stormwater system.

Chlorination: The addition of chlorine to drinking water, recycled water, wastewater, or industrial waste to disinfect or to oxidise undesirable compounds.

Chlordane: an organochlorine compound used as a pesticide.

Chlorine (Cl): A naturally occurring element. Chlorine is added to drinking, recycled water supplies and wastewater to kill bacteria and other pathogens that may cause disease. Residual chlorine needs to be present in drinking and recycled water supply pipelines so that the water is disinfected to appropriate levels all the way to the tap.

Chlorophyll-a: Produced by plants and algae. Indicates the potential presence of algae in water. Elevated chlorophyll-a levels are generally an indication of increased nutrient loads and eutrophication.

Concept Approval area: Area covered by the application for Concept Plan Approval for the overall Proposal to provide water and wastewater services to the WDURA and AGAs. This is synonymous with the Proposal Area.

Conservation: Use, management and protection of resources so they are not degraded, depleted or wasted and are available on a sustainable basis for present and future generations.

CORMIX: A numerical model that estimates the trajectory and dilution of a buoyant jet in both the near-field and the far-field.

Cumulative effects: the collective effect that a number of independent environmental aspects may have when considered together

Dangerous goods: Dangerous goods are substances or articles that pose a risk to people, property or the environment, due to their chemical or physical properties.

dB(A): A-weighted decibels. The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the “A” filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.

Dechlorination: A process that neutralises the toxicity of chlorine and chloramines (a by-product of chlorine).

Decibel [dB]: The units that sound is measured in. The following are examples of the decibel readings of every day sounds:

0dB	The faintest sound we can hear
30dB	A quiet library or in a quiet location in the country
45dB	Typical office space. Ambience in the city at night
60dB	Martin Place at lunch time
70dB	The sound of a car passing on the street
80dB	Loud music played at home
90dB	The sound of a truck passing on the street
100dB	The sound of a rock band
115dB	Limit of sound permitted in industry
120dB	Deafening

Direct Impact Area: Conservative estimate of the area of native vegetation to be cleared as a result of construction of the Proposal.

Disinfection: Inactivation (killing) of pathogens or organisms, capable of causing infectious disease, by chemical or physical processes.

Dissolved oxygen: The amount of oxygen that is dissolved in water. Dissolved oxygen is vital for many forms of riverine and estuarine biota including native fish and is also vital for the functioning of healthy aquatic ecosystems.

Drinking water: Drinking water is defined as water intended primarily for human consumption but which has other domestic uses.

Ecologically Sustainable Development (ESD): Development that improves the quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

Ecosystem: A community of organisms, interacting with one another, and the environment in which they live. Processes occurring within an ecosystem are the flow of energy by food chains and food webs and nutrient cycling. An ecosystem may be a pond that is dry for half the year, a lake or even a planet.

Effluent: A liquid waste product that is discharged to the environment, usually used to mean wastewater discharged from sewage (wastewater) treatment plants.

Emission: Anything given off as a result of a process, for example, gases, heat and odours.

Emission factors: Emission factors are assumed concentrations of contaminants in wastewaters and are, generally, more conservative than observed data. In the absence of reliable data, emission factors may be used. Sydney Water has only limited data on the concentrations of contaminants in wet weather and hence uses the wet weather emission factors.

Enterococci: Streptococcus bacteria of faecal origin used as an indicator organism in the determination of wastewater pollution.

Endangered Ecological Community: As defined under section 4(1) of the TSC Act and any additional endangered ecological communities listed under Part 13 of the EPBC Act.

Environmental impact: Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products and services.

Environmental indicators: Physical, chemical or biological features that can be monitored and used to measure changes in the environment.

Ephemeral creek lines: A creek that flows during or immediately after a rainfall event

EPLs: Environment Protection Licences issued by EPA.

Escarpment: A steep slope or cliff separating two relatively level areas of ground, resulting from erosion or faulting.

Escherichia coli: (E.Coli), bacterium commonly found in the lower intestine of warm-bloodied organisms. Pathogenic strains can cause disease through faecal – oral contamination.

Estuary: The part of a river system that is a mixture of fresh water and seawater.

Eutrophication: the process by which a body of water increases in productivity as a response to an increase in the concentration of nutrients.

Faecal coliform: A type of bacteria found in faecal material of humans and other mammals. Faecal coliforms themselves generally do not make people sick. High levels indicate that water is likely to contain other organisms that make people sick.

Field assessment area: The area along pipeline corridors and other infrastructure sites assessed as part of the specialist studies. Environmental assessments undertaken for the Proposal were based on the field assessment area to provide flexibility to revise infrastructure alignments and construction methods.

Filterable Reactive Phosphorus (FRP): a measure of orthophosphates, which represents the component of total Phosphorus which is readily available biologically. FRP concentrations within the waterbody can be influenced by variations in pH, oxygen levels and turbidity.

Freshwater: Water found in lakes, rivers, streams; generally containing less than 1,000 mg/L of dissolved solids (salts)

Gradational soil: A soil which increases in texture (becomes more clayey) with depth

Greenhouse gas emissions: Gases such as carbon dioxide and other forms of air pollutants, resulting from the burning fossil fuels (such as coal, natural gas or oil) and land clearing, which contribute to the warming of the Earth's atmosphere.

Groundwater: Water found below the surface, usually in porous rock or soil or in underground aquifers (natural underground formations that contains sufficient saturated, permeable material to yield significant quantities of water).

GSG Assessment: Coffey Geotechnics' Geology, Soils and Groundwater Assessment

GSG study area: The area assessed during the GSG Assessment

GSP: Growth Servicing Plan (see Section 2.4.4)

Habitat: An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component.

Hazardous material: Any material that, because of its quantity, concentration, or physical or chemical characteristics, may pose a hazard to human health or the environment.

Horizontal directional drilling (HDD): a steerable trenchless method of installing underground pipes, conduits and cables using a surface launched drilling rig, with minimal impact on the surrounding area.

Iron (Fe): A naturally occurring element which occurs at low levels in water and may be responsible for taste and staining problems.

Irrigation: Controlled application of water for agricultural or horticultural purposes through manmade systems to supply water requirements not satisfied by rainfall.

IWWS: Acronym for Illawarra Waste Water Strategy. A strategy to improve the quality of receiving waters in the Illawarra Region. A marine monitoring program was undertaken between 2003 and 2007 to quantify environmental change resulting from this strategy.

Kilolitre (kL): One thousand litres of water

Kilowatt: A measurement unit for electricity consumption

Latite: an igneous volcanic rock

L_{90}: The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).

LEP: Local Environmental Plan - a statutory planning instrument.

Leachates: dissolved substances

L_{eq}: The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.

Lipophilic substances: Substances that are attracted to, combine with or dissolve in, fats or lipids. They do so more readily than they dissolve in water.

Littorinids: a type of mollusc, tending to prefer habitats above the high tide level, only being wetted by sea spray.

Litre (L): A measure of liquid volume.

Lmax: The maximum sound pressure level measured over a given period.

Macrophytes: macroscopic plant, commonly used to describe aquatic plants that are large enough to be visible to the naked eye.

Manganese (Mn): A naturally occurring element that is found in water. It is an essential element in our diet but causes staining of kettles, baths and laundry.

Median: A median value lies where 50 per cent of results will be below this value, and 50 per cent will be above it.

Megalitre (ML): A measurement of volume equal to one million litres (1,000,000L).

Microgram per litre (u g/L): Unit of measurement which is equivalent to one millionth of a gram of a substance dissolved in a litre of water.

Microorganisms: The organisms which are invisible or only barely visible with the unaided eye.

Milligram (mg): Unit of measurement which is equivalent to 0.001 of a gram.

Milligrams per litre (mg/ L): Unit of measurement which is equivalent to 0.001 of a gram of a substance dissolved in a litre of water.

Ministry of Health: the primary NSW public sector organisation responsible for public health (previously DoH).

Mixing zone: The zone surrounding the outfall where the wastewater plume mixes with the receiving waters. The initial mixing zone may extend beyond the near-field model (initial dilution zone).

Net present cost: Sum of the present value of all costs over the period of concern.

NHMRC: The National Health and Medical Research Council, which is an advisory body to the Australian Government. Advisory standards are established by the NH&MRC with respect to the performance of products such as drinking water to ensure they are of appropriate quality.

Nitrogen (N): A naturally occurring element found in soils and organic matter. Often added to soils in fertiliser. Plants use nitrogen as a nutrient for growth and high levels in water may result in excessive growth of algae and aquatic weeds.

Non-potable reuse: The use of treated wastewater for purposes that do not require water of a drinkable standard.

NTU: Nephelometric Turbidity Units – the unit of measure for suspended material in water that may cause it to look muddy or discoloured.

Nutrients: Substances required for growth by plants and other organisms. Major plant nutrients are phosphorus and nitrogen.

Occupational health and safety: protection of the health, safety and welfare of employees, contractors and visitors who are at, or may be affected by, a worksite.

Operating licence: A licence issued under the *Sydney Water Act 1994*, that defines many of Sydney Water's performance standards.

Organism: Any living animal or plant.

Organochlorines: a class of compounds in which one or more atoms of chlorine are combined with an organic molecule (eg chlordane [in pesticides], chloroform)

Oxidised nitrogen: represents the level of free nitrogen within the water column that is immediately available to plants. Similarly to other nitrogen species, excessive concentrations can promote algal growth.

PAD: Potential Archaeological Deposit. An area or specific site which may contain the potential for archaeological deposits.

Pathogens: Potentially disease-causing microorganisms including bacteria, viruses, parasitic protozoa (Giardia and cryptosporidium) and helminths (intestinal worms).

Per capita: For each head of population.

Perennial creek lines: A creek that flows all year

pH: A measure of the alkalinity or acidity of water expressed on a scale from 1 to 14: 1 is most acidic, 7 neutral and 14 most alkaline. Changes in pH can impact the ability of aquatic organisms to maintain basic functions such as respiration. pH also controls the bioavailability of metals, nutrients and other organic molecules.

Phosphorus (P): An element that is essential for all living organisms. It is a nutrient and a common ingredient in fertilisers and washing detergents. The Australian natural environment is adapted to very low levels of P in soils and water.

Phytoplankton: the community of photosynthetic organisms, mainly algae, that occur freely suspended in the water column.

Pollutants: Contaminants in water, soil or air that, when in sufficient quantity, may cause environmental degradation.

Pollution: Any harmful or undesirable change in the physical, chemical or biological quality of air, water or soil as a result of the release of chemicals, radioactivity, heat and large amounts of organic matter.

Potable reuse: Reuse of highly treated wastewater for drinking and other purposes that require drinking water quality standards.

Potable: Fit or suitable for drinking and other similar uses.

Project Approval area: Area covered by the application for Project Approval for components of the Proposal required to service the early release Precincts (Kembla Grange, Sheaffes/Wongawilli and West Horsley).

Proponent: the person proposing to carry out an activity (such as erecting a building), as defined under the *Environment Planning and Assessment Act 1979.*For the purposes of this Proposal, the Proponent is Sydney Water or any party acting under authorisation from and on behalf of Sydney Water.

Proposal: to construct and operate water and wastewater infrastructure required to service the new development in West Dapto Urban Release Area (WDURA) and Adjacent Growth Areas (AGAs) in the Illawarra Region.

Proposal area: That area comprising the WDURA and AGA. This is synonymous with the Concept Approval area**.**

PSU: practical salinity units – a measurement of salinity. Absolute (or ideal) salinity is the mass fraction of salts in seawater. In practical terms, salinity is expressed as PSU, which are based on water temperature and conductivity measurements. Salinity used to be expressed in parts per thousand (ppt). For oceanic seawater, ppt and PSU are very close.

Putrescible: Material that contains organic matter capable of being decomposed by microorganisms.

Rating background level: The overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).

Receiving water: A stream, river, pond, lake or ocean that receives stormwater or wastewater discharges.

Recycled water: Highly treated wastewater that can be used in industrial processes, for irrigation in agriculture, urban parks and landscapes, and in the home for flushing toilets, car washing and watering gardens. It is not for drinking or personal use.

Recycling: Collecting and reprocessing a resource so that it can be used again.

Regulators: Organisations that set standards and guidelines for Sydney Water.

Remaining Proposal area: The area within the Proposal area, excluding the Project Approval area.

Renewable resource: A resource that can be replenished naturally with the passage of time.

REP: Regional Environmental Plan - a statutory environmental planning instrument.

Reservoir: An artificial body of water. Water is transferred from the dams and treatment plants either by gravity or pumping stations to a water storage reservoir. These reservoirs are human-made water storage areas, usually on high land. From these storage facilities the water flows through a system of mains pipes to homes, shops, factories, schools and public places.

Residual environmental risk: The level of risk to the environment remaining after risk management measures have been applied.

Reticulation pipelines: Reticulation pipelines are generally smaller than 300mm diameter and directly supply water to the customers from the water trunk pipelines, or dispose of wastewater from the customers to the wastewater trunk pipelines. Sydney Water will only be constructing trunk water and wastewater pipelines greater than 300mm in diameter in the Proposal. Reticulation pipelines will be constructed by developers and are not included in the Proposal.

Riparian corridor: Land adjacent to creeks and rivers. Corridor widths are defined by DIPNR (2004) and NOW (2008).

RMS: Roads and Maritime Services (formerly the RTA), the primary NSW public sector organisation responsible for roads.

Runoff: Water that flows across the land surface and does not soak into the ground.

Sediment: Soil or other particles that settle to the bottom of lakes, rivers, oceans and other waters.

SEPP: State Environmental Planning Policy - a statutory planning instrument.

Sodic soils: A soils that has a high level of exchangeable sodium in relation to other exchangeable cations. A sodic soil contains sufficient exchangeable sodium to interfere with the growth of plants. Sodic soils also have poor structure, are highly dispersible and are therefore prone to erosion.

Sound: A fluctuation of air pressure which is propagated as a wave through the air.

Stakeholder: A stakeholder is any individual or group, which can affect or is affected by an organisation's activities.

Statement of Commitment: Measures for environmental mitigation, management or monitoring of the Proposal.

Stormwater system: The system of pipes, canals and other channels used to carry stormwater to bodies of water, such as rivers or oceans. The system does not usually involve any treatment.

Stormwater: Rainwater that runs off the land, frequently carrying various forms of pollution such as litter and detritus, animal droppings and dissolved chemicals.

SOE: State of the Environment.

Suspended solids: Particles in water that can be removed by sedimentation or filtration.

Sustainable development: Activities that can be maintained over the long term while achieving a balance between the environment, the economy and society.

Sustainability: See Ecologically Sustainable Development.

Syphon crossing: An inverted syphon is a closed pipeline with the end sections of the pipe at a higher elevation than the middle section

Talus: An accumulation of rocks or weathered geological material, often referred to as a talus slope.

Terrain Unit: A landscape area that has broadly similar characteristics, properties and constraints.

Texture contrast soil: Soils with a clear or abrupt boundary (a boundary depth of less than 50mm) between the A and B Horizons.

Threatened species: Critically endangered, endangered or vulnerable threatened species and populations as defined in section 4(1) of the TSC Act; or any additional threatened species listed under Part 13 of the EPBC Act as critically endangered, endangered or vulnerable.

Top of bank: Digital survey information that helps further define the spatial extent of riparian corridors.

Total Nitrogen (TN): a measure of all the nitrogen species found in a water body including ammonia, oxidised nitrogen and total organic nitrogen.

Total Phosphorus (TP): a measure of both biologically available and unavailable species. The biologically available species is known as Filterable Reactive Phosphorus. There are two forms of dissolved phosphorus in the water body, organic phosphorus produced from the decay of plant and animal material and inorganic orthophosphates, which released through breakdown of rock and transported into the waterbody.

Total suspended solids (TSS): A water quality measurement, referring to the mass of suspended material in suspension in a volume of liquid.

Trunk pipelines: Trunk pipelines are greater than 300mm in diameter and are not available for direct household connection, other than in exceptional circumstances. Trunk wastewater pipelines are the principal wastewater pipelines of a catchment system that drain to the point of treatment. Trunk water pipelines are a water pipeline main designed for bulk transfer eg supply to or from a reservoir and or a supply zone

Turbidity: This is a measure of suspended material in water that may cause it to look muddy or discoloured. It is measured in Nephelometric Turbidity Units (NTU)

Uniform soil: A soil with limited texture change throughout the profile

Under boring: A pipeline construction method (comprising thrust boring and/or horizontal directional drilling) that involves less disturbance of the ground surface.

Upgrade: To improve something.

Vegetation type: The finest level of classification of native vegetation used in the assessment. Vegetation types are assigned to vegetation classes, which in turn are assigned to vegetation formations. There are approximately 1,600 vegetation types within NSW.

Waste: Discarded, rejected, unwanted, surplus or abandoned substances, excluding gas, water, wastewater, beneficially used biosolids and reuse water.

Wastewater: The dirty water or wastewater that goes down the drains of homes, offices, shops, factories and other premises and is discharged into the wastewater system. Also known as sewage.

Wastewater pumping s tation (WWPS): A facility in the wastewater system that mechanically lifts wastewater to a higher level to assist flow of the wastewater from its origin to its destination (eg to a treatment plant).

Wastewater system: The system of pipes and pumping stations for collecting and transporting wastewater from each property to the wastewater treatment plant.

Wastewater treatment: Primary - The initial stage of wastewater treatment in which floating or settleable solids are removed by screening and sedimentation.

Wastewater treatment: Secondary - The second stage of wastewater treatment involving the capture and removal of dissolved and fine organic solids. This usually involves a biological process.

Wastewater treatment: Tertiary - The third stage in the purification of wastewater. This process consists largely of the removal of dissolved nutrients and any remaining suspended solids and may include disinfection of the effluent.

Water conservation: Preventing and reducing wasteful, uneconomical, impractical or unreasonable use of water resources.

Water cycle: The continuous cycle of water movement through the environment, including the oceans, atmosphere, surface water systems and ground water.

Water demand: Total water use requirements for drinking, agriculture, industry, recreation and gardening. It is seasonal and highly influenced by the weather.

Water filtration plant (WFP): Water filtration plants are treatment facilities that improve water quality. Impurities are removed through a process known as filtration; incoming water is passed through a porous structure or medium, such as a screen, membrane, sand or gravel.

Water pumping station (WPS): A facility in the water system that mechanically lifts water to a higher level to assist flow of water from its origin to its destination (eg to households).

Water quality: Physical, chemical and biological measures of water.

Water recycling plant (WRP): a facility to improve wastewater quality before discharge to receiving waters or providing recycled water to other users. This applies to the facilities at Wollongong.

Waterways: All streams, creeks, rivers, estuaries, inlets and harbours.

Wetland: A wetland is a low-lying area of land often inundated or permanently covered by shallow water. They play a major role in the water cycle by storing and filtering water and replenishing underground water supplies. Wetlands can also be effective in cleaning polluted water by reducing aquatic plant nutrients, suspended solids and oxygen demands.

Wet weather: is defined in an environment protection licence (EPL). The EPLs for Wollongong WWTP and Shellharbour WWTP define wet weather as occurring when 10 millimetres or more of rainfall has been measured at a rain gauge in the catchment of the wastewater treatment system during a 24 hour period.

Wet weather overflow: Means an overflow in the reticulation system caused by wet weather as determined by the hydraulic wastewater system model.

Wrack: Organic material, such as sea grass, that is washed up onto beaches and/or foreshores by surf, tides, and/or wind.

Wastewater treatment plant (WWTP): a facility to improve wastewater quality before discharge to receiving waters which applies to the facilities at Shellharbour.

1 Introduction

This chapter introduces Sydney Water's Proposal to provide drinking water and wastewater related services for the West Dapto Urban Release Area and Adjacent Growth Areas. It describes the need for the Proposal and outlines the purpose and structure of this Environmental Assessment (EA).

1.1 The Proposal

Sydney Water proposes to construct and operate water and wastewater infrastructure to service the West Dapto Urban Release Area (WDURA) and Adjacent Growth Areas (AGAs) (the Proposal) in the Illawarra Region. The West Dapto Urban Release Area consists of the following Precincts:

- Kembla Grange
- Sheaffes/Wongawilli
- West Horsley
- Cleveland
- Avondale
- Yallah/Marshall Mount.

The following Precincts have been identified to date as Adjacent Growth Areas (AGA):

- Tallawarra Lands
- Huntley
- Calderwood
- Tullimbar Village.

The Proposal has been structured to allow it to be refined to accommodate additional Precincts. It is expected that additional Precincts will be nominated by the NSW Department of Planning and Infrastructure (DP&I), as development progresses within the Proposal area.

The WDURA and AGAs will accommodate approximately 30,000 dwellings and 420 ha of non-residential development to cater for population growth up to 2048. Extensive new public infrastructure is required to accommodate this growth and this includes providing drinking water and wastewater services.

Sydney Water is responsible for the planning to deliver drinking water and wastewater services for the new development. In this regard Sydney Water developed an Integrated Servicing Strategy (ISS) that involves:

- providing drinking water services by extending the existing Illawarra water supply system
- providing wastewater services by extending the existing Wollongong and Shellharbour wastewater treatment systems
- homeowners installing rainwater tanks on each residential lot to provide non-drinking water supply.

The Proposal is for the construction and operation of the infrastructure required to implement the ISS. It includes:

- drinking water pipelines
- wastewater pipelines
- new water pumping stations (WPS) and upgrades to existing WPSs
- new wastewater pumping stations (WWPS) and upgrades to existing WWPSs
- transfer of wastewater flows from the new growth areas of Kembla Grange, Sheaffes/Wongawilli, and West Horsley to the Wollongong Water Recycling Plant (WRP) or

Shellharbour Wastewater Treatment Plant (WWTP) for treatment and either reuse or ocean discharge

- potential amplification and/or upgrades to Wollongong WRP and Shellharbour WWTP
- up to five new drinking water reservoirs.

The Proposal is limited to providing drinking water and wastewater services for WDURA and AGAs and includes treatment, storage and bulk transport systems.

The Proposal does not include other types of infrastructure or land development, such stormwater systems or reticulation networks. Infrastructure required to connect properties to services provided by Sydney Water is not included in the Proposal as this will be the responsibility of landowners and/or developers.

A detailed description of the Proposal is provided in Chapter 3, including an outline of the stages in which it is likely to be implemented.

1.2 Need for and objectives of the Proposal

The key driver for the Proposal is the need to expand Sydney Water's network of drinking water and wastewater infrastructure to ensure there is sufficient capacity to service the NSW Government's planned development of the WDURA and AGAs up to 2048. Sydney Water is responsible for providing drinking water and wastewater services to the Illawarra Region. Although there is uncommitted capacity within the existing drinking water and wastewater systems, there is insufficient capacity to meet the demands of the projected population growth.

Sydney Water has developed an ISS to ensure that the Proposal is safe, reliable and sustainable. This strategy also complies with the requirements of Sydney Water's Operating Licence and Environment Protection Licences (EPL) for the Wollongong and Shellharbour wastewater treatment systems.

The objectives of the Proposal are derived from the ISS for the WDURA, which was developed in consultation with government and non-government stakeholders. Objectives of the Proposal are to:

- ensure a secure water supply
- protect public health
- protect catchment and river health
- provide affordable and efficient water and wastewater services
- provide resource and energy efficient water and wastewater services
- support the orderly rollout of land release and infrastructure
- meet Sydney Water's statutory and regulatory obligations.

The ISS is discussed further in Chapter 4.

1.3 Background

1.3.1 The WDURA and AGAs

The Illawarra Region includes the local government areas (LGA) of Wollongong, Shellharbour and Kiama. The Illawarra adjoins Sydney, the South Coast and the Southern Highlands, and there are close employment, transport and settlement links between neighbouring regions. In 2011 there were 275,837 people living in the Illawarra Region (ABS 2012) and the population is expected to increase by 47,600 people by 2031 (DoP 2007).

The strategic context of the Proposal is detailed in Chapter 2. This indicates that the Illawarra Regional Strategy (2006 – 2031) (DoP 2007) and later studies by the (then) Growth Centres Commission (GCC) identified that the main opportunity for urban expansion in the Illawarra Region is located around West Dapto where the coastal plain broadens. The GCC concluded that the staged development of WDURA can and should proceed, as it will assist in meeting the housing and employment needs of the Illawarra Region up to 2048. Since the GCC review, the area for staged development has been extended to include the AGAs of Calderwood, Tallawarra Lands, Huntley and Tullimbar Village.

In late 2008 the GCC was merged into the DP&I (refer to Section 2.2.1 for more information).

1.3.2 Sydney Water's role in supporting development of the WDURA and AGAs

As indicated in Section 1.4, the WDURA and AGAs were divided into a number of Precincts to facilitate the staged release of land for development. Based on the recommendation in the 2008 GCC review, rezoning and land release sequencing for the initial stages of WDURA was from north to south. The DP&I, in consultation with relevant local councils, agencies and developers, will determine the rezoning, land release and sequencing of development for future stages.

Development of the early release Precincts of WDURA (Kembla Grange, Sheaffes/Wongawilli and West Horsley) commenced in April 2012. The remaining Precincts will be developed and released over time depending on the future rezoning, land release sequencing, development timing, staging and expected lot take up rates and future demand. The Growth Servicing Plan (GSP) indicates that the target date for staged delivery of infrastructure to the early release precincts of WDURA is December 2015.

Sydney Water is responsible for providing the drinking water and wastewater infrastructure required to facilitate development of the WDURA and AGAs. The Proposal has been designed to enable water and wastewater services to be delivered in stages to accommodate the ultimate staging of development.

The importance of the Proposal is described in the Department of Planning's (DoP) *Illawarra Regional Strategy* (DoP 2007), which identifies West Dapto as the priority new release area for the region (refer to Chapter 2). In addition, the *West Dapto Release Area Review Planning and Infrastructure Report* (GCC 2008) identified infrastructure servicing as being key to the successful development of the area.

1.4 The Proposal area

The Proposal area comprises the localities most likely to be affected by the construction and operation of the Proposal. It is situated approximately 15 km to the south west of Wollongong, and is generally bounded by the suburb of Farmborough Heights in the north, Tullimbar Village in the south, Lake Illawarra to the east and the Illawarra Escarpment to the west (refer to Figure 1-1).

Regional transport infrastructure corridors are located to the east of the Proposal area and include the Princes Highway, F6 Southern Freeway and Illawarra Railway Line. The Illawarra Highway is located to the south of the Proposal area and provides access to Moss Vale and other inland areas to the west of the Illawarra Escarpment.

The Proposal area is on the eastern side of the Illawarra Escarpment and is wholly contained within the catchment of Lake Illawarra which discharges to the Tasman Sea at Windang. The main watercourses include Dapto Creek, Mullet Creek, Reed Creek, Robins Creek and Macquarie Rivulet. The watercourses generally commence in the Illawarra Escarpment's foothills and flow in an easterly direction prior to discharging to Lake Illawarra.

Land affected will be in public and private ownership and will be located within both the Wollongong and Shellharbour LGAs. Figure 1-1 shows the indicative location of the Precincts and AGAs in relation to the Wollongong and Shellharbour LGA boundary.

The Proposal may also require upgrades to the existing Wollongong WRP and Shellharbour WWTPs as well as possible upgrades to parts of the networks leading to the WWTPs. Therefore the Proposal area also includes the terrestrial and marine areas in the vicinity of these facilities.

The WDURA and AGAs are divided into a number of Precincts to facilitate the staged release of land for development over a period of approximately 40 years. As a result, the environmental and social context in which the Proposal will be developed will differ from that which is currently present. The locations of the Precincts are outlined in the following sections and the proposed water related services infrastructure is described in Chapter 3.

1.4.1 Kembla Grange Precinct

The Kembla Grange Employment Precinct is within the Wollongong LGA and is located south of the suburb of Farmborough Heights and north west of the suburb of Horsley. Existing land use in the area is predominantly rural, with other land uses including the Kembla Grange Racecourse and associated stables and the Wollongong Resource Recovery Park.

The main transport infrastructure in the area is West Dapto Road, which connects to the Princes Highway near the Kembla Grange Racecourse. The Illawarra Railway Line is in the east of the Precinct and the Kembla Grange Station is located near the intersection of West Dapto Road and the Princes Highway.

West Dapto Creek is the main waterway in the Precinct and flows in a southeasterly direction before joining Mullet Creek, which is a tributary of Lake Illawarra.

The Kembla Grange Employment Precinct was rezoned under the Wollongong Local Environmental Plan (LEP) (West Dapto) 2010 and has been identified as an early release precinct.

1.4.2 Sheaffes/Wongawilli Precinct

The Sheaffes/Wongawilli Precinct is within the Wollongong LGA and is to the south west of the Kembla Grange Precinct and north west of the suburb of Horsley. Existing land use in the area is predominantly rural and there is an existing village at Wongawilli that has historic links to mining in the region.

The main transport infrastructure in the area is the West Dapto Road. West Dapto Creek is the main waterway in the Precinct.

The Sheaffes/Wongawilli Precinct was rezoned under the Wollongong LEP (West Dapto) 2010 and has been identified as an early release precinct.

1.4.3 West Horsley Precinct

The West Horsley Precinct is within the Wollongong LGA and is to the south of the Sheaffes/Wongawilli Precinct and west of the suburb of Horsley. Existing land use in the area is predominantly rural.

The main transport infrastructure in the area is the West Dapto Road. Other main roads in the vicinity of the Precinct are Fowlers Road, Bong Bong Road and Cleveland Road.

Robins Creek and Reed Creek are the main waterways in the Precinct and flow in an easterly direction before joining Mullet Creek which is a tributary of Lake Illawarra.

The West Horsley Precinct was rezoned under the Wollongong LEP (West Dapto) 2010 and has been identified as an early release precinct.

On 18 October 2011, Sydney Water obtained project approval under the former provisions of Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for two early release lead-in mains for a small part of the West Horsley Precinct in the vicinity of Bong Bong Road known as Brook Reach Estate (Sydney Water 2011a).

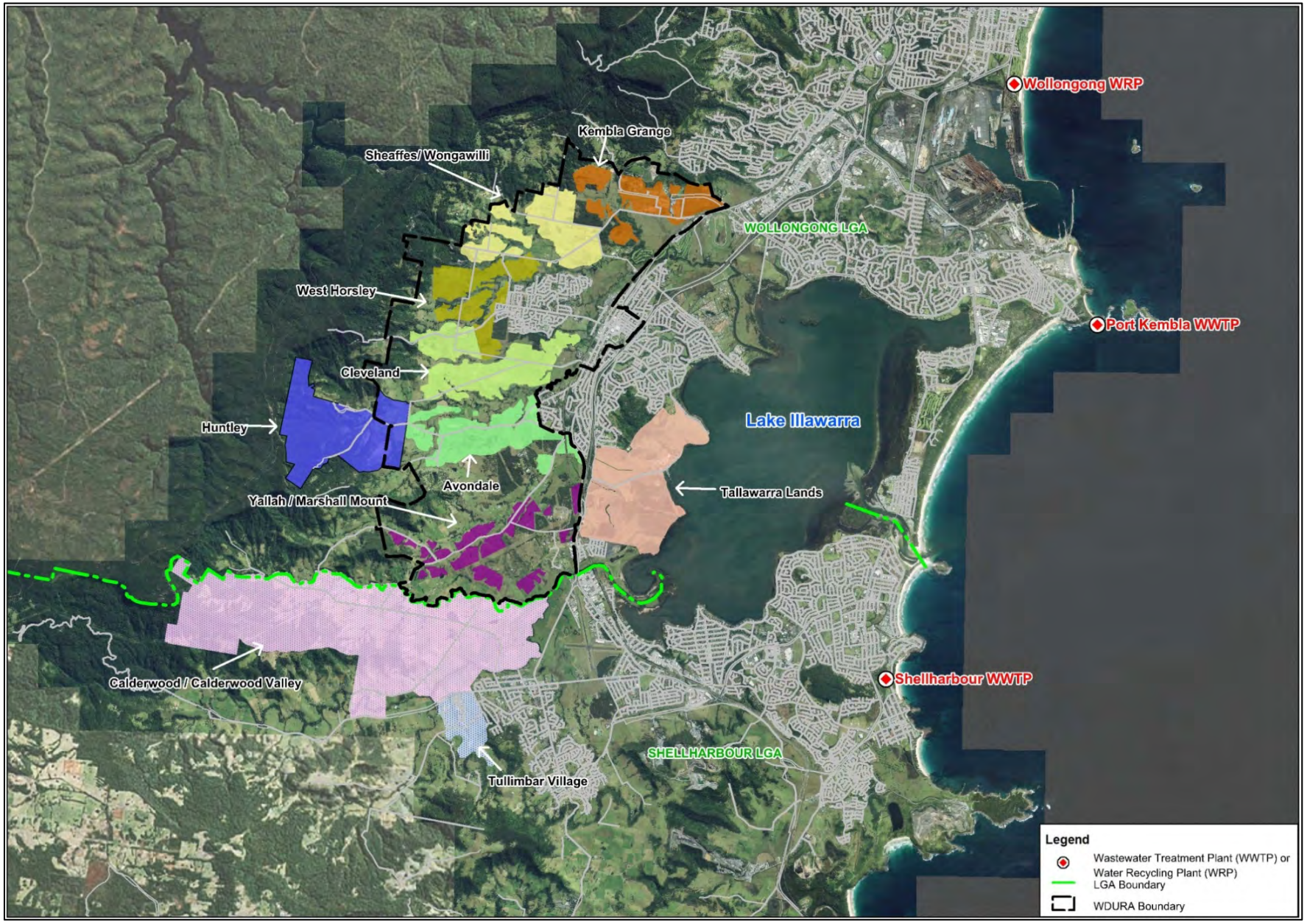

Figure 1-1 Location of the Proposal area

1.4.4 Cleveland Precinct

The Cleveland Precinct is within the Wollongong LGA and is to the south and west of the West Horsley Precinct. Existing land use is predominantly rural. The suburb of Penrose is located to the south east of the Precinct.

The main transport infrastructure in the area is Cleveland Road which links Avondale Road in the west to the Princes Highway in the east.

The Precinct is situated between Mullet Creek to the south and Reed Creek to the north. These waterways generally flow in an easterly direction, before heading north east where Mullet Creek discharges to Lake Illawarra.

1.4.5 Avondale Precinct

The Avondale Precinct is within the Wollongong LGA and is to the south of the Cleveland Precinct and to the west of the suburb of Penrose. Existing land use is predominantly rural.

The Precinct is centred around Avondale Road which connects to the Princes Highway in the east. The Illawarra Railway Line also passes through the eastern portion of the Precinct.

The Precinct is situated to the south of Mullet Creek which generally flows in an easterly direction, before heading north east and discharging to Lake Illawarra.

1.4.6 Yallah / Marshall Mount Precinct

The Yallah / Marshall Mount Precinct is within the Wollongong LGA and is to the south of the Avondale Precinct and north of the Calderwood Growth Area. Existing land use is predominantly rural, with some rural residential development.

The Precinct is composed of a number of discrete packages of land that are elevated above the floodplains of Marshall Mount Creek to the north and Macquarie Rivulet to the south. Large areas of vegetation are present that provide a habitat corridor that extends west to the Illawarra Escarpment.

The Precinct is centred around Marshall Mount Road which links the Princes Highway in the east to Calderwood Road in the west.

DP&I has redefined the Yallah Marshall Mount precinct as a ‘free stage’ meaning that it can potentially be rezoned out of sequence. Wollongong Council is currently preparing the draft LEP aiming to rezone the Precinct for release by mid 2013.

1.4.7 Tallawarra Lands Growth Area

The Tallawarra Lands Growth Area is within the Wollongong LGA. It is generally bounded by the suburb of Koonawarra to the north, Haywards Bay to the south, the F6 Southern Freeway to the west and Lake Illawarra to the east.

The Growth Area includes land that was used for the Tallawarra coal-fired power station that operated between 1954 and 1989 prior to being decommissioned over a 10-year period. TRUenergy purchased the site and in 2006 commenced constructing a new $350 million natural gas power plant. The first stage of the new power plant opened in 2009.

As the gas power plant occupies a relatively small proportion (about 40 ha) of the overall 565 ha site, TRUenergy investigated future potential land use options for the remainder of the site. A Concept Plan application was submitted to the DP&I to develop the remainder of the site and this includes an industrial precinct, a commercial precinct, residential precincts, and extensive environmental conservation and recreational lands.

The Growth Area contains a number of waterways and wetlands that drain directly to Lake Illawarra, the largest of which is Duck Creek.

1.4.8 Calderwood Growth Area (including Calderwood Valley)

The Calderwood Growth Area includes the Calderwood Valley and is located in the Shellharbour LGA, to the south and west of the Yallah Marshall Mount Precinct. It is to the north and west of existing suburbs of Tullimbar Village and Albion Park. Existing land use is predominantly rural, including activities such as dairy farming. This Precinct will extend the existing urban footprint at Tullimbar Village and Albion Park.

The southern boundary of this Growth Area fronts the Illawarra Highway. Other main roads include North Macquarie Road, Calderwood Road and Marshall Mount Road.

Waterways that traverse the site include Macquarie Rivulet and its tributaries, Yellow Rock Creek and Hazleton Creek. Macquarie Rivulet is a tributary of Lake Illawarra. Marshall Mount Creek is the northern boundary of the area and is also the boundary between the Shellharbour and Wollongong LGAs.

In February 2009, Delfin Lend Lease submitted an application for Concept Approval under the former provisions of Part 3A of the EP&A Act to rezone approximately 700 ha of land in the Calderwood Valley to enable development for approximately 4,800 dwellings and 50 ha of mixed use/employment land. The Concept Plan was approved by the Minister for Planning in December 2010. On 14 January 2011, the Calderwood Urban Development Project site was gazetted as a State significant site under Schedule 3 of State Environmental Planning Policy (Major Development) 2005 (Major Development SEPP). The planning and development framework to be used by consent and approval authorities to assess future development proposals within the Calderwood Urban Development Project site is set out in Part 28 of Schedule 3 of the Major Development SEPP.

In March 2010, Delfin Lend Lease submitted an application for Project Approval under Part 3A of the EP&A Act for Stage 1 of the Calderwood Precinct. This is referred to as the Calderwood Urban Development Project and is a master planned community development that proposes a mix of residential, conservation and open space uses. Stage 1 has 320 residential lots, 10 mixed use/super lots, 37 hectares of open space land and other associated developments. The 127 ha site for Stage 1 is located on the southern side of the overall site for which Concept Approval was obtained. The project application for Stage 1 of the Calderwood AGA was refused by the Planning Assessment Commission (PAC) in April 2012. Delfin Lend Lease has lodged an appeal with the Land and Environment Court against the PAC decision and a determination is likely to be made in December 2012.

1.4.9 Tullimbar Village Growth Area

Tullimbar Village Growth Area is an urban release area to the south of the Illawarra Highway and west of the suburb of Albion Park. The area has been rezoned and approved for development and is near existing water and wastewater services. Residential areas will be developed around a town centre that will include shops, cafes, taverns, and a supermarket as well as public facilities and buildings.

This Growth Area also includes areas that have been identified for urban renewal that would occur as a result of redeveloping existing areas.

Tullimbar Village Growth Area is within the catchment of Macquarie Rivulet which is located to the north and flows to the east prior to discharging to Lake Illawarra.

1.4.10 Huntley Growth Area

The Huntley Growth Area is within the Wollongong LGA and is to the west of the Avondale Growth Area and east of the Illawarra Escarpment. Existing land use is predominantly rural.

The main roads in the area are Avondale Road and Cleveland Road which provide access to the Princes Highway in the east.

The Growth Area is generally located within the catchments of Mullet Creek to the south and Reed Creek to the north. These waterways generally flow in an easterly direction, before heading north east where Mullet Creek discharges to Lake Illawarra.

1.4.11 Other areas impacted by the Proposal

The Proposal may require upgrades to the existing Wollongong WRP and Shellharbour WWTPs as well as possible upgrades to parts of the networks leading to the WWTPs. The Proposal area also includes the terrestrial and marine areas in the vicinity of these facilities.

Wollongong WRP is located off Springhill Road, Coniston, and surrounding land use includes JJ Kelly Park, Wollongong Greenhouse Park, and the Wollongong Golf Club. Port Kembla is located to the south of the WRP and the nearest residential area is approximately 400 m to the north. It is a tertiary treatment plant and treats wastewater from Bellambi WWTP and Port Kembla WWTP prior to it being discharged in the ocean approximately 1 km offshore.

Shellharbour WWTP is located on the western side of Junction Road, Shellharbour, and currently serves the developed areas of Shellharbour, Albion Park, Albion Park Rail, Blackbutt, Balarang, Barrack Heights, Barrack Point, Flinders, Haywards Bay, Lake Illawarra South, Mount Warrigal, Oak Flats, Warilla and Shellcove. The treatment plant discharges via a near shore ocean outfall off Shellharbour/Barrack Beach.

1.5 Consultation

Sydney Water commenced consultation with key government agencies in 2007 and 2008 during the preparation of an integrated water-related servicing strategy for the WDURA and AGAs. Consultation included one-on-one briefings and inter-agency workshops and through regular servicing updates at IUDC meetings.

During the preparation of the EA, Sydney Water developed a Stakeholder Consultation and Communications Strategy that included a range of activities to keep key stakeholders (government stakeholders, Aboriginal stakeholders and community stakeholders) involved and informed throughout the Proposal. This included:

- public information day/s
- placing information on Sydney Water's website, including contact details to obtain further information or provide feedback
- distributing a community newsletter to approximately 10,000 residents in and around the Proposal area via a letter box drop
- consultation with representatives of the local Aboriginal community.

1.6 Purpose and structure of this report

This EA has been prepared under the former provisions of Part 3A of the EP&A Act to support Sydney Water's application for Concept Plan Approval for the overall Proposal. It also supports an application for Project Approval for components of the Proposal required to service the early release Precincts (Kembla Grange, Sheaffes/Wongawilli and West Horsley). Subsequent approval(s) may be obtained for components of the Proposal relating to areas released at a later date and/or upgrades to the existing system that will be confirmed at a later date.

The EA describes the Proposal, assesses the key environmental issues associated with constructing, commissioning and operating the Proposal, and identifies the management measures that may be implemented to mitigate impacts. The EA has been prepared to address the environmental assessment requirements issued by the Director-General of the DP&I on 4 July 2011 (refer to Section 5.1.3) and includes a draft Statement of Commitments based on the proposed impact mitigation measures, which would form the environmental management framework for the Proposal.

A summary of the information contained within each chapter of this report is provided below:

- Chapter 1 - introduces Sydney Water's Proposal to provide drinking water and wastewater related services for the WDURA and AGAs. It describes the need for the Proposal and outlines the purpose and structure of this EA.
- Chapter 2 - outlines the strategic context of the Proposal, having regard to the existing and future development in the Proposal area.
- Chapter 3 - provides a detailed description of all components of the Proposal, including the drinking water and wastewater infrastructure. Descriptions include the indicative pipeline alignments, construction methodologies and system operation and the process that would be implemented to refine the Proposal during detailed design.
- Chapter 4 - describes the process that was implemented to develop the ISS. Alternatives examined included various servicing strategies as well as alternative infrastructure locations and pipeline routes.
- Chapter 5 - describes the environmental and statutory planning framework within which the Proposal will be assessed, constructed and operated. The requirements of relevant environmental statutes are summarised and the corresponding considerations and requirements for the Proposal are identified. The chapter also outlines relevant government policies, plans and environmental guidelines.
- Chapter 6 - assesses the environmental issues associated with constructing and operating the Proposal. Possible impact mitigation and management measures that may be implemented are also identified.
- Chapter 7 - discusses other (non-key) environmental factors and the mitigation and management measures to be implemented to minimise impacts.
- Chapter 8 - describes the stakeholder engagement and consultation undertaken for the Proposal to date and summarises the issues raised in this process. It also outlines Sydney Water's future consultation approach if the Proposal is approved.
- Chapter 9 - provides an overall summary and justification for the Proposal, considers the principles of ecologically sustainable development, and concludes the EA.
- Chapter 10 - provides the draft Statement of Commitments for the Proposal.
- Chapter 11 - lists the references used in this EA.

2 Strategic context

This chapter outlines the strategic context of the Proposal, having regard to the existing and future development in the West Dapto area.

2.1 Urban planning context

2.1.1 Background

The Illawarra Region covers the LGAs of Wollongong, Shellharbour and Kiama. The region adjoins Sydney, the South Coast and the Southern Highlands, and there are employment, transport and settlement links between these neighboring regions. In 2011 there were 275,837 people living in the Illawarra Region (ABS 2012) and the population is expected to increase by 47,600 people by 2031 (DoP 2007).

Development in the north of the region is characterised by small communities overlooking the Pacific Ocean. Kiama and parts of Shellharbour in the south are characterised by urban landscapes and agricultural lands. The main opportunity for urban expansion is located in the middle of the Illawarra Region, around West Dapto, where the coastal plain broadens.

Rezoning in the West Dapto area began with the release of the suburb of Horsley over 20 years ago. Due to high infrastructure costs and low housing demand, further development did not proceed. In 2004, the then Department of Infrastructure, Planning and Natural Resources announced that rezoning in the Dapto Release Area would recommence. The Wollongong (West Dapto) LEP was gazetted in May 2010 to enable new residential development to proceed.

2.1.2 Strategic Context

The WDURA is located 15 km southwest of Wollongong and covers an area of approximately 3,000 ha. WDURA has been identified as an important component of the Illawarra and Greater Sydney Metropolitan Area housing market (refer to Section 1.3).

The West Dapto Release Area was first identified as suitable for urban development when it was placed on the Illawarra Urban Development Program (IUDP) in the early 1980s.

Three first release precincts within WDURA were identified and rezoned in 2010. The first release precincts were selected based on the north to south land release sequence recommended by the (then) GCC. The Precincts are Kembla Grange, Sheaffes/Wongawilli and West Horsley. Figure 2-1 identifies the Precincts and AGAs that have been rezoned and those that are yet to be rezoned.

Several development applications (DA), by developers, have been submitted to subdivide rezoned land in the WDURA Stages 1 and 2, and pre-DA lodgment meetings with Wollongong City Council have also been held regarding other developments. A 400 lot subdivision application was approved by Wollongong City Council for the West Horsley Precinct in April 2011 and construction of dwellings is likely to commence in 2012. In October 2011, Sydney Water received approval under the former Part 3A of the EP&A Act for two lead-in mains to provide water related services to this subdivision. The remaining Precincts will be developed and released over time and water and wastewater services will be delivered according to Sydney Water's GSP, depending on development rates and future demand for services.

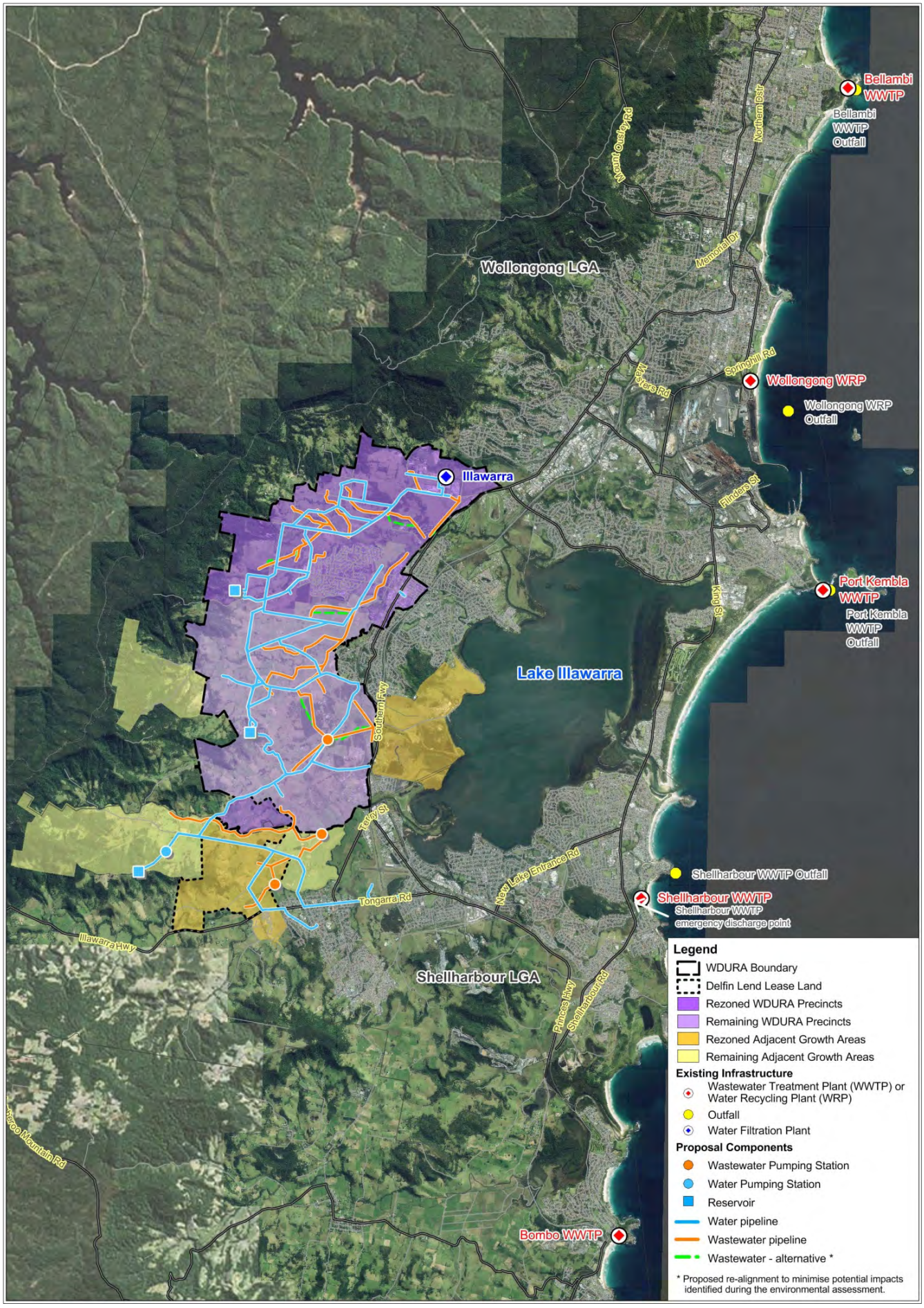

Figure 2-1 Location of WDURA and AGAs

2.2 Illawarra Regional Strategy 2006-31

The Illawarra Regional Strategy is one of the regional strategies prepared by the DoP for areas of high growth in NSW. The strategy aims to ensure the projected housing and employment needs of the region over the next 25 years are adequately accommodated and appropriately located. This regional strategy also identifies and protects the regions significant natural assets such as the Illawarra Escarpment, Lake Illawarra and the Minnamurra Estuary. The Strategy aims to ensure that careful planning of new development in the West Dapto area will recognise and protect natural vegetation corridors between the coast and the escarpment.

The Strategy identifies the WDURA as a priority new release area that could accommodate approximately 20,000 dwellings and meet approximately 60 per cent of future residential demand in the Illawarra Region. The DP&I is currently reviewing the Illawarra Regional Strategy with the aim of releasing a new five year strategy in early 2013. It is expected that the review will not significantly affect future development in the WDURA and AGAs.

The Illawarra Regional Strategy includes the IUDP. The IUDP was established in 1982 to coordinate the planning, servicing and development of new urban areas in Wollongong, Kiama and Shellharbour. The Calderwood area, to the south of West Dapto, was identified under the IUDP as a potential development area for up to 8,000 dwellings. Calderwood provides an opportunity for an additional new release adjacent to WDURA. The IUDP also identified the Tallawarra Lands and Tullimbar Village areas as having potential for urban development. The Proposal would provide water and wastewater services to the Calderwood, Huntley, Tallawarra Lands and Tullimbar Village AGAs. Figure 2-1 shows the location of these AGAs.

The WDURA has been divided into a number of Precincts to facilitate the staged release of development. A summary of the Precincts and the AGAs is provided in Chapter 1. The land in Kembla Grange, Sheaffes/Wongawilli, and West Horsley Precincts has been rezoned and is known as WDURA Stages 1 and 2. Development applications have been submitted by developers and/or approved within the West Horsley and Wongawilli precincts and dwelling construction commenced in April 2012. The remaining Precincts will be developed and released over time depending on development rates and future demand.

2.2.1 Growth Centres Commission

In late 2008 the GCC was merged into the DP&I to better facilitate the supply of land in NSW for urban development. The role of the DP&I is to co-ordinate the planning and infrastructure for the growth centres, whilst working with State agencies, local councils, industry and the community.

In December 2008 the GCC produced the *West Dapto Release Area Review – Planning and Infrastructure* (GCC 2008), which aimed to review the key aspects of the development of the WDURA. The review concluded that the staged development of WDURA can and should proceed and development sequencing should generally be from north to south as this would:

- minimise initial capital expenditure
- optimise the use of existing infrastructure
- assist in meeting the housing and employment needs of the Illawarra Region up to 2048.

Since the GCC review, the area for staged development has been extended to include the AGAs.

2.3 Securing Sydney's future water supply

2.3.1 Metropolitan Water Plan

The NSW Government's *2010 Metropolitan Water Plan* outlines strategies to balance demand for water with a sustainable supply. Based on an adaptive management approach, the Plan outlines a diverse suite of options to meet Sydney's long-term water needs while minimising the costs to the community and the environment.

The review of the Metropolitan Water Plan, finalised in 2010, identified community objectives for water and wastewater management that are relevant to this EA, including:

- providing a safe and affordable water supply for homes
- considering the needs of future generations in decision-making and water planning
- ensuring a dependable long-term water supply for current and future generations
- ensuring there is enough water to meet both environmental and human needs.

Sydney Water has developed an ISS for WDURA in accordance with the objectives of the Metropolitan Water Plan. The Strategy adopts a sustainable approach to implementing and managing water and wastewater services now and in the future.

Sydney Water's Integrated Servicing Strategy

Sydney Water's ISS is a plan for providing water and wastewater services to the WDURA and the AGAs up to the year 2048. The ISS was prepared in order to provide safe, reliable and sustainable water and wastewater services for the WDURA and AGAs. The preferred strategy was chosen following a sustainability planning process used throughout Sydney Water to ensure preferred options are environmentally, financially, technically and socially sustainable. A sustainable decision is one that weighs up all relevant social, environmental, economic, and technical considerations in a manner that is understood and accepted by the key stakeholders. The decision making process in Sydney Water was adapted from the Sustainability Framework commissioned by Water Services Association of Australia (WSAA) which is the peak representative body of the Australian urban water industry. The process includes steps for engaging external stakeholders (including local councils, community and business groups), setting objectives, developing options and appropriate quantitative and qualitative criteria, assigning weightings to those criteria, and using them to evaluate options and carry out sensitivity analysis.

The process of identifying and choosing the preferred servicing strategy was undertaken in two stages. The first stage was to establish a long list of options that could service the expected needs for residential, industrial and commercial uses. The long list of options was evaluated and ranked against the following criteria and the eight highest scoring options were added to a "short list" for further assessment:

- maximise drinking water conservation
- minimise wet weather discharges to Lake Illawarra
- minimise cost
- minimise energy consumption
- minimise impacts to the community
- maximise community acceptance
- maximise flexibility to development staging.

Further development of the short-listed options was then undertaken to provide enough information for assessment in the second stage. The short-listed options were again assessed and ranked against the above objectives. The assessment and ranking of the short-listed options included consultation with representatives from the (then) DoP, (then) Department of Water and Energy, (then) Department of Environment and Climate Change (DECC), NSW Health, and the local councils (Wollongong and Shellharbour).

After considering all the criteria, the preferred ISS chosen for WDURA was to provide:

- drinking water services by extending the existing Illawarra water system
- wastewater services by extending the existing Wollongong and Shellharbour wastewater treatment systems
- non-drinking water supply by homeowners installing rainwater tanks on each residential lot.

Preliminary calculations indicate that the existing WWTPs may need amplification but the water filtration plant (WFP) currently servicing the area has sufficient uncommitted spare capacity to cater for additional growth. However, major extensions to the existing drinking water and wastewater network of pipelines are required to cater for the proposed growth in the WDURA and AGAs.

The Proposal was developed for the WDURA and AGAs to address the ISS. Details on the Proposal are provided in Chapter 3.

2.4 Sydney Water's initiatives for sustainable water supply

2.4.1 Sydney Water Act 1994

The three main objectives of Sydney Water are set out in the *Sydney Water Act 1994* and are to:

- protect public health
- protect the environment
- be a successful business.

In addition to these objectives, there are further requirements placed on Sydney Water by its Act and regulators. This includes:

- support for the Building Sustainability Index (BASIX) compliant development
- meeting Government development timeframes
- complying with all requirements of the *Sydney Water Act 1994* and Operating Licence
- complying with the *Protection of the Environment Operations Act 1997* (POEO Act) and EPLs
- complying with the *Australian Drinking Water Quality Guidelines*
- complying with recycled water guidelines
- complying with applicable regulations, codes and legislation.

2.4.2 Sydney Water 2010-2015 Operating Licence

Sydney Water's Operating Licence enables Sydney Water to supply water, wastewater, recycled water and some stormwater services in Sydney, the Illawarra and Blue Mountains. The current licence is effective from 1 July 2010 to 30 June 2015 (Sydney Water 2010a).

The Operating Licence reflects public expectations of Sydney Water's performance and provides key requirements to ensure that Sydney Water operates in line with the objectives to protect public health, protect the environment and be a successful business. The licence sets out:

- drinking water (health and aesthetic) requirements
- infrastructure performance requirements
- customer and consumer rights
- system performance standards (continuity, water pressure and wastewater overflows)
- water efficiency targets, demand management and recycling requirements
- environmental indicators and management
- the Customer Contract.

Sydney Water's ISS and the Proposal have been developed to comply with these requirements.

2.4.3 The Sydney Water 2010-2015 Environment Plan

The *2010-2015 Environment Plan* (Sydney Water 2010b) sets out the objectives, actions and targets required to manage Sydney Water's environmental performance over the term of the 2010-2015 Operating Licence. The Plan identifies how Sydney Water is addressing one of its principal objectives, to protect the environment, by conducting its operation in compliance with the principles of ecologically sustainable development.

2.4.4 The Growth Servicing Plan (2011-2016)

Sydney Water's GSP sets out Sydney Water's plans for water, wastewater and recycled water infrastructure to service urban growth over the next five years. Developers will continue to be responsible for funding and constructing reticulation services for their developments. 'Urban growth' includes new housing, industrial and commercial facilities and includes potential development of WDURA and AGAs. The GSP is produced annually and is based on the NSW Government's Metropolitan Development Program (MDP), IUDP and the Employment Land Development Program (ELDP). Each year, the GSP is updated and finalised in consultation with relevant internal and external stakeholders, the development industry, and government agencies.

When investing in growth assets, Sydney Water must assess the need for those assets. The need is based on the MDP, IUDP, and the ELDP and specific demand for services. The timing of the investment is important to ensure that financial efficiency tests set by the Independent Pricing and Regulatory Tribunal (IPART) are met. In determining market demand for services, Sydney Water is primarily guided by the DP&I lot and dwelling production targets in the MDP, IUDP and the ELDP.

The current GSP targeted staged delivery of infrastructure to three early release precincts (rezoned land in WDURA Stages 1 and 2) by December 2015, subject to receipt of planning approvals.

2.5 Strategies and management plans for the Illawarra catchment

2.5.1 Lake Illawarra Estuary Management Study and Strategic Plan (March 2006)

The *NSW Estuary Management Policy* aims to promote cooperation between the NSW Government, local government, catchment management authorities, landholders and estuary users in the development and implementation of Estuary Management Plans for individual estuaries. In accordance with the *Estuary Management Policy*, the *Lake Illawarra Estuary Management Study and Strategic Plan* (LIA 2006) was developed as a planning tool to describe how the estuary would be managed. The plan provides recommended solutions for managing problems and prioritising activities.

The management objectives in the plan address the environmental, social and economic issues currently faced by Lake Illawarra. These issues include the management of the lake entrance, algal blooms, water quality, organic (seagrass and algal) wrack accumulation, erosion and sedimentation, catchment management, ecology and the fishery, waterway use, riparian zones, foreshore enhancement, flooding, visual amenity, community consultation and heritage management.

Management objectives outlined in the plan relating to this Proposal, include:

- seeking to ensure that land usage decisions are made having regard to the quality and amenity of Lake Illawarra's environmental and recreational values
- preserving the heritage values of Lake Illawarra and its foreshores.

The plan includes water quality objectives to reduce the impacts of stormwater and wastewater overflows on the Lake from existing and future urban developments. The *Condition Assessment of Lake Illawarra* (Draft) (LIA 2010) includes site specific water quality guidelines for Lake Illawarra that were developed by LIA in accordance with the ANZECCC (2000) and these were considered when preparing the Water Quality, Aquatic Ecology and Public Health Impact Assessment (SKM, 2011) undertaken for the Proposal.

The Proposal includes measures to prevent or minimise wastewater discharges and subsequent impacts on watercourses. The inland water quality assessment undertaken for the Proposal considers the key management objectives and issues that have been identified for Lake Illawarra in the *Lake Illawarra Estuary Management Study and Strategic Plan* (LIA 2006) and the *Condition Assessment of Lake Illawarra* (Draft) (LIA 2010) (refer to Section 6.4).

3 Detailed description of the Proposal

This chapter provides a detailed description of all components of the Proposal, including the indicative pipeline alignments, construction methodologies and system operation.

3.1 Proposal overview

Sydney Water will provide continuous healthy drinking water to the WDURA and AGAs as required by the Operating Licence issued by the IPART. Under the Operating Licence, Sydney Water is required to collect, transport, treat and safely return wastewater to the environment. A network of pipes, pumps and reservoirs will be constructed and operated to provide these services.

There is insufficient capacity within the existing Illawarra water and wastewater systems to accommodate the expected demands from developing the WDURA and AGAs up to 2048. Sydney Water is responsible for providing water and wastewater services to the Illawarra Region to address this deficiency. In 2008 Sydney Water prepared an ISS to deliver safe, reliable and sustainable water and wastewater services for the WDURA and AGAs (refer to Section 2.3.1).

The ISS proposes using uncommitted capacity within the existing water and wastewater systems that are operated under existing approvals and licences. Approval is not sought to operate the existing water and wastewater systems to the limits of their capacity as this is covered by existing approvals and licences (Water Board 1994, DUAP 2001, Sydney Water 2003a).

The Proposal includes water and wastewater pipelines that are generally 300 mm diameter or greater and these are referred to as trunk pipelines/infrastructure. Reticulation pipelines, consisting of pipelines generally smaller than 300 mm, connect customers to Sydney Water's trunk infrastructure and would be constructed and funded by developers. The key components of the Proposal are summarised in Table 3-1 and shown in Figure 3-1. Section 3.2 describes the existing water and wastewater systems to provide an overview of the context in which the Proposal would be undertaken.

The pipelines will be constructed to the WSAA Water Supply Code (WSSA 2002a) and Sewerage Code (WSSA 2002b) standards. Pipes will generally be laid in road corridors or private properties. The exceptions are reservoirs, pumping stations and larger wastewater pipelines. Reservoirs are generally located on top of a hill and larger wastewater pipelines are generally located in low lying drainage areas. Wastewater pipelines will be laid outside the natural creek lines unless crossings are required.

One of the aims of the Proposal is to limit environmental impacts by locating pipelines within existing and proposed developed areas. Locating infrastructure in areas such as road reserves generally has minor environmental impacts as the environment has typically been disturbed by construction of the road network and other urban infrastructure, such as electricity, gas and communications services.

As Sydney Water will refine construction method, location of infrastructure, and means of operating the water and wastewater systems during detailed design, approval is sought for:

- the Proposal to be located anywhere within the field assessment area described in Chapter 6
- the Proposal to be located outside the field assessment area where:
    - changes are consistent with the environmental objectives of the Proposal
    - environmental impacts are no greater than those described in this EA
    - no additional environmental mitigation measures are required.

3.1.1 Concept Approval

Sydney Water is seeking Concept Approval for all new trunk infrastructure required to service new development within the WDURA and AGAs to accommodate future population growth. Approval is required for all infrastructure within the new development areas as well as lead-in works that extend between the development areas and the existing systems. The components described in Section 3.3 and outlined in Table 3-1 are required to expand the existing water and wastewater systems. Sydney Water has existing approvals and licences to operate the existing infrastructure and this EA does not seek to revisit these approvals or licences.

Figure 3-1 shows the indicative location of the Proposal. Sydney Water has not yet determined the exact locations of pipelines, pumping stations and reservoirs. Further detailed planning and design of the infrastructure would take into account the environmental constraints and opportunities identified during preparation of this EA when determining final locations. The Proposal area would undergo significant urban development and a number of new roads are proposed and some existing roads would be upgraded or realigned. The detailed design and planning would also take into account the final layout of the road network.

Table 3-1 Key components of the Proposal

Water services	Key components
Drinking water	• five new reservoirs at three sites at Avondale, Calderwood and Marshall Mount • approximately 15 km of new pipelines from Illawarra WFP to the new reservoirs • approximately 65 km of new pipelines from the new reservoirs to the supply areas • upgrading approximately 3 km of existing pipelines from Dapto and Wongawilli Reservoirs • one new WPS at Calderwood • two new pressure reducing valves (PRV)
Wastewater	• approximately 45 km of new wastewater pipelines including 5 km of pressure pipelines • three new WWPSs in Yallah and Calderwood • upgrading three existing WWPSs • upgrading the existing Dapto Carrier • if required, amplifying the Wollongong WRP and Shellharbour WWTP.

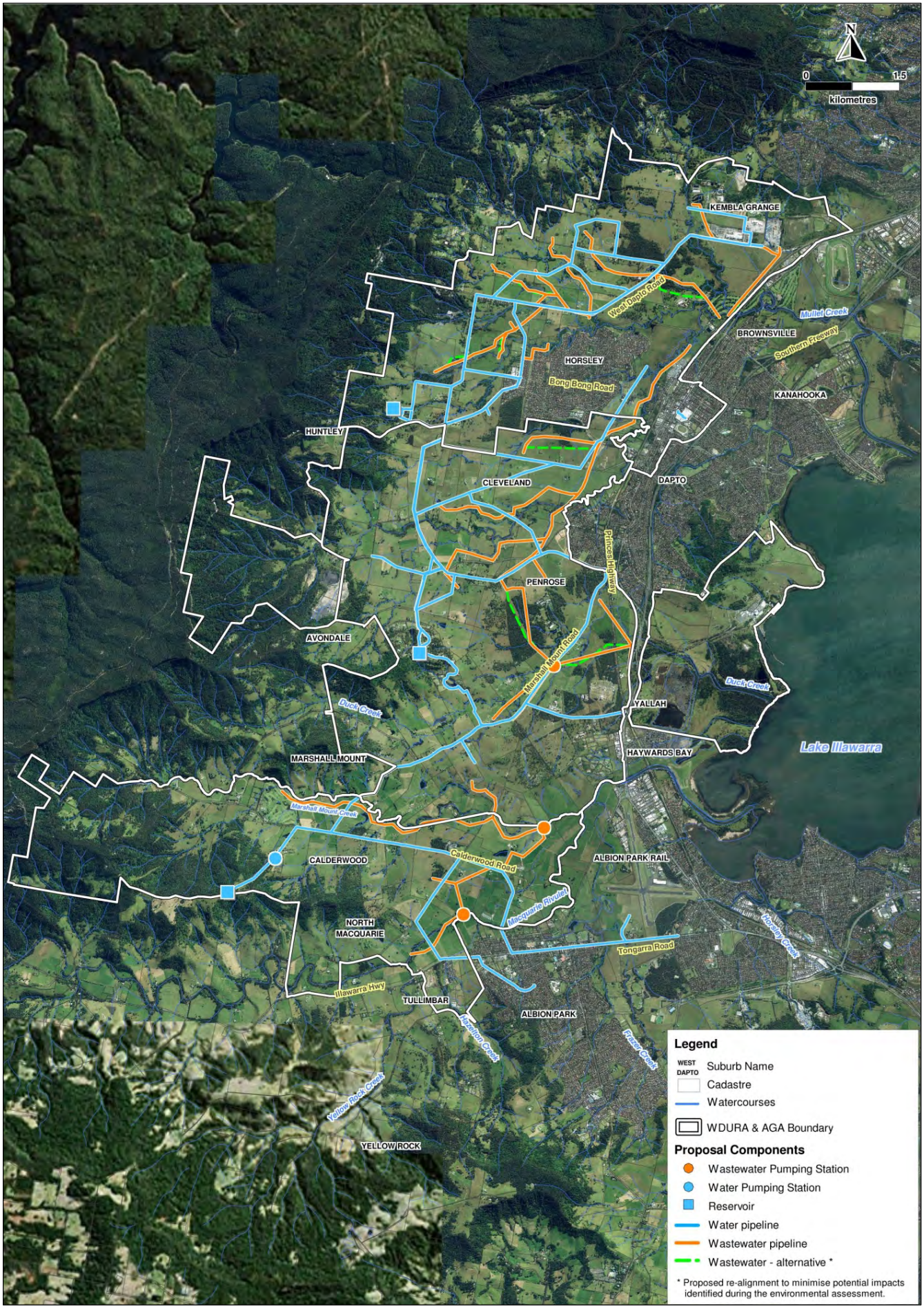

Figure 3-1 Indicative location of Proposal components

3.1.2 Project Approval

Sydney Water is seeking Project Approval for infrastructure outlined in Table 3-2. This infrastructure is required to provide water and wastewater services to the early release areas of WDURA, including the Kembla Grange, Sheaffes/Wongawilli and West Horsley Precincts. These areas were rezoned for residential development in May 2010. In addition to this infrastructure, Project Approval is sought to construct the reservoirs and pipelines for the Marshall Mount Reservoir site. Figure 3-2 shows the indicative locations of the infrastructure for which Project Approval is sought.

Table 3-2 Proposal components requiring Project Approval

Water services	Proposal components
Drinking water	• Avondale Reservoirs (2) • Marshall Mount Reservoirs (2) • approximately 45 km of new and upgraded drinking water pipelines in Kembla Grange, Sheaffes/Wongawilli, West Horsley, Cleveland and parts of Avondale
Wastewater	• approximately 25 km of new wastewater pipelines in Kembla Grange, Sheaffes/Wongawilli, West Horsley and parts of Cleveland • upgrading one existing WWPS (WWPS1007 Kembla Grange).

3.1.3 Proposal staging

The Proposal will be staged to meet the:

- land release sequencing set by the DP&I
- councils and developer's timing and staging requirements
- connection requirements.

The first stage involves delivering the infrastructure outlined in Table 3-2 to service the rezoned areas.

Additional infrastructure is likely to be delivered every five to ten years. The timing and scope of future stages is dependent on development rates, demand for housing, and detailed modelling. As such, detailed construction timeframes for subsequent stages cannot be determined at present. Sydney Water will continue to consult with relevant planning authorities and adjust the scope and timing of new stages as necessary.

3.1.4 Description of land

Some public and private land will be affected in and adjacent to the WDURA and AGAs. Easements for the pipelines across some lands would be acquired as necessary. Where possible pipelines would be positioned within cleared areas including roads and other easements to minimise the impact on private property.

Land will be acquired for the entire Calderwood WPS and Calderwood Reservoir site. Sydney Water currently owns land for the Avondale and Marshall Mount Reservoirs, but would need to buy additional land.

The Proposal area will undergo a significant transformation with the development of the WDURA and AGAs, as a result of other development activities including road widening, residential subdivision, and development of town centres and industrial land. This could change the number of properties affected by each stage of the Proposal.

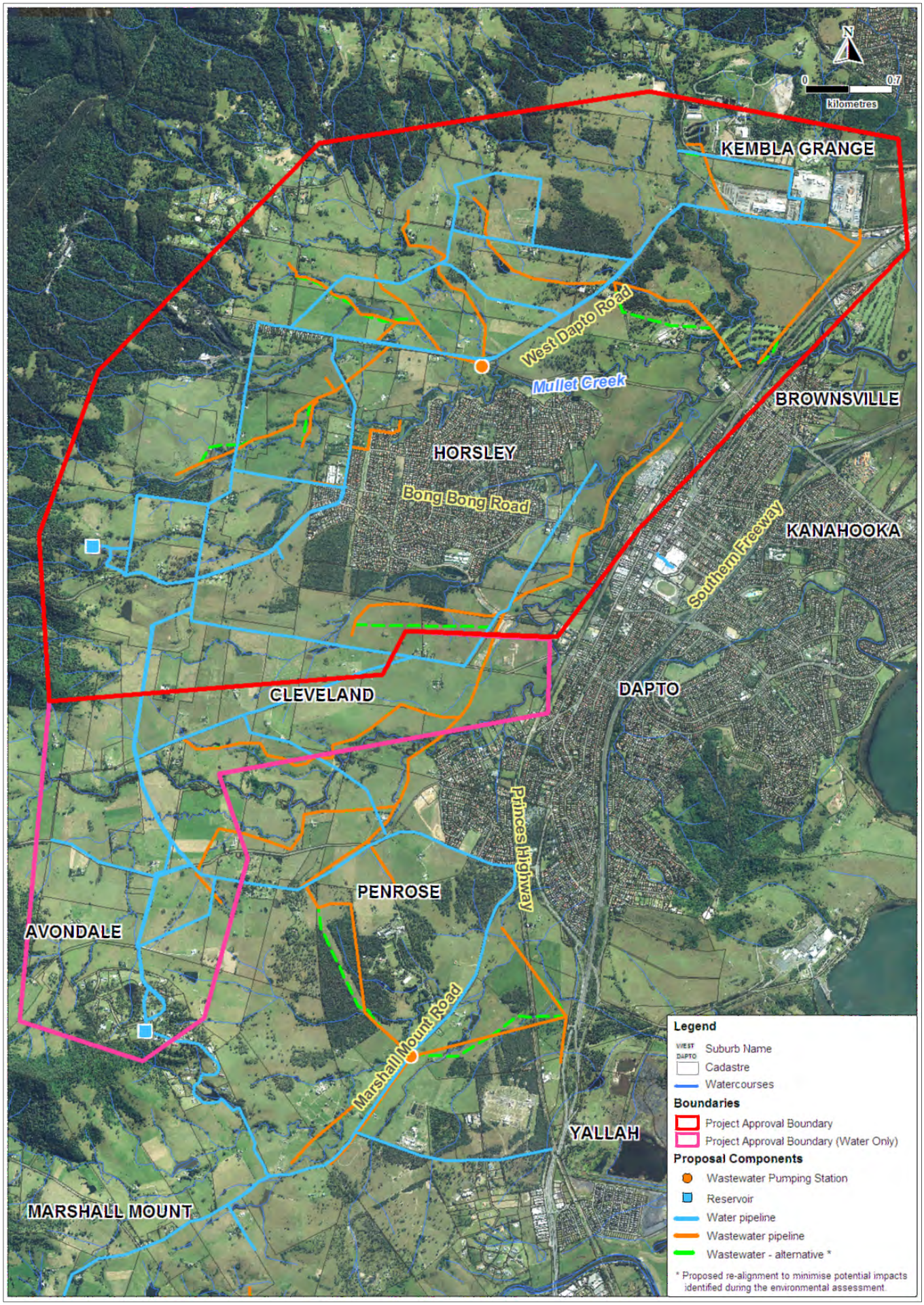

Figure 3-2 Indicative location of Project Approval components

3.2 Existing water and wastewater systems

This section describes the existing water and wastewater systems to be expanded by the Proposal. As these existing systems operate under existing approvals, they do not form part of the Proposal for which approval is sought under Part 3A of the EP&A Act.

3.2.1 Existing water infrastructure

The existing Illawarra water supply system obtains raw water from Avon Dam. Water is pumped from Avon Dam to Illawarra WFP for treatment, prior to being pumped to a number of distribution reservoirs in the southern and northern region of the Illawarra Water Supply System. The reservoirs include Dapto, Berkeley, Mt Keira, Mangerton and Wongawilli. Dapto Reservoir is the major servicing reservoir adjacent to WDURA and the AGAs and supplies water to Albion Park, Oak Flats, Kiama and Jamberoo. Berkeley Reservoir is the largest reservoir in the system with a capacity of 100 ML, which acts as a buffer storage for the entire system. The existing water infrastructure is shown in Figure 3-3.

3.2.2 Existing wastewater infrastructure

Sydney Water's existing wastewater systems in the Illawarra Region affected by the Proposal are the Wollongong, Port Kembla and Shellharbour wastewater systems. Sydney Water holds environment protection licences (EPL) under the POEO Act for these systems. The Wollongong and Port Kembla systems operate under EPL number 218 and the Shellharbour system operates under EPL number 211. Figure 3-4 shows the extent of the existing wastewater catchments for each system.

The treatment process at the Bellambi WWTP is not described as it is not affected by the Proposal.

Wollongong WRP

Wollongong WRP serves about 200,000 people in Wollongong and surrounding suburbs, treating about 43 ML/d. The plant recycles about 22 ML/d that is sold to industry. The remaining treated and disinfected wastewater is discharged to the ocean via an approximately 1 km pipeline. The Wollongong WRP process flow diagram is shown in Figure 3-5.

Wollongong WRP has approval to treat 59 ML of wastewater per day (DUAP 2001). The WRP currently treats about 43 ML/day, indicating that there is about 16 ML/day spare capacity for future growth.

Wastewater from Bellambi WWTP and Port Kembla WWTP is pumped to Wollongong WRP for treatment, reuse and disposal via the 1 km ocean outfall. During wet weather, Bellambi and Port Kembla WWTP store excess wastewater that cannot be treated at Wollongong WRP. When storages are full, Bellambi and Port Kembla WWTP treat the wastewater and discharge to the ocean.

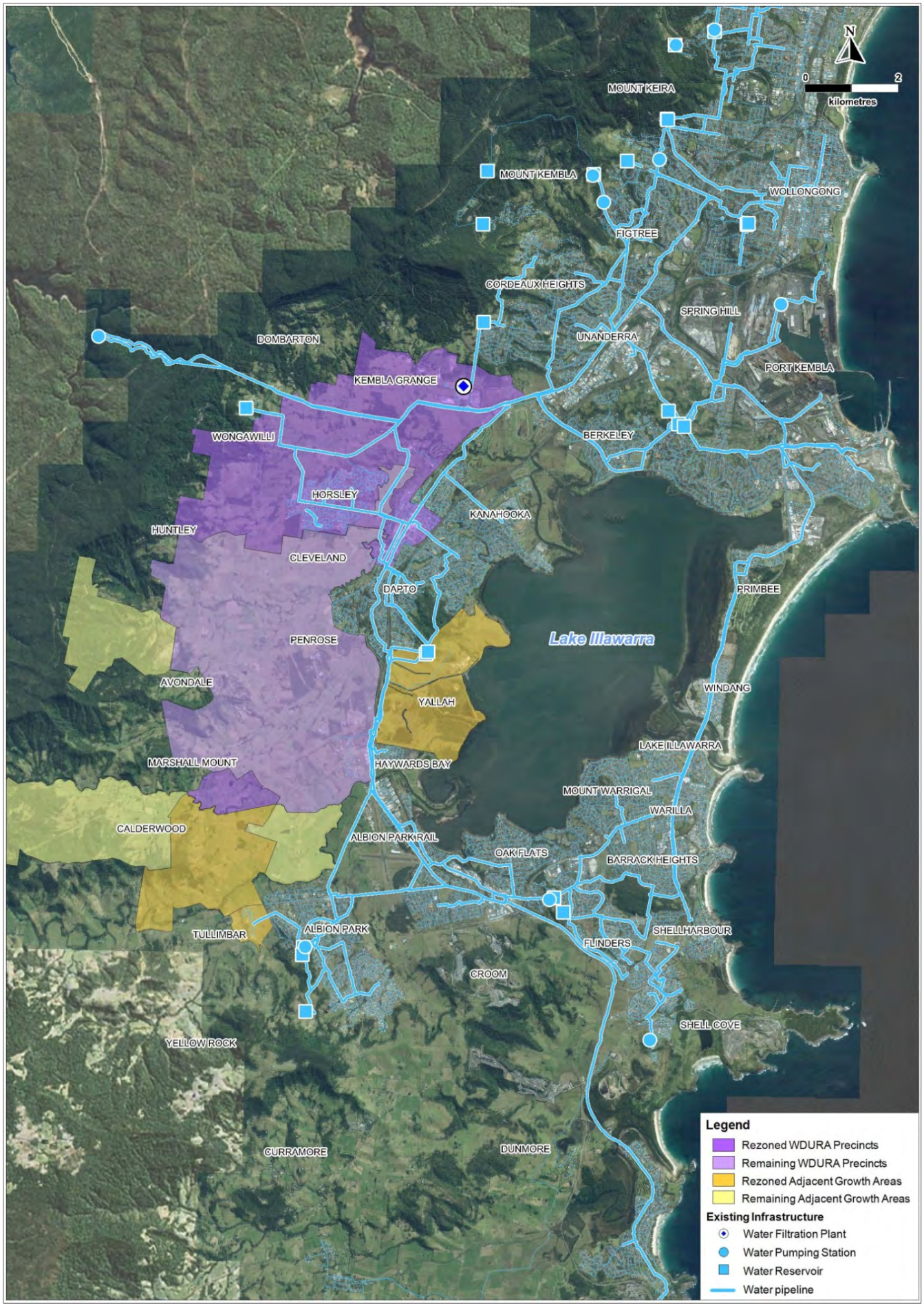

Figure 3-3 Existing trunk water infrastructure

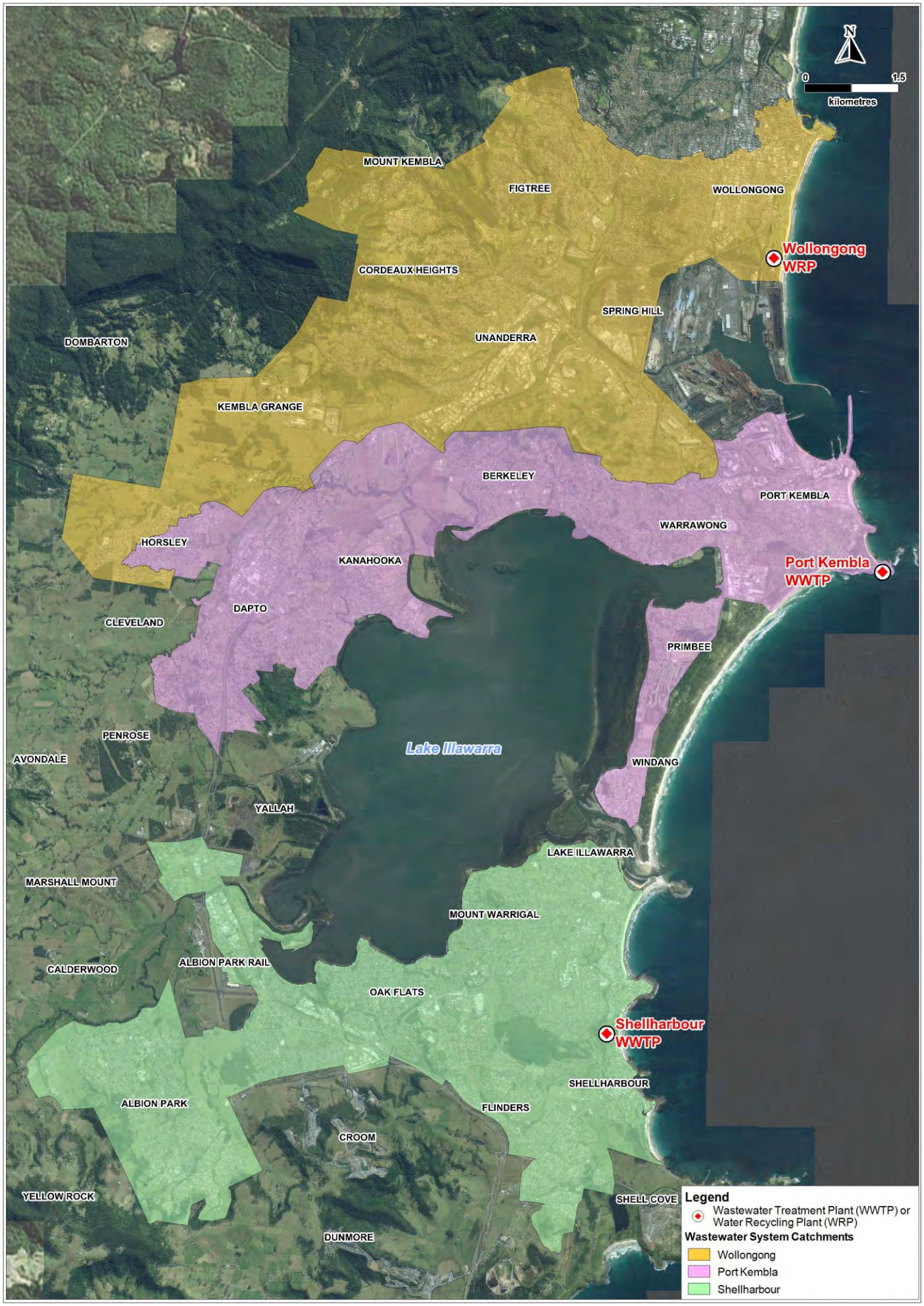

Figure 3-4 Existing wastewater catchments for treatment

Treatment process

Wollongong WRP has a tertiary treatment process that removes inorganic compounds, including nitrogen and phosphorus. The design wet weather treatment capacity of Wollongong WRP is 3700L/s, of which 2050L/s receives full tertiary treatment. Excess wet weather flow up to 1650 L/s receives fine screening, Actiflo treatment and disinfection before discharge to the ocean to comply with the EPL conditions.

The main stages in the treatment process are shown in Figure 3-5 and include:

- Inlet – the inlet to the plant receives flows pumped from the Wollongong, Bellambi and Port Kembla catchments
- Screening – mechanical 5 mm fine screens separate and remove fine inorganic material. The screenings are collected, washed and compacted before being stored in bins and removed from site
- Grit removal – grit is removed from all flows
- Actiflo treatment - solids are pumped to the gravity thickener. This process treats all wet weather storm flows to a secondary standard
- Primary sedimentation - primary sedimentation tanks treat dry weather flows from Bellambi and Wollongong catchments. Multiflow process uses lamella plate sedimentation to treat flow from the Port Kembla catchment. The settled solids drain to a settled wastewater collection channel. The treated wastewater flows to the secondary treatment tanks
- Secondary treatment – this uses Conventional Activated Sludge and Biological Nutrient Removal processes to remove phosphorus and nitrogen
- Tertiary Filtration - Deep bed gravity filters are used to filter wastewater from the secondary treatment facilities
- Disinfection - Disinfection is carried out using ultraviolet radiation and operates automatically to achieve the required wastewater quality
- Recycled water treatment process - The Wollongong WRP produces recycled water for use at Bluescope Steel. Recycled water may be supplied to other users in the future. The recycled water process involves microfiltration, reverse osmosis, chemical conditioning and cleaning, hypochlorite and ammonia dosing and chlorine contact
- Ocean outfall system - A portion of the treated wastewater product is recycled within Wollongong WRP for wash down purposes. The rest is discharged via a 1 km ocean outfall. There is an additional ocean outfall that is used in emergency situations to discharge flows to the ocean approximately 200 m from the site
- Biosolids treatment - Biosolids are treated by gravity thickening, thickening the waste activated solids in a centrifuge, anaerobic digestion, and solids dewatering. The Biosoil® product is then stored and sent off site.

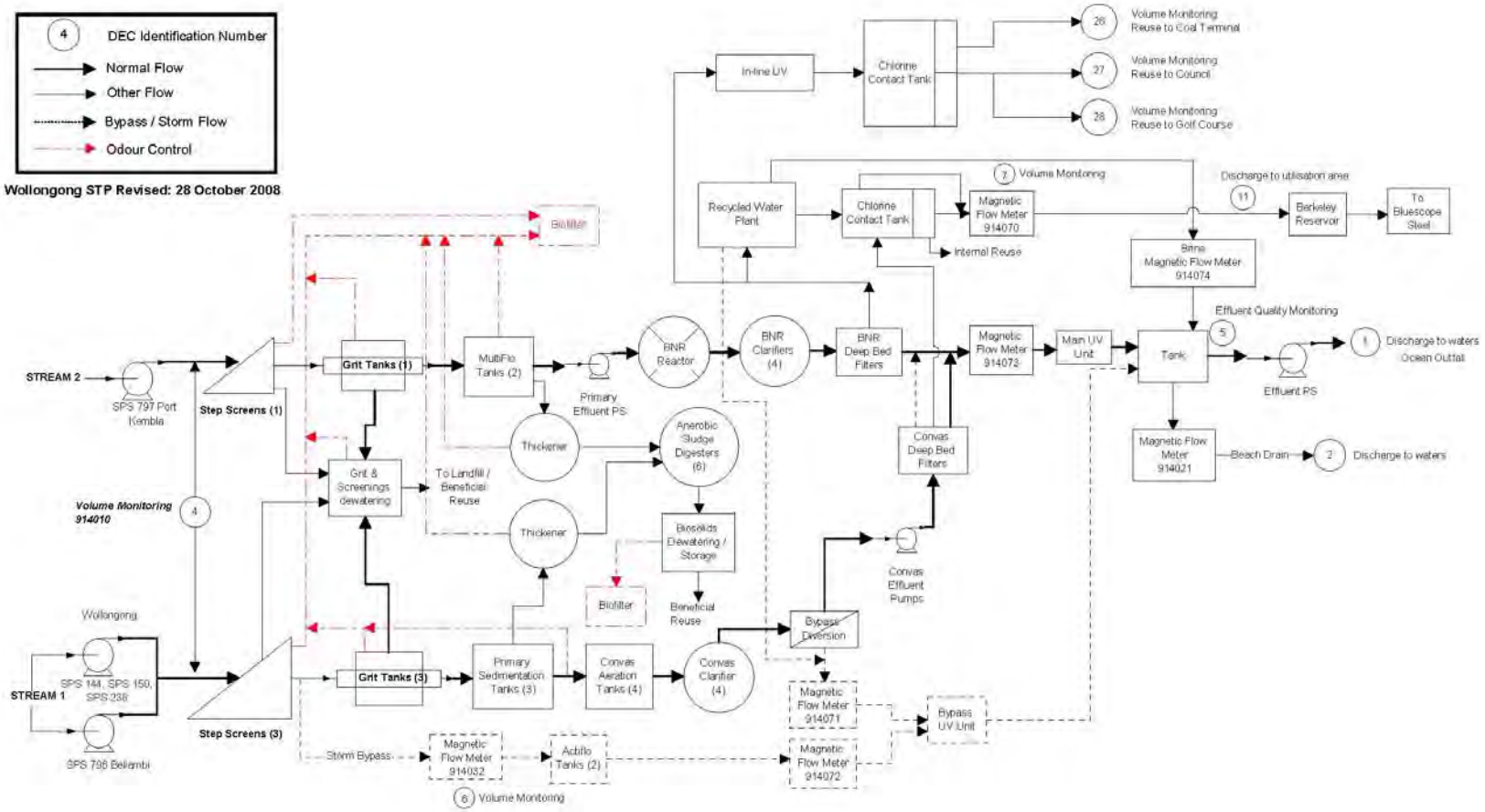

Figure 3-5 Wollongong WRP process flow diagram

Wollongong WRP EPL requirements

The Wollongong WRP operates under EPL 218, issued by EPA, and in accordance with the *Australian Guidelines for Water Recycling* (NRMMC, 2006). The EPL sets treatment requirements that limit the concentration and loads of discharges and the overflow frequencies.

Wollongong WRP has two licensed ocean outfall discharge points as indicated in Figure 3-5. Point 1 is an ocean outfall that discharges approximately 1 km to the east of Wollongong WRP and Point 2 is an emergency discharge ocean outfall located 200 m from the plant. The EPL sets a daily limit on the volume of effluent that that can be discharged from each of these points. The EPL also sets limits on the concentration of substances that can be discharged in the effluent. In addition, limits are placed on the load (ie mass) of the substances that can be discharged during each reporting period (one year).

The EPL specifies that wet weather overflow performance must not exceed 43 overflows in any 10-year period for the Wollongong Wastewater System up until June 2013. After June 2013, the EPL specifies that future wet weather overflow performance must not exceed 40 events in any 10 year period. Dry weather overflow events reaching waterways must not exceed 26 events per reporting period.

Port Kembla WWTP

Port Kembla WWTP operates under the Wollongong WRP EPL 218. It is located on land that is leased from the Australian Commonwealth Government.

In dry weather, up to 590 L/s of wastewater is pumped from Port Kembla WWTP to Wollongong WRP. When the inflow exceeds 590L/s, flows are held at Port Kembla WWTP for storage. When the storage is full, flows are treated and discharged to the ocean at Red Point. All flows less than 714 L/s are screened and disinfected as shown in Figure 3-6. Flows more than 714L/s are partially disinfected. Stored wet weather flows are pumped back to WWPS797 and then transferred to Wollongong WRP when capacity becomes available.

Shellharbour WWTP

Shellharbour WWTP is located on Junction Road, Shellharbour. The WWTP serves Albion Park, Albion Park Rail, Blackbutt, Balarang, Barrack Heights, Barrack Point, Flinders, Lake Illawarra South, Mount Warrigal, Oak Flats, Warilla, Shellcove and Shellharbour. Figure 3-4 shows the Shellharbour WWTP catchment area.

Shellharbour WWTP is a secondary treatment plant servicing a population of 65,600. The plant was amplified in 2006 and has an approved capacity of 20 ML/d (Sydney Water 2003a). Currently, 14 ML/d of wastewater is treated, allowing for 6 ML/d extra capacity for future growth. Treated flows are discharged to the ocean via a 130 m long ocean outfall. In emergencies flows are discharged to Barrack Swamp.

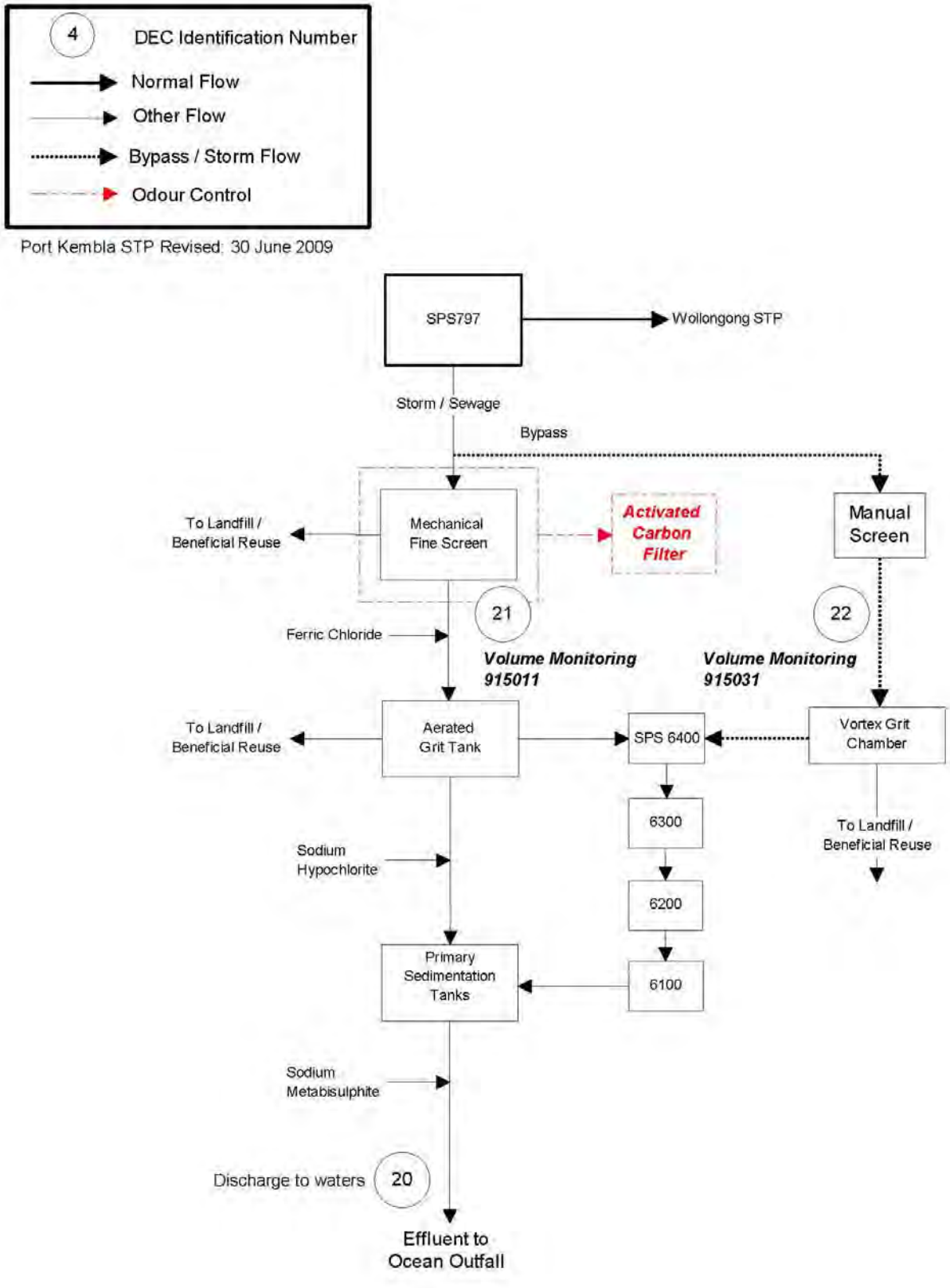

Figure 3-6 Port Kembla WWTP process flow diagram

Treatment process

Shellharbour WWTP treats water to a secondary level and removes solids, oil, grease, organic solids and inorganic solids. The treatment process is outlined in Figure 3-7 and includes:

- Inlet - wastewater is pumped to the plant inlet via WWPSs and pipelines
- Screening – mechanical 5 mm fine screens separate and remove fine inorganic material. The screenings are washed, dewatered and placed in bins, prior to being transported to the SITA Badgers Creek landfill
- Grit removal – grit is removed and transported to the SITA Badgers Creek landfill with the screenings
- Primary treatment - solids, oil and grease are removed from the wastewater in the primary treatment facility
- Secondary treatment – this involves Conventional Activated Sludge and Modified Ludzack-Ettinger processes to remove nutrients from wastewater
- Disinfection - chlorine is used for disinfection
- Ocean outfall system - Shellharbour WWTP discharges treated wastewater to the ocean via a 130 m long outfall. Up to 38 ML/d can be discharged through the ocean outfall under gravity
- First flush stormwater - A first flush stormwater system collects runoff from the first 10 mm of rainfall from most of the plant area. This is temporarily stored in a basin and pumped to the plant inlet for treatment once wastewater flows reduce
- Flow attenuation basin - Overflows are contained in two basins. The stored flow is pumped back to the inlet for treatment during low flow periods. During severe wet weather conditions when the storage reaches its capacity, all flow is directed to the disinfection facility. The bypass flow mixes with the treated wastewater before being chlorinated/dechlorinated and discharged via the outfall at Barrack Point
- Biosolids treatment - Biosolids treatment involves gravity thickening, centrifuge thickening the waste activated solids (WAS), anaerobic digestion and solids dewatering. The Biosoil® product is then stored and sent off site for beneficial use/reuse.

Shellharbour WWTP EPL requirements

Shellharbour WWTP operates under EPL 211. Under the license, all flows up to 630 L/s require full treatment. This includes screening, de-gritting, primary and activated solids treatment. Flows that exceed 630L/s (up to 2700L/s) must receive screening, de-gritting and primary sedimentation. There are three licensed discharge points in the EPL, the 130 m ocean outfall (Point 1 in Figure 3-7) the outfall to Barrack Swamp (Point 2) and the tanker reuse point near the disinfection area (Point 19). The EPL sets treatment requirements that specify such things as:

- the volume of wastewater that can be discharged
- limits for the concentration and loads of discharges
- the number of overflows.

The EPL specifies that wet weather overflow performance must not exceed 45 overflows in any 10-year period for the Shellharbour Wastewater System. Dry weather overflow events reaching waterways must not exceed 4 events per reporting period.

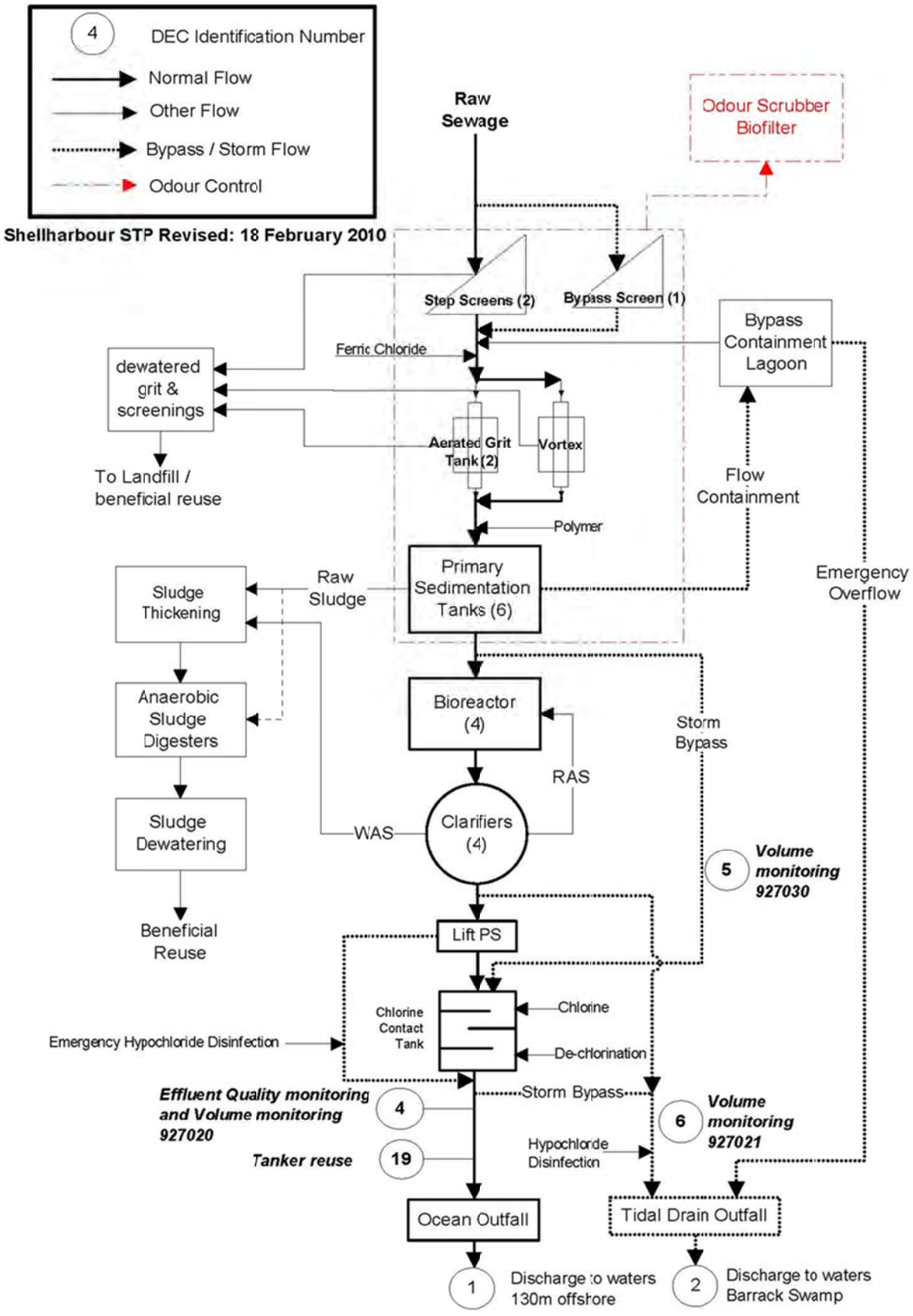

Figure 3-7 Shellharbour WWTP process flow diagram

3.3 Components of the Proposal

3.3.1 Drinking water infrastructure

Overview

The Proposal would expand the existing water supply system and this requires additional reservoirs, pumping stations, water pipelines and pressure reducing valves. Table 3-3 summarises the proposed water infrastructure that forms part of the Proposal. Figure 3-8 provides an indicative layout of the proposed water infrastructure and identifies components for which Concept Approval and Project Approval are sought. Table 3-2 summarises components requiring Project Approval.

The Proposal does not include reticulation pipelines that are generally smaller than 300 mm diameter. Reticulation pipelines supply water directly to customers and would be constructed by developers.

Table 3-3 Summary of proposed water infrastructure

Infrastructure component	Details
Five new reservoirs	• Avondale (20 ML and17 ML) • Marshall Mount (two 15 ML reservoirs) • Calderwood (4 ML elevated)
One new WPS	• one new WPS to pump water from Marshall Mount Reservoir to Calderwood Reservoir
New drinking water pipelines	• approximately 15 km of pipelines from Illawarra WFP to five new reservoirs • approximately 65 km of pipelines from the five new reservoirs to WDURA and AGAs
Upgrade existing water pipelines	• approximately 3 km of existing water pipelines from Dapto and Wongawilli Reservoirs
Pressure reducing valves	• two pressure reducing valves on the water pipelines

Water source and treatment

Water will continue to be sourced from Avon Dam and treated in the Illawarra WFP. The Illawarra WFP has sufficient capacity to service the entire WDURA and AGAs up until 2038. Reducing water demand, implementing process improvements and increasing system capacity would enable the Illawarra WFP to service the WDURA and AGAs until 2048.

Reservoirs

Treated drinking water would continue to be delivered to the existing Wongawilli, Oak Flats, Mount Terry and Albion Park Reservoirs. The Proposal has been designed to minimise the volume of water obtained from Dapto Reservoir to reduce the need to upgrade pipelines from the WFP to the southern reservoirs. The existing reservoirs would supply Sheaffes/Wongawilli, West Horsley, Kembla Grange, Dapto Town Centre, Yallah/Marshall Mount and Tullimbar Village.

The existing reservoirs servicing the WDURA and AGAs have sufficient spare capacity to cater for growth up until 2021. New reservoirs would be required by 2021 to meet demands beyond this date. The timing of delivery will depend on development sequencing, development rates and demand for future services.

New reservoirs would be provided on elevated locations at Avondale, Marshall Mount and Calderwood. The Avondale Reservoirs (20 ML and 17 ML) are likely to service Avondale, Bong Bong Town Centre and Cleveland. Marshall Mount Reservoirs (two 15 ML reservoirs) are proposed to supply water to Marshall Mount and Huntley. Calderwood Reservoir (4 ML) would supply Calderwood.

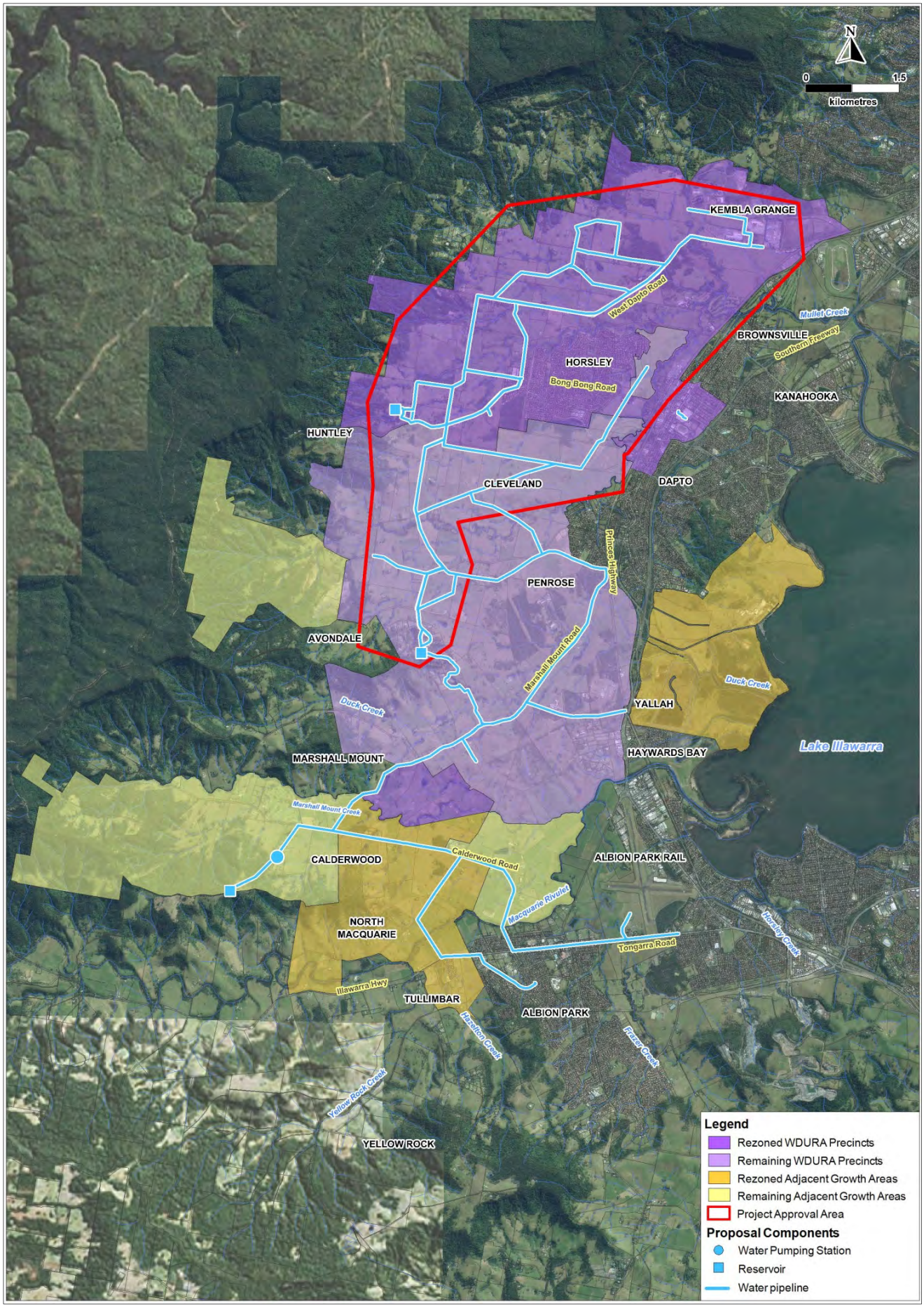

Figure 3-8 Indicative location of proposed water infrastructure

The indicative locations of the new reservoirs are shown in Figure 3-8. Ancillary facilities likely to be required for the reservoirs may include:

- chlorine dosing facilities, including a chlorination tank
- connecting pipelines
- switchroom, controls and telemetry
- a discharge pipeline to the nearest waterway
- sealed access road.

Water pumping stations and pressure reducing valves

One new WPS would be required in the Calderwood Precinct to pump water from Marshall Mount Reservoir to Calderwood Reservoir. The pumping station is expected to have variable speed pumps, motors and starters housed in an above-ground brick structure. Inlet and outlet pipe work, and valves are likely to be incorporated both inside and outside the structure. Switchrooms, controls and telemetry, a transformer/substation, and an access road would be provided.

Two pressure reducing valves (PRVs) are likely to be required in Dapto and Wongawilli. PRVs reduce downstream pressure to minimise water use, and the potential for leakage and pipe breakage and would contribute to the sustainable operation of the system (WSAA 2002a). A PRV installation consists of a small kiosk approximately 1.0 m high x 1.0 m wide x 0.5 m deep and a valve chamber approximately 1.8 m x 1.5 m. The kiosk houses local controls and telemetry. The pressure reducing valves are buried under a road shoulder or footpath. The only visible section of the valve is likely to be 6 or 8 cast iron covers over the valve chamber and the kiosk.

Drinking water pipelines

Approximately 80 km of the water pipelines would be constructed. The indicative location of the new drinking water pipelines is shown in Figure 3-8. The pipes are likely to be ductile iron cement mortar lined pipes or mild steel cement lined pipes. Both materials comply with the Water Supply Code of Australia 2002 (WSAA 2002a). These pipes have a relatively long life span if operated and maintained correctly (WSAA 2002a).

Approximately 3 km of existing water pipelines from the existing Dapto and Wongawilli Reservoirs would need to be upgraded. This would involve replacing existing sections of pipeline with a larger diameter pipe to increase the supply.

The majority of drinking water pipelines are likely to be located in existing or future road verges and pathways. The remainder would be laid in drainage reserves or private property. Where practicable, drinking water pipelines within future road verges are proposed to be constructed at the same time as the NSW Roads and Maritime Services (RMS) and/or Wollongong City Council are constructing their roads. Wollongong City Council provided the proposed layout of the future road network for the WDURA and AGAs and it is planned to locate the pipelines within these alignments. It is likely that the road layout will change as the design progresses, in which case the location of drinking water pipelines will also be amended to match the alignment of the roads.

Ancillary components for drinking water

Ancillary components for drinking water pipelines would include scour valves, scour lines and air valves. Scour valves would be located at low points along the pipelines to allow the pipes to be drained for maintenance and repairs. Gravity scour lines would connect the scour valves to the nearest creek or stormwater drainage system. Pump scours, consisting of a scour valve and chamber, would be located where water is unable to be directly drained under gravity. Air valves would be constructed at high points along the pipelines to admit or release air when draining or recharging the pipelines and to allow air to escape during operation. Pressure reducing valves would be required at various locations along the drinking water pipeline to maintain adequate water pressure for customers.

Other ancillary components include hydrants and stop valves. Hydrants would be located at the ground surface at regular intervals along the drinking water pipelines. The principal purpose of hydrants is to allow pipelines to be flushed. Pipeline flushing would be carried out during commissioning and also during operation after pipelines are repaired or if water quality problems are reported. Hydrants may also be used as temporary tanker filling points to maintain water supply to customers in the event of incidents such as pipeline breaks. Hydrants are also accessed for fire fighting purposes. Water pressure monitoring on pipelines may be carried out by temporarily attaching data loggers to the hydrants.

Stop valves would be located at the ground surface at various points along the drinking water pipelines to allow an area to be isolated if there are events such as pressure problems or pipeline breaks.

3.3.2 Wastewater infrastructure

Overview

Sydney Water's existing wastewater systems in the Illawarra Region include the Wollongong, Port Kembla, Bellambi and Shellharbour wastewater systems. Sydney Water holds EPLs under the POEO Act for these systems. The Wollongong, Bellambi and Port Kembla systems operate under EPL number 218 and the Shellharbour system operates under EPL 211. The EPLs have different monitoring and reporting requirements and overall compliance with the EPLs, including compliance with monitoring and reporting requirements, is provided to the EPA in annual reports.

The existing systems do not have sufficient capacity to service all the new development. The Proposal involves expanding the existing Wollongong, Port Kembla and Shellharbour wastewater systems by constructing new wastewater pipelines and WWPSs, as well as upgrading existing wastewater pipelines and WWPSs. Wastewater would be transported to the Wollongong WRP and Shellharbour WWTP and treated in accordance with the EPLs, prior to being discharged to the ocean.

Table 3-4 summarises the proposed wastewater infrastructure that forms part of the Proposal. The wastewater infrastructure would also incorporate other ancillary facilities. Figure 3-9 provides an indicative layout for the new wastewater infrastructure to show how it is integrated into the existing wastewater system. This figure also identifies components for which Concept Approval and Project Approval is sought. Table 3-2 summarises components requiring Project Approval.

Table 3-4 Summary of proposed wastewater infrastructure

Infrastructure components	Details
Three new WWPSs	• Yallah (1) • Calderwood (2)
Upgrade three existing pumping stations	• WWPS1007 – additional pump capacity and emergency storage • WWPS500 – additional emergency storage • WWPS238 – additional emergency storage
New wastewater pipelines	• approximately 45 km of wastewater pipelines including 5km of pressure pipelines
Upgrade existing wastewater pipelines	• a parallel wastewater pipeline constructed next to the existing Dapto Carrier
Amplify existing treatment plants	• if required, amplify the Wollongong WRP and Shellharbour WWTP

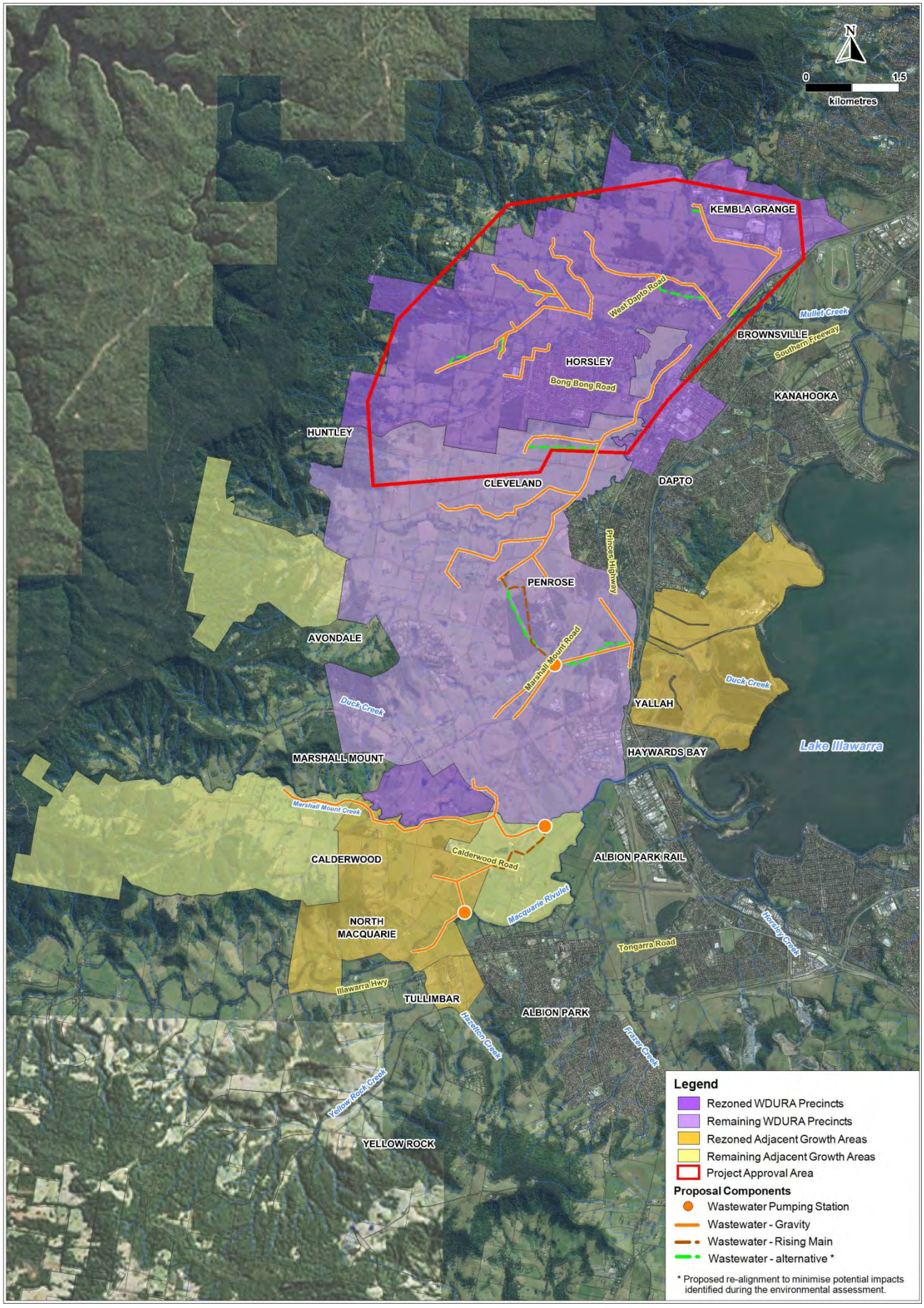

Figure 3-9 Indicative location of proposed wastewater infrastructure

Wastewater treatment systems

Treatment plant upgrades

Average dry weather flows

Wastewater from the WDURA and AGAs will be treated at the existing Wollongong WRP and Shellharbour WWTP. The existing treatment process at these plants is described in Section 3.2.2. The Wollongong WRP and Shellharbour WWTP have sufficient capacity to treat the anticipated wastewater flows from WDURA and the AGAs until 2031. As indicated in Table 3-5, based on system modelling it is predicted that dry weather wastewater flow to Wollongong WRP and Shellharbour WWTP from WDURA and AGAs would exceed existing capacities before 2048. A 5 per cent increase in the dry weather treatment capacity at Wollongong WRP and a 10 per cent increase in the dry weather treatment capacity at Shellharbour WWTP would be required to accommodate development by 2048.

Wollongong WRP has limited land for upgrades due to the adjacent golf course. Shellharbour WWTP has available land for future capacity upgrades.

Sydney Water would consider the following upgrade options to accommodate the expected growth:

- improving the process at Wollongong WRP to increase capacity
- upgrading the existing facilities at Shellharbour WWTP.

The Wollongong WRP and Shellharbour WWTP currently treat wastewater flows from within their catchments that are the equivalent of 150 L/person/day. Sydney Water will consider the need to upgrade the WRP and WWTP as a part of detailed system modelling. Sydney Water is seeking Concept Approval for the upgrades and these would be undertaken as a future stage of the Proposal, if required.

Upgrades at the treatment plants could use small membrane bioreactor (MBR) process units of 2 to 3.2 ML/day capacities. MBRs remove nitrogen (including ammonia) and phosphorus through chemical dosing. With appropriate nutrient removal facilities, these units would produce tertiary filtered wastewater. The quality of the treated water would be similar to that currently produced by the biological nutrient removal process stream at Wollongong WRP. These units occupy a smaller land area than conventional activated sludge technologies.

The upgrades are unlikely to be required prior to 2031 and investigations would be undertaken closer to this time to select the preferred treatment technologies. Further environmental impact assessment would then be undertaken to consider construction and operational impacts prior to the upgrades being carried out.

Table 3-5 Shellharbour WWTP and Wollongong WRP existing and future treatment capacities

WRP/WWTP	Average Dry Weather Flow (ADWF) Capacity (ML/day)	2009 ADWF (ML/day)	ADWF to 2048 (ML/day)			2048 Deficit (ML/day)
			Infill Growth	WDURA and AGAs	Total	
Wollongong	59	43	8	11.2	62.2	3.2
Shellharbour	20	14	3.1	5.1	22.2	2.2

Peak wet weather flows

The peak wet weather flows (PWWF) following ultimate development of the WDURA and AGAs is expected to be within the treatment capacity and licensing limits for Wollongong WRP and Shellharbour WWTP. The three-month design storm event was used, as this corresponds approximately to the long-term target overflow rate in the EPL for these catchments. No upgrades to existing facilities are likely to be required to accommodate wet weather flow loading.

Wet weather partial treatment and bypass events

During extreme wet weather events, high flows in Wollongong WRP, Shellharbour WWTP and Port Kembla WWTP may miss treatment stages (a bypass) or exceed the disinfection capacity (a partial treatment). Flows may also discharge via emergency outfalls as detailed in Section 3.2.2. Modelling indicates that during development of the Proposal up to 2048, no additional wet weather bypass/partial treatment events are anticipated at Wollongong WRP and Shellharbour WWTP.

The capacity of the disinfection units at Port Kembla WWTP has been designed so that there are no more than 40 partial treatment events in a 10 year period. This is a condition of the EPL. It is predicted that this frequency will be exceeded sometime after 2031, as shown in Table 3-6. Sydney Water continually monitors the system performance as part of the EPL and will consider upgrading the Port Kembla WWTP if necessary to meet EPL conditions. The potential need for an upgrade would be reassessed by comparing modelled flows against actual flows as development proceeds. The Proposal does not include the potential upgrade of the Port Kembla WWTP. If the upgrade is require, it would be subject to a separate approval process.

Table 3-6 Anticipated wet weather partial treatment events at Port Kembla WWTP

Growth Scenario	Partial treatment frequency (events in a 10 year period)	Volume (ML/year)
Existing	32	160
2016	35	178
2021	37	191
2031	40	218
2048	47	262

Indicative wastewater catchments

Table 3-7 summarises details of the existing carriers that are likely to be used to transfer flows from wastewater catchments in WDURA and AGAs to Wollongong WRP and Shellharbour WWTP. These trunk wastewater pipelines have sufficient spare to accommodate growth in WDURA and the AGAs.

Approximately 75 per cent of the wastewater flows from WDURA and the AGAs would be transferred to Wollongong WRP via the Coniston and Berkeley Carriers. Flows from Calderwood, Tullimbar Village and the southern part of Yallah would flow to the Shellharbour WWTP.

Table 3-7 Wastewater catchments in WDURA and AGAs

Wastewater Catchment	Main wastewater carrier	Treatment Plant
West Horsley and Sheaffes/ Wongawilli (part)	Existing Coniston Carrier	Wollongong WRP
Kembla Grange and Sheaffes/ Wongawilli (part)	Existing Berkeley Carrier	Port Kembla WWTP- flows to Wollongong WRP for treatment
Dapto Town Centre, Cleveland, Avondale, North Yallah	Existing Dapto Carrier and Berkeley Carrier	Port Kembla WWTP - flows to Wollongong WRP for treatment
South Yallah, Tullimbar Village, Calderwood, Calderwood Valley	Existing Oak Flats sub-main	Shellharbour WWTP via Calderwood

Wastewater pipelines

The Proposal includes approximately 45 km of new wastewater pipelines as indicated in Table 3-4 and Figure 3-9. The new pipelines will connect to the three new pumping stations.

Conventional wastewater pipelines can receive high levels of water infiltration due to leaking pipe joints and property connections. The Proposal would use leak tight wastewater pipelines that significantly reduce wet weather inflow by using systems such as a fully welded polyethylene pipe. It is expected that these pipes would reduce inflow to no more than 1 per cent of rainfall ingress for up to 30 years after construction. Ongoing maintenance activities will target to preserve this level of performance over the life of the infrastructure. Relative to conventional pipelines, leak tight pipelines:

- reduce the potential for wet weather overflows
- reduce the cost of treatment and improve treatment plant performance
- reduce the size of the pipeline network
- reduce the volume of wastewater requiring treatment at the WWTP which in turn reduces electricity consumption.

The wastewater pipelines would generally be laid adjacent to drainage lines and creek lines to allow wastewater to be transported by gravity. Pressure mains transport wastewater using pumps when there is a need to transport the wastewater uphill. The use of pumps allows greater flexibility in locating the pipelines. Pressure mains can be laid within road reserves or in areas that avoid environmentally sensitive sites.

In accordance with guidelines set down by the WSAA (WSAA 2002b), where practicable, wastewater pipelines would be laid in the following locations:

- within the road reserve, in a location clear of the carriageway
- within public land, with the permission of the controlling authority
- within drainage reserves, outside the 1 in 100 year flood zone
- within private property, parallel to the front, rear, and/or side boundaries.

The wastewater pipelines would be designed to avoid the following locations as much as possible:

- National Parks, nature reserves, proclaimed reserves, State forests, stands of native vegetation
- habitats of threatened species
- steep slopes
- waterways and floodways
- wetlands, swamps, estuaries, sand dunes, foreshore areas
- bushland and vegetation communities
- heritage items and precincts
- Aboriginal objects, sites and places
- unstable areas subject to rock falls, slips and flows including areas steeper than 33 per cent grade
- aggressive ground conditions such as mining areas, acid sulfate soils and contaminated land, including suspected contaminated land
- landfill sites and mine subsidence areas.

If these areas cannot be avoided measures will be implemented to minimise impacts and manage potential issues.

Proposed pipeline realignments

When preparing the Concept Plan, Sydney Water identified some locations along the wastewater pipeline alignments where there are opportunities to revise the alignment to minimise environmental impacts. Indicative alternative alignments are identified and shown in Figure 3-9. Detailed design would consider the feasibility of implementing these alternative alignments and this would involve further environmental impact assessment as discussed in Section 3.4.

Wastewater pumping stations

Three new WWPS are proposed, two at Calderwood and one at Yallah. WWPSs require four hours (minimum) of emergency storage capacity under Sydney Water design criteria (Sydney Water 2008a). Estimated flows during operation of the system have been modelled and this indicates that the emergency storage capacity at three existing WWPS would need to be upgraded to account for growth in WDURA and the AGAs up to 2048.

Details of the new pumping stations and the existing pumping stations to be upgraded are shown in Table 3-4.

Wet weather overflow structures

Pipeline sizes and pumping station storage capacities have been designed to ensure the Proposal meets the EPL limits for wet weather overflows. The long term targets in the EPL for the Wollongong wastewater system limits wet weather overflows to 40 events per 10 year period. The Proposal would comply with the EPL frequency limits for wet weather overflow events for Wollongong WRP catchment.

The long term targets in the EPL for the Shellharbour wastewater system limits wet weather overflows to 45 events in a 10 year period. Two overflow points, within the Shellharbour wastewater system, are predicted to exceed EPL wet weather overflow limits beyond 2031. The overflow performance at these locations will need continual monitoring as growth progresses. Sydney Water is required to monitor and report on overflow performance as part of its EPL reporting requirements. Additional measures may be required in the future to maintain the overflow frequency within the EPL limits.

SewerFix Wet Weather Alliance is completing surcharge mitigation work for wet weather overflows in the wastewater systems discharging to Wollongong WRP and Port Kembla WWTP. This work, which is planned to be completed in 2015, will reduce surcharges and wet weather overflows from the Wollongong wastewater system.

Wet weather bypass structures

During extreme wet weather events, high flows in Wollongong WRP, Shellharbour WWTP and Port Kembla WWTP may be bypassed and discharged via emergency outfalls. No additional wet weather bypass events are anticipated at Wollongong WRP or Shellharbour WWTP due to the Proposal. Port Kembla WWTP may exceed the EPL limit for bypasses of the primary disinfection unit sometime beyond 2031. Sydney Water will monitor the system performance and will consider upgrading the Port Kembla WWTP if necessary to meet EPL conditions. If required, the upgrade of Port Kembla WWTP would be subject to a separate process to the Proposal.

Ancillary components of the wastewater system

Ancillary components that are required to enable the wastewater system to function effectively include maintenance structures, designed emergency relief structures, and vent shafts. Maintenance structures will be installed so wastewater pipelines can be inspected and maintained and these are usually placed at changes of level, pipeline direction and/or pipe size.

Vent shafts allow air to be admitted to the wastewater system to reduce the likelihood of wastewater turning septic or corrosive and causing offensive odours. Vent shafts also allow odours to be dispersed from the wastewater system. The number and location of vent shafts would be determined during detailed design. Each vent shaft would be a supported pipe up to 19 m tall and up to 0.3 m in diameter.

The location of maintenance structures will be determined during detailed design. Existing maintenance structures will be used where possible. Where new maintenance structures are required these will be located to minimise any environmental impacts.

3.4 Proposal phases

3.4.1 Pre-construction

Sydney Water's standard business practices involve undertaking route and location feasibility studies during detailed design. For the Proposal, these studies would consider site specific issues and could include, for example, geotechnical and contamination surveys, geomorphological assessments, identifying the location of existing underground services, condition surveys and other minor surveys and tasks required to optimise and finalise alignments, design and constructability.

The outcome of additional surveys or investigations would influence which watercourses are under bored and which are trenched. In general, it is anticipated that creek crossings would be under bored if the localities have features such as dynamic watercourses, perennial streams, highly erodible soils, and sensitive riparian corridors (including Category 1 waterways (refer to Section 6.5)). Trenching is likely to be preferred construction method to cross minor creeks that are shallow, ephemeral, highly disturbed and weed infested.

The design of watercourse crossings would consider the potential for the bed and banks of watercourses to scour and migrate as this would influence the depth of cover required over pipelines and the location of launch and receival pits for locations that would be under bored.

The WDURA and AGA will undergo significant development with a number of new roads to be constructed, and existing roads to be upgraded and realigned. It is preferable that pipelines in road corridors are constructed at the same time as the road is constructed. Where this is not possible, the relevant road authority would be consulted to confirm the alignment of the road corridor. This would ensure that the pipeline alignments take into consideration the future final alignments of these roads.

Should any surveys or investigations be required prior to Project Approval being granted for the Proposal, Sydney Water would consider whether the exempt development provisions of the State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) apply.

The technical studies undertaken for the Proposal were prepared for the dual purpose of identifying potential environmental constraints and assessing potential environmental impacts to address the Director-General's requirements (refer to Appendices C – I). These reports recommend that further consideration be given to specific constraints as the design is refined. The recommendations were developed on a single issue basis and did not take into account whether the recommendation would be appropriate given the interaction with other environmental, engineering, or operational parameters.

Opportunities to reduce potential environmental impacts would be identified during the design process and would consider the mitigation measures detailed in Chapter 6, the Statement of Commitments (Chapter 10), and relevant recommendations detailed in Appendices C – I. This would avoid or otherwise minimise potential impacts on higher risk issues identified in the EA, including:

- Illawarra Lowland Grassy Woodlands endangered ecological community (EEC) within the direct impact areas defined in Section 6.5.
- hollow bearing trees within the direct impact areas identified in Section 6.5
- riparian corridors and associated ecological and geomorphological risks
- items of Aboriginal cultural heritage significance (refer to Section 6.6)
- items of non-Aboriginal heritage significance (refer to Section 6.7)
- soils and geological risks such as landslide areas, steep slopes, contamination, acid sulfate soil, high or very high soil erodibility (refer to Section 6.8).

The final design would be selected following consideration of environmental issues, constructability and operational requirements. A consistency assessment would be undertaken to determine whether the impacts associated with the final design are greater than those described in Chapter 6. This would identify whether any site specific mitigation measures would be required that are additional to those detailed in this EA.

Accordingly, Sydney Water is seeking approval for:

- the Proposal to be located anywhere within the field assessment area described in Chapter 6
- the Proposal to be located outside the field assessment area where:
    - changes are consistent with the environmental objectives of the Proposal; and
    - environmental impacts are no greater than those described in this EA; and
    - no additional environmental mitigation measures are required.

A modification to the Approval would only be sought if, on balance, the impacts of the preferred option are likely to be greater than those described in Chapter 6.

3.4.2 Construction

Timing

Construction would occur in stages between 2014 and 2048. Depending on the rate of development, work may occur beyond 2048. It is expected that developers would construct the reticulation water and wastewater pipelines (generally less than 300 mm in diameter) in a sequential manner, so that development can occur as Sydney Water's trunk infrastructure is provided.

Pipeline construction method

The drinking water and wastewater pipelines would generally be installed underground using a combination of open trenching and boring techniques, such as micro tunnelling and horizontal directional drilling (HDD). Trenching is the preferred method of pipe installation as it allows open access to the pipeline during construction and is likely to be the primary construction method to construct new pipelines and upgrade existing pipelines. The specific creek lines to be trenched would be assessed as a part of the detailed design process and would take into account potential geomorphological impacts on the watercourses and riparian land.

Boring may be undertaken when engineering or environmental constraints are such that open trenching would lead to excessive environmental or community impacts, such as at major creek, road and rail crossings.

A creek crossing may be required at Mullet Creek for the gravity wastewater pipeline constructed in Kembla Grange and part of Sheaffes/ Wongawilli to connect to the existing Berkeley Carrier. The crossing is likely to require an inverted syphon crossing due to relative levels in the creek and Berkeley Carrier. An inverted syphon is a closed pipeline with the end sections of the pipe at a higher elevation than the middle section. These crossing types ensure flow is maintained and also reduces wastewater retention time in the pipeline to reduce odour issues. The syphon crossing may be bored to minimise environmental impact.

Open trench excavation

The construction footprint for the pipeline corridors is expected to typically be between 6 m and 10 m wide and access tracks would be provided within this zone. The trenches would generally be 1.3 to 1.7 m wide and range in depths from 1.5 m (drinking water pipeline) to 3 to 5 m (wastewater pipeline), depending upon topography.

Construction activities associated with trenching typically include:

- establishing temporary site compounds at appropriate locations along the pipeline route
- establishing erosion and sediment control measures
- implementing traffic management measures
- site preparation, including removing pavement, footpath and/or road surface or vegetation removal
- providing temporary access to properties where trenches impact driveways
- excavating trenches, including stockpiling spoil material on the upslope side of trenches
- shoring and dewatering trenches, depending upon trench depths and groundwater levels
- spreading granular material such as sand or gravel along the base of the trench prior to pipe laying
- installing and testing the pipeline
- constructing maintenance holes
- backfilling the trenches with bedding material and excavated soil
- compacting the fill material in the trenches
- restoring areas disturbed by the construction works.

Trenching methods can include both machine trenching and hand trenching. Trenching would generally be carried out using excavators and a small compactor. Rockbreakers may also be required where bedrock is encountered during excavation. Hand trenching may be considered in environmentally sensitive areas, including areas where there is a need to avoid root damage to large trees and areas where heritage items are located in close proximity to the pipeline route.

In trafficable areas, all spoil may need to be removed. In non-trafficable areas, the majority of spoil from the trenches would be used to backfill the trench (per WSAA 2002a and 2002b). Spoil would be classified in accordance with the DECCW guidelines *Waste Classification Guidelines: Part 1 - Classifying waste* (DECCW 2009a) and the POEO Act. Excess spoil would be disposed of at a licensed facility in accordance with the *Waste Classification Guidelines* (DECCW 2009a).

Boring

Potential boring techniques for the Proposal include micro-tunnelling and HDD. Micro-tunnelling requires a launch shaft (approximately 6 m long by 3 m wide and to pipeline depth) and an exit shaft of similar or smaller size. The final depth of the shafts is dependent upon the design level of the pipeline. Additional space is required at the launch site to accommodate plant and equipment. Before micro-tunnelling can commence, the shafts need to be excavated.

Micro-tunnelling generally involves a hole being bored by the cutting heads with the boring equipment being thrust along a straight alignment from the launching shaft to the receiving shaft using rods or jacks. The machine is guided by laser and survey equipment, which allows very flat grades to be bored with great accuracy. A single bore hole is restricted to a maximum length of approximately 180 m to 200 m.

In self-supporting strata, the pipe is generally installed after the bore is completed. In collapsible material, the pipe is typically jacked immediately behind the boring equipment or installed within a casing pipe.

Micro-tunnelling requires drilling fluids to keep the drill head moving through the strata. Water is generally used as the drilling fluid for boring in rock, while bentonite slurry is typically used in soft materials. Drill cuttings are removed from the borehole via either vacuum extraction or a slurry system, which takes the cuttings to the ground surface for treatment.

With HDD, there is no need for a launch shaft to be excavated. Instead, the drilling rig sits on the ground surface and drills into the ground at an angle. The drill head is remotely controlled from the surface and can be directed so that both vertical and horizontal curves can be drilled. A potential disadvantage of HDD is that the drill head can become misdirected when there is a change in strata. However, HDD is able to perform much longer bores compared to micro-tunnelling in a similar range of diameters. In a single HDD bore, a length of up to 2 km is achievable.

Activities associated with boring techniques include:

- establishing sites for the launch and exit shafts, including:
    - installing erosion and sediment controls
    - installing measures to manage drilling fluids and cuttings
    - installing measures to manage groundwater
- site preparation, including removing pavement, footpath and/or road surface removal or vegetation removal
- installing fencing and security measures
- excavating the launch and exit shafts
- drilling the borehole, including removing spoil and cuttings
- inserting the pipe into the borehole
- disposing excess spoil and cuttings, if they cannot be used in site restoration, at a licensed facility
- commissioning the pipeline
- restoring affected areas, including backfilling the bore shafts.

Restoration of areas disturbed by pipeline construction

Restoration of areas disturbed during construction would be undertaken as soon as possible to ensure the sites are suitably stabilised and restored to their pre-works condition. Restoration along pipeline corridors would include revegetation with suitable groundcover species and the use of temporary erosion and sediment controls as required. Groundcover plant species would be selected to match the existing vegetation of the disturbed area. As pipelines would be constructed progressively using trenching techniques, trenched areas would be restored progressively. In locations where the bed or banks of watercourses would impacted by construction, restoration would take into account site specific requirements required to stabilise the bed or bank.

In locations where infrastructure such as roads or footpaths would be impacted, restoration would involve reinstating the road or footpath in accordance with Sydney Water's standard practices.

Construction of water storage reservoirs and pumping stations

Constructing reservoirs and pumping stations (water and wastewater) would commence with basic site preparation works. Site preparation works would include:

- establishing site compounds and construction access
- site levelling, removing excess soil, vegetation and other earthworks
- providing services for construction.

The following section outlines the specific activities that may occur when constructing reservoirs and pumping stations.

Water storage reservoirs

Constructing reservoirs would include:

- establishing concrete pads for the footings or foundations of the reservoirs
- installing the surface reservoir structures, including placing and welding floor and wall sheets and installing final supporting and connecting structures including roof support columns, roof beams, rafters, pipe fittings, stairs and access doors
- installing elevated reservoir structures (assembled and erected on-site and installed using a crane)
- constructing auxiliary structures
- installing underground connecting inflow/outflow pipelines using open trenching techniques
- installing the electrical and mechanical fitout
- commissioning.

Water pumping stations

Constructing the WPS would include:

- establishing a concrete pad
- constructing the pumping station building
- installing the pumps
- installing and connecting inflow/outflow pipelines using open trenching techniques
- installing the electrical and mechanical equipment
- commissioning.

Wastewater pumping stations

Constructing the new WWPS would include:

- excavating to construct the wet well and emergency storage
- installing the pumps
- installing and connecting inflow/outflow pipelines using open trenching techniques
- installing access covers
- installing an electrical control housing structure
- installing the electrical and mechanical equipment
- commissioning.

Connection to existing network and upgrade of the wastewater pumping station

Water and wastewater pipelines would generally be connected to the existing network by pipe welding and joining, prior to the ground surface being restored. In some areas, this may involve resurfacing roads. Upgrading the WWPSs would include constructing additional emergency storage and connecting inflow/outflow pipelines using open trenching techniques.

Treatment plant upgrades

Sydney Water will consider the need to upgrade the Wollongong WRP and Shellharbour WWTP as development in WDURA and AGAs progresses. The construction method for the upgrades is dependent on the type of works required and would be described when approval is sought for this stage of the Proposal. Treatment plant upgrades, if required, are not anticipated until after 2031.

Construction equipment

The machinery/equipment likely to be used during construction includes:

- excavators
- small compactors
- saw cutters
- welding equipment
- delivery and concrete trucks
- powered hand tools
- small compressors
- small generators
- trucks and pumps (if dewatering required)
- micro-tunnelling or directional drilling rigs
- cranes for WWPS upgrade.

3.4.3 Commissioning

During commissioning, the new and upgraded infrastructure would be thoroughly tested prior to use. Commissioning would be in accordance with Sydney Water's procedures.

3.5 Operation and maintenance of the Proposal

All infrastructure will be designed, built and operated in accordance with Sydney Water's and associated regulatory standards. It is expected that the pipelines would commence operation once construction and commissioning has been completed. During operation, the pipelines would be routinely inspected, cleaned and repaired as necessary in accordance with Sydney Water's procedures. This would involve restricting regrowth of vegetation in the 6 m to 10 m wide construction zone along the pipeline alignments to ensure that access is available for maintenance. Permanent access tracks across waterways would not be required.

All WWPSs would be monitored and operated remotely. The pumping station capacities would be upgraded (if required) to maintain four-hour emergency storage capacity in case the pumps or power fails. This emergency storage capacity would ensure that adequate time is available for maintenance crews to restore the operation of the pumping station before a dry weather overflow occurs.

4 Proposal alternatives

This chapter describes the process that was implemented to develop the ISS. Alternatives examined included various servicing strategies as well as alternative infrastructure locations and pipeline routes.

4.1 Developing the Integrated Servicing Strategy

In 2008 and 2009 Sydney Water developed an ISS to provide water and wastewater services to the WDURA and the AGAs, up to the year 2048. The ISS was developed in consultation with key stakeholders including the DP&I, the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS), the OEH, NSW Health, and Wollongong and Shellharbour councils.

A series of technical studies was undertaken when preparing the servicing strategy, including:

- alternative configurations of wastewater treatment systems
- wastewater collection, transport and treatment technologies
- a water balance examining the future demands for various uses of water.

From these studies a list of options was developed and subjected to a planning process to assess the environmental costs and benefits of each option and ensure the preferred options are environmentally, financially, technically and socially sustainable. The process included setting objectives, developing options and appropriate quantitative and qualitative criteria, assigning weightings to those criteria and using them to evaluate the options. As part of the consultation process, key stakeholders provided input to the criteria used to evaluate options.

The servicing strategy was developed in the context of the existing water and wastewater systems operated by Sydney Water in the Illawarra Region described in Section 3.2.

4.2 Alternative Servicing Strategies

The alternative servicing strategies considered for the WDURA and the AGAs included:

- providing drinking water and wastewater services only
- providing integrated water services, including recycled water, drinking water and wastewater services
- providing water and wastewater services, with rainwater tanks to supply non-drinking water (the preferred servicing strategy).

4.2.1 Providing drinking water and wastewater services only

Providing drinking water and wastewater services without an alternative non-drinking water supply would satisfy essential service demands in new developments. However, Sydney Water would not meet corporate goals and objectives to provide customers with a sustainable water supply. A sustainable water supply must consider drinking water, wastewater, non-drinking water and stormwater. There are opportunities to supply water from a range of non-drinking water sources in WDURA and AGAs that can potentially reduce the demand for drinking water and thus meet Sydney Water's sustainability objectives.

4.2.2 Providing integrated water services incorporating recycled water

The benefits of providing integrated water services is recognised in the *2010 Metropolitan Water Plan* (NSW Government 2010). Providing dual reticulation services (drinking water and recycled water) is costly although beneficial in terms of sustainability and the environment. Rainwater tanks offer similar benefits as recycled water and are estimated to be $30 million less expensive in terms of net present cost. Recycled water in this instance was not the most effective option for servicing the area and therefore, was not chosen as the preferred servicing strategy.

4.2.3 Preferred servicing strategy

The preferred servicing strategy is to provide water and wastewater services, with rainwater tanks to supply non-drinking water. The Sydney Water Board endorsed the preferred servicing strategy for the WDURA and AGAs in April 2009 to include:

- Sydney Water to provide drinking water services from Avon Dam by extending the existing Illawarra water system
- Sydney Water to provide wastewater services by extending the existing Wollongong and Shellharbour wastewater treatment systems
- homeowners to supply non-drinking water by installing rainwater tanks on each residential lot.

Including rainwater tanks in the servicing strategy offers a number of benefits as shown in Table 4-1. The preferred strategy also has the advantage of being able to be implemented incrementally. The staging of the existing drinking water and wastewater infrastructure would occur gradually as growth occurs.

Table 4-1 Benefits of rainwater tanks

Benefit	Description
1	$30 million less expensive than recycled water in terms of net present cost
2	Rainwater tanks can contribute to stormwater and environmental management of Lake Illawarra through minimising stormwater discharge
3	The local community has a preference for rainwater tanks over recycled water. This community has the largest uptake rate for rainwater tanks subsidy in Sydney Water's area of operations
4	Rainwater tanks are easier to stage during development of the WDURA as homeowners would purchase them when the property is constructed

4.3 Initial planning to deliver the Strategy

After the preferred servicing strategy was chosen planning commenced to develop infrastructure options to implement the strategy. Separate processes were carried out to determine the preferred infrastructure option for delivering water and wastewater services.

The preferred infrastructure options were chosen using a two-stage assessment process. The first stage established a range of options to service the WDURA and AGAs. These options were based on:

- different drinking water pipeline, pumping stations and reservoir arrangements
- wastewater pipelines and pumping station arrangements with different flow splits to Wollongong WRP and Shellharbour WWTP.

The options were ranked against the criteria in Table 4-2.

Table 4-2 Long listed options assessment criteria

Financial	Technical	Environmental	Social
Preliminary life cycle cost	Design and construction Maintenance Maximise use of existing assets	Flora and fauna Heritage Waterways and potential acid sulfate soils	Stakeholder acceptability

The six highest scoring options were added to a short list. The short-listed options were then assessed in a Multi Criteria Analysis (MCA) using the criteria shown in Table 4-3 and a lowest life cycle cost (LLCC) assessment. The MCA was used to highlight technical, environmental and social issues and to determine the level of risk for each option. Representatives from the DP&I, the (then) Department of Water and Energy, the (then) DECC, NSW Health, and the Wollongong and Shellharbour Councils, were consulted in the MCA process.

Table 4-3 Options assessment criteria

Criteria	Description
Minimum impact to the community	Consideration included land acquisition, proximity of works to residents, noise and vibration impacts, traffic disruptions, visual impacts, dust, odour and human health.
Minimum impact to the environment	Considerations included impacts on flora and fauna, soils, creeks and waterways, air quality, energy use and Indigenous and non-Indigenous heritage.
Construction costs	Considerations included the cost of designing, supplying, installing and commissioning the pipelines and associated infrastructure.
Operating costs	Considerations included the cost of operating and maintaining the pipelines and associated infrastructure.

4.4 Drinking water infrastructure

4.4.1 Water pipeline locations

Water pipelines were ranked on the ability to locate them in the road reserve in compliance with the *Water Supply Code of Australia* (WSAA 2002a). There are general space allocations for utility services in the footways of the road reserves. Water pipelines are allocated 2.6 metres from the property line. If the water pipelines are placed outside the allocated area there is the potential to interfere with other utility services. Placing water pipelines in the road reserves is preferred for the following reasons:

- allows easy access for repairs and maintenance
- minimises disruptions to residents and customers
- provides greater protection of services being disrupted by landowners accidentally digging up the pipelines.

One of the objectives of the project is to limit environmental impacts by placing the pipelines within existing and disturbed developed areas. Locating pipes in road reserves creates relatively minor adverse impacts because generally the environment has already been disturbed by road construction activities. Sydney Water would aim to construct water pipelines once the Wollongong City Council or the NSW RMS have cleared their proposed road routes. This would allow for all construction impacts to occur during the road construction period and reduce the potential for additional environmental impacts.

4.4.2 Reservoir locations

The preferred location of new reservoirs is on existing Sydney Water property to minimise the impact to the environment, stakeholders and the cost of land acquisition. New reservoirs may be located on current private property. Proposed new reservoir locations consider the impact to the environment and stakeholders in the area.

4.4.3 Water pumping station locations

WPSs were ranked on the ability to locate them in an area that has minimal impact to stakeholders and the environment whilst also providing the lowest cost of transporting water.

4.4.4 Alternative water infrastructure options

Initially eleven options were developed for providing water services to WDURA and the AGAs. All options used the existing Avon Dam for supply and Illawarra WFP for treatment in accordance with the preferred strategy. Six options were short listed after meeting the financial, technical, environmental and social criteria listed in Table 4-2. Each short listed option had two or more new water reservoirs, one or two new WPSs and new water pipelines in varying routes and lengths, as shown in Table 4-4.

Table 4-4 Details of shortlisted options for water servicing

	Option 1	Option 1A	Option 5	Option 7	Option 10	Option 11
New reservoirs	Avondale (2 x 15 ML), Marshall Mount (2 x 15 ML), and Calderwood (4 ML)	Avondale (2 x 15 ML), Marshall Mount (2 x 15 ML), and Calderwood (4 ML)	Wongawilli (17 ML), Avondale (13 ML), Marshall Mount (2 x 15ML), and Calderwood (4 ML)	Marshall Mount (2 x 20 ML) and Calderwood (4 ML)	Avondale (20 ML & 17 ML), Marshall Mount (2 x 15 ML) and Calderwood (4 ML)	Avondale (2 x 15ML), Marshall Mount (2 x 15ML), and Calderwood (4 ML)
New WPSs	Calderwood	Calderwood	Avondale and Calderwood	Calderwood	Calderwood	Avondale and Calderwood
New inlet pipeline (km)	13	-	10	10	14	18
New outlet pipeline (km)	58	47	62	60	59	59
New inlet/outlet pipeline (km)	-	13	-	-	-	-
Upgrading of existing pipelines (km)	5	5	5	5	3	5
Land acquisition	1.575 ha	1.575 ha	1.575 ha	0.575 ha	1.575 ha	1.575 ha
Total Capital Cost ($ M)	137	134	147	137	137	156
PV ($ M)	63	64	69	64	63	72

Note: Costs are planning cost estimates only.

Option 1

Option 1 consists of dedicated inlet transfer pipelines to new reservoirs at two Sydney Water owned sites, Avondale and Marshall Mount. The Avondale Reservoir site requires acquirement of 1 ha of additional land. The inlet transfer pipeline is common from Illawarra WFP to a point where the pipe splits to the two reservoir sites. The spare capacity at the existing Wongawilli, Dapto, Mount Terry, Oak Flats and Berkeley Reservoirs is used to service parts of the WDURA and AGAs. Berkeley Reservoir is used to service the elevated areas of Kembla Grange.

Option 1A

Option 1A is similar to Option 1 with a combined inlet/outlet transfer water pipeline feeding the two new reservoir sites instead of one dedicated inlet and one outlet transfer pipeline.

Option 5

Option 5 is similar to Option 1 with an additional third reservoir site next to the existing Wongawilli Reservoir. The transfer pipeline from Illawarra WFP feeds Wongawilli Reservoir. A gravity transfer pipeline from Wongawilli Reservoir transfers water to Avondale Reservoir. A transfer pipeline from Avondale Reservoir would transfer water to Marshall Mount Reservoir, first as a gravity pipeline and then a pressure pipeline via a pumping station.

Option 7

Option 7 consists of a dedicated transfer pipeline to the reservoirs at Marshall Mount, supplying to the southern section of WDURA and the AGAs, and a new outlet transfer pipeline from Berkeley Reservoir supplying the northern section. The spare capacity at the existing Wongawilli, Dapto, Mount Terry, Oak Flats and Berkeley Reservoirs is used to service parts of the WDURA and AGAs. A new 20 ML capacity reservoir would be built at Berkeley to maintain reliability and security of water supply.

Option 10

Option 10 is similar to Option 1. The difference is that the spare capacity of the existing Dapto Reservoir is not used to service growth areas. This option requires limited amplification of the transfer main to Dapto Reservoir compared to other options using Dapto Reservoir.

Option 11

Option 11 is similar to Option 1. The difference is that a transfer pipeline from Illawarra WFP feeds Avondale Reservoir only. An outlet transfer pipeline from Avondale Reservoir transfers water to Marshall Mount Reservoir.

Justification for the preferred water infrastructure option

The preferred option is Option 10 based on the MCA and LLCC. Option 10 has the best overall performance ranking as shown in Table 4-5 (one being the highest ranking and six the lowest). Option 10 has the LLCC primarily due to the reduced new infrastructure requirements. Option 10's potential environmental impact would be lower than those of Option 1, Option 1A, Option 5 and Option 11 (see Table 4-6). Only Option 7 is considered likely to have a lower environmental impact. Option 10's potential environmental impacts during construction can be mitigated and managed by implementing environmental safeguards.

Option 10 is likely to have the highest stakeholder acceptability. There are no major railway or freeway crossings. The proposed reservoir sites are located close to residential development and are likely to impact residents. Sydney Water would complete a visual and shading assessment during the detailed design phase. Appropriate management measures would be implemented to mitigate potential visual impacts.

Table 4-5 Ranking of short listed options for water servicing

Weighting and Criteria	Option 10	Option 1	Option 1A	Option 5	Option 7	Option 11
All criteria	1	2	6	4	3	5
Non-cost criteria	1	2	6	5	4	3
Financial criterion	1	2	4	5	3	6
Technical criterion	2	3	5	1	6	4
Environmental criterion	2	3	3	6	1	3
Social criterion	1	2	4	5	6	2

A summary of the short listed options assessment in relation to the overall life cycle cost and technical, environmental and social criteria is shown in Table 4-6.

Table 4-6 Assessment of short listed options for water servicing

Option	Financial	Technical	Environmental	Social
1	Lowest cost	• good geographical spread of reservoirs and low potential water age • less pressure reduction required • uses spare capacity of existing reservoirs • two new reservoir sites currently owned by Sydney Water.	• moderate impact on flood plains and riparian corridors • possible high impact on Aboriginal heritage and endangered ecological communities.	• minor land acquisition required • visual and construction impacts high to Marshall Mount and near to pressure reducing valves.

Option	Financial	Technical	Environmental	Social
1A	Moderate cost	• complex system to operate.	• moderate impact on flood plains and riparian corridors • possible high impact on Aboriginal heritage and endangered ecological communities.	• similar to Option 1 except higher chlorine residuals close to WFP.
5	Moderate cost	• good geographical spread of reservoirs and low potential water age • less pressure reduction required • uses spare capacity of existing reservoirs • two new reservoir sites currently owned by Sydney Water • additional pumping station required.	• highest potential impact of short listed options.	• most impact to community from reservoir construction.
7	Moderate cost	• adaptable to change as uses existing Berkeley Reservoir.	• least potential impact to Aboriginal heritage and endangered ecological communities • highest potential impact to floodplains and riparian corridors.	• least stakeholders affected by new reservoir construction • higher likelihood of breakages caused from high pressure.
10	Lowest cost	• good geographical spread of reservoirs and low potential water age • less pressure reduction required • uses spare capacity of existing reservoirs except for Dapto • two new reservoir sites currently owned by Sydney Water.	• least potential impact to flood plains and riparian corridors • relatively low impact to endangered ecological communities.	• minor land acquisition required • visual and construction impacts high at Marshall Mount and near pressure reducing valves.
11	Highest cost	• good geographical spread of reservoirs and low potential water age • less pressure reduction required • uses spare capacity of existing reservoirs except for Dapto • two new reservoir sites currently owned by Sydney Water • additional pumping station required.	• moderate impact on flood plains and riparian corridors • possible high impact on Aboriginal heritage and endangered ecological communities. •	• minor land acquisition required • visual and construction impacts high at Marshall Mount and near pressure reducing valves. • noise issues in Marshall Mount due to pumping station.

Risk assessment

The preferred option was subject to a detailed risk assessment, to identify risks, potential impacts and appropriate mitigation measures. Table 4-7 lists the risk aspects and considerations used in the risk analysis. The risks were deemed to be acceptable based on available data and information, and consultation with internal stakeholders and technical specialists. The risks would be addressed in the design phases of the project and then progressively closed off by implementing mitigation measures.

Table 4-7 Risk aspects considered in risk analysis

Risk aspects	Risk considerations	Mitigation measures
Environmental	Acid sulfate soil	Implement environmental safeguards
	Aboriginal heritage (archaeological deposits)	
Effects on existing system	System pressures	Rezoning of water supply zones to meet future growth
	Operations and maintenance	Provide new storage at Avondale, Marshall Mount and Calderwood
	WFP capacity and peak system demand	Reconfigure WFP pumps and control philosophy
Operation and maintenance of new systems	Performance	Rezoning is required to ensure reserve storage is met
Construction	Staging	Develop interim solutions

4.5 Wastewater Infrastructure

4.5.1 Location of new infrastructure

Wastewater pipelines are constructed in low-lying areas and in the vicinity of waterways. Due to the design requirements of gravity wastewater systems, locating wastewater pipelines away from waterways is not always feasible.

Laying pipes in a waterway and its riparian corridor could increase the risk of runoff and sedimentation, leading to impacts to water quality. The operation and maintenance of pipelines could increase the risk of scouring and erosion to the riverbank and bed stability by increasing flow velocities.

All wastewater pipelines were assumed to be constructed using leak tight materials and techniques. Leak tight wastewater pipelines have an approximate rainfall infiltration rate of 1 percent of the total rainfall. This is beneficial for the environment as it reduces the volume of water through the system, thus decreasing the overflow frequency and volume during wet weather events.

Wastewater pipelines were ranked on their location relative to riparian waterways, acid sulfate soils, and their proximity to flora and fauna and heritage items.

The preferred location for pumping stations is in an area that has minimal impact to stakeholders and the environment whilst also providing the lowest cost of transporting wastewater.

4.5.2 Alternative wastewater infrastructure options

Initially, twenty-two options were developed for providing wastewater services. These options consist of pumping stations and gravity wastewater pipelines to transfer flows from the WDURA and AGAs to existing networks in Shellharbour and Wollongong. From these, six options were short listed for further consideration after meeting the preferred financial, technical, environmental and social criteria listed in Table 4-8.

Table 4-8 Long listed options assessment criteria

Financial	Technical	Environmental	Social
Preliminary life cycle cost (PV)	• Design and construction • Maintenance • Maximise use of existing assets	• Flora and fauna • Heritage • Waterways and potential acid sulfate soils	• Stakeholder acceptability

Table 4-9 summarises the number of new pumping stations and flow transfer routes for the short listed options.

Table 4-9 Number of pumping stations and flow transfer routes for short listed options

	Option 1	Option 1A	Option 1A + B	Option 5A + B	Option 6A	Option 9A
Wastewater Pumping Stations (number required)						
Calderwood	10	3	3	3	3	3
Yallah	5	1	1	1	1	1
Tallawarra Lands	1	1	1	1	1	1
Kembla Grange and Sheaffes/ Wongawilli	2	2			2	2
Total WWPS	18	7	5	5	7	7
Tallawarra Lands Flow Transfer Routes						
Coastal route via new WWPS (Kanahooka)	Yes	Yes	Yes			Yes
Inland route to Dapto Carrier via new WWPS				Yes	Yes	
Kembla Grange and Sheaffes/ Wongawilli Flow Transfer Routes						
Two new WWPS and pressure pipelines	Yes	Yes				
Two new WWPS and pressure pipelines					Yes	
Gravity wastewater pipelines to Berkeley			Yes	Yes		
Two new WWPS and pressure pipelines						Yes

Option 1

This option includes a pumped wastewater system with 18 new pump stations included to avoid potential impacts on riparian corridors. Trenching of conventional gravity wastewater pipelines can potentially cause greater environmental impact than pumped systems above ground. Most of the pumping stations within Calderwood could be classified as small (i.e. less than 100L/s), except for two major pumping stations located along Marshall Mount Creek and Macquarie Rivulet.

Flows from Kembla Grange and Sheaffes-Wongawilli are discharged to Coniston via two new pump stations. The flow from Tallawarra Lands is discharged to Brooks Creek Carrier. This option would require an upgrade of the existing Dapto Carrier by constructing a 500 mm parallel wastewater pipeline next to the existing carrier.

Option 1A

Option 1A is based on Option 1 however a number of the pumping stations at Calderwood have been replaced by two intercepting wastewater pipelines and two pumping stations. Flows from the southern part of Yallah would be transferred to Calderwood via a gravity wastewater pipeline. This would reduce the number of pump stations required in Calderwood from ten to three.

Option 1A+B

Option 1A+B is similar to Option 1A in regards to the transfer of flow from Calderwood and Calderwood Valley to Shellharbour WWTP. The flow from Kembla Grange and Sheaffes-Wongawilli would be transferred to Berkeley Carrier via a wastewater pipeline that would cross Mullet Creek (where it is intersecting the railway line and Southern Freeway). Preliminary assessment indicates that the wastewater pipeline crossing at Mullet Creek is likely to require a siphon due to relative levels in the creek and Berkeley Carrier.

Option 5A+B

Option 5A+B is similar to Option 1A+B, with flow transfer from Calderwood and Calderwood Valley to Shellharbour WWTP, and from Kembla Grange and Sheaffes-Wongawilli to Wollongong WRP. The difference from option 1A+B is the flow from Tallawarra Lands would be transferred to Dapto Carrier via a new pumping station at Yallah.

Option 6A

Option 6A is similar to Option 5A+B. Flow from Kembla Grange and Sheaffes-Wongawilli would be intercepted at two new pumping stations and transferred to the pressure pipeline of WWPS1007. The existing capacity of the pressure pipeline of WWPS1007 is considered adequate to act as a combined pressure pipeline. The existing pumping rate of WWPS1007 would need to be upgraded to overcome increased head loss when all three pumping stations are operating via the combined pressure pipeline.

Option 9A

Option 9A is similar to Option 1A+B. Flow from Kembla Grange and Sheaffes-Wongawilli would be intercepted at two new WWPS sites and transferred to Berkeley Carrier via a new pressure pipeline. This arrangement can be considered as an alternative to gravity transfer from Kembla Grange and Sheaffes-Wongawilli to Berkeley Carrier.

4.5.3 Justification for the preferred wastewater infrastructure option

Option 1A+B has the LLCC, comparatively low environmental impact, comparatively high stakeholder acceptability and is the best technical option. The two highest ranking options based on the MCA criteria were Option 1A and Option 1A+B. Option 1A+B ranked highest for financial and technical criterion, whilst Option 1A ranked highest for environmental and social criterion. The performance ranking of the options is shown in Table 4-10 (one being the highest ranking and six the lowest).

Table 4-10 Ranking of shortlisted wastewater servicing options

Weighting and Criteria	Option 1A+B (preferred)	Option 5A+B	Option 1A	Option 6A	Option 9A	Option 1
All criteria	2	4	1	3	5	6
Non-cost criteria	2	4	1	3	5	6
Financial criterion	1	2	4	5	3	6
Technical criterion	1	3	2	5	4	6
Environmental criterion	2	4	1	2	5	6
Social criterion	2	4	1	3	4	6

A summary of the MCA results is provided in Table 4-11. The preferred option is Option 1A+B.

Table 4-11 Assessment of short listed wastewater servicing options

Option	Financial	Technical	Environmental	Social
1	Highest lifecycle cost	• 18 WWPS with associated operating and maintenance issues • Option considered poor in accommodating change to development sequencing.	• potential impacts on riparian corridors and floodplains is considered to be low compared to Options 1A+B and 5A+B due to 18 WWPS avoiding these areas • highest potential impact to EECs along with option 6A.	• stakeholder satisfaction anticipated with ability to accommodate growth • 18 WWPS required to avoid environmentally sensitive areas which may cause odour and visual issues to community.
1A	Second LLCC along with 5A+B, 6A and 9A	• flexibility to accommodate rezoning through use of existing Port Kembla system • design and construction issues for deep intercepting wastewater pipelines at Calderwood and Yallah • most potential odour issues .	• lowest potential impact on the EECs and Aboriginal heritage • low impact from wet weather overflows to sensitive wetlands • comparatively high impact to riparian corridors and floodplains.	• proposed connection points to Coniston and Berkeley carriers in highly built up areas.
1A + B (preferred option)	LLCC	• maximises use of Port Kembla system, improving odour issues in Berkeley Carrier • minimal requirement for significant up front asset delivery • design and construction issues with deep wastewater pipeline and wet well for WWPS and transferring flow from Kembla Grange and Sheaffes Wongawilli to Berkeley Carrier.	• low potential impact to EECs • low impact from wet weather overflows to sensitive wetlands • comparatively high impact to riparian corridors, floodplains and aboriginal heritage due to interceptor wastewater pipeline crossing Mullet Creek.	• least number of WWPS • likely to meet development timeframes • several wastewater pipeline crossings under rail line and potential disruption to Princes Highway • Shellharbour City Council indicated concern with additional transfers from the north to Shellharbour WWTP .
5A + B	Second LLCC along with 1A, 6A and 9A	• similar to Option 1A+B	• moderately low impact to EECs, riparian corridors and floodplains • relatively high impact to Aboriginal heritage and archaeological sensitive sites due to interceptor wastewater pipeline crossing Mullet Creek.	• least number of WWPSs • likely to meet development timeframes • several wastewater pipeline crossings under rail line and potential disruption to Princes Highway.

Option	Financial	Technical	Environmental	Social
6A	Second LLCC along with 5A+B, 1A and 9A	• few design and construct issues associated with combining the new pressure pipelines (Sheaffes/ Wongawilli and Kembla Grange) to the existing pressure pipeline of WWPS1007 • design and construct issues for deep intercepting wastewater pipelines • combined pressure pipeline has more operation and maintenance issues then other options.	• lowest potential impact to riparian corridors and floodplains due to low construction footprint. • combined inlet-outlet pipeline has high potential environmental impact • wet weather overflows of this option are the lowest frequency and volume • highest potential impact to EECs.	• similar to option 5A+B.
9A	Second LLCC along with 5A+B, 6A and 1A	• local odour issues at 7 WWPS sites • improvement in odour to Berkeley carrier, not as much as option 1 • design and construct issues with deep intercepting wastewater pipelines.	• lowest potential impact to EECs • highest potential impact on Aboriginal heritage registered sites and archaeological sensitive areas. Highest potential impact to sensitive wetlands from wet weather overflow events.	• avoids busy roads and utility intensive corridors by connecting to the Berkeley Carrier • proposed connection points to Coniston and Berkeley Carriers in highly built up areas.

Wet Weather Flow Events

Option 1A+B performs comparatively well in regard to the frequency of wet weather flow events discharging to Lake Illawarra and sensitive sites. Table 4-12 shows the anticipated wet weather overflow frequency in a 10 year period to Lake Illawarra and sensitive sites. Hydraulic modelling has shown that relative to Options 1A+B, Options 1, 1A and 6A would have more frequent overflow events in the Wollongong catchment. These options have not been chosen for this reason.

According to the modelling results, all of the short listed options (including Option 1A+B) may exceed the licence conditions for overflow events in the Shellharbour catchment. Two wet weather overflows points are predicted to exceed the EPL limits for the Shellharbour wastewater treatment system. The overflow performance at these locations will need continual monitoring as growth progresses. These overflow points may be upgraded in the future as part of the Proposal to maintain the overflow frequency within the EPL limits.

Table 4-12 Frequency of wet weather flow events

Growth scenario	Baseline	Option 1	Option 1A	Option 1A + B	Option 5A + B	Option 6A	Option 9A
	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency
Wollongong WRP Catchment: overflows discharging to Lake Illawarra and sensitive sites (Licence condition: 43 events/ 10 years up until June 2013, 40 events/ 10 years post June 2013)							
Existing	34						
2048		37	37	34	34	37	34

Growth scenario	Baseline	Option 1	Option 1A	Option 1A + B	Option 5A + B	Option 6A	Option 9A
	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency
Port Kembla WWTP Catchment: overflows discharging to Lake Illawarra and sensitive sites (Licence condition: 43 events/ 10 years up until June 2013, 40 events/ 10 years post June 2013)							
Existing	46						
2048		37	37	39	39	37	39
Shellharbour WWTP Catchment: overflows discharging to Lake Illawarra and sensitive sites (Licence condition: 45 events/ 10 years							
Existing	35						
2048		48	48	48	48	48	48

Risk assessment

The overall risks were deemed to be acceptable based on available data and information, and consultation with internal stakeholders and technical specialists. The risks would be addressed in the modeling and concept design phases and then progressively closed off after implementation of mitigation measures. Table 4-13 lists the risk considerations and mitigations proposed.

Table 4-13 Risk aspects and mitigation measures for wastewater servicing

Risk aspects	Risk considerations	Mitigation measures
Environmental	Acid sulfate soil	Implement environmental safeguards
	Aboriginal heritage (archaeological deposits)	Implement environmental safeguards
	Riparian corridors and creek crossings	Consider under boring methodologies for high risk areas and implement environmental safeguards
Growth	Wet weather flow bypass at Port Kembla WWTP	Monitor and review flow rate after 2040. Additional storage may be required after this time
	Capacity at Wollongong WRP and Shellharbour WWTP after 2031	Review growth as it occurs in WDURA and AGAs after 2035. Update the servicing strategy as required
Effects on existing system	Dry and wet weather system performance	Bypass WWPS308
	Operations and maintenance	Provide additional storage at WWPS1012
	Cumulative effects (wastewater surcharge at WWPS500 and WWPS505 catchments)	Upgrade WWPS500 and WWPS505
Operation and maintenance of new systems	Performance (odour and saltation)	Provide additional gradient to new wastewater pipelines to achieve self-cleansing velocities
Construction	Staging	Develop interim solutions
Design	Constructability (wastewater pipeline crossing at Mullet Creek)	Divert flow away from the growth area or use a WWPS
	Standard versus performance (assumptions of leak tight wastewater pipelines)	Implement monitoring program and adjust sizing accordingly

5 Legislative planning framework

This chapter describes the statutory planning framework within which the Proposal will be assessed, constructed and operated. The requirements of relevant environmental laws are summarised and the corresponding considerations identified. The chapter also outlines relevant government laws, policies, plans and environmental guidelines.

5.1 Environmental Planning and Assessment Act 1979

5.1.1 Overview

The framework for environmental impact assessment and planning approvals for development in NSW is established by the EP&A Act, the associated *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), and environmental planning instruments (EPIs) made under the EP&A Act.

Prior to 1 October 2011 the EP&A Act contained three schemes that imposed environmental assessment requirements for planning approval:

- Part 3A provided for the control of major developments that require approval from the Minister for Planning and Infrastructure
- Part 4 included provisions for the control of local development requiring development consent from the planning authority (e.g. local council)
- Part 5 provided control for activities that were permissible without consent and which were not otherwise controlled by Part 3A.

On 1 October 2011, the Government amended the EP&A Act to repeal Part 3A. Part 3A was replaced with an alternative system for the assessment of projects of regional planning significance. The amended EP&A Act includes transitional arrangements (Schedule 6A) for projects that were being assessed under Part 3A before its repeal. The DP&I issued environmental assessment requirements for the Proposal on 4 July 2011 which applied to both the Concept Plan element of the Proposal, as well as the Project Approval elements. Since the environmental assessment requirements were issued prior to the repeal of Part 3A, by reason of clause 2(1)(c) of Schedule 6A of the EP&A Act, both elements of this Proposal are considered to be "*transitional Part 3A projects"* and as such will continue to be assessed under Part 3A of the EP&A Act. This chapter refers to relevant provisions of Part 3A that are in effect for the Proposal.

5.1.2 Previous environmental assessments

Sydney Water has previously undertaken environmental assessments for the existing water and wastewater systems in the Illawarra Region under Part 5 of the EP&A Act. These assessments and subsequent approvals comprise the following documents:

- *Environmental Assessment of proposed Illawarra Water Filtration Plant: Determining Authority's Report,* Water Board 1994
- *Sydney Water Corporation – Illawarra Wastewater Strategy Consolidation of Bellambi, Wollongong and Port Kembla Sewage Treatment Plants – Director General's Report*, Department of Urban Affairs and Planning, May 2001
- *Review of Environmental Factors – Optimisation and Amplification of Shellharbour Sewage Treatment Plant – vol. 1 and 2,* Sydney Water, December 2003.

This EA assumes these approvals continue to apply and does not reassess or revisit the previous environmental assessments.

5.1.3 Application of Part 3A of the EP&A Act

Part 3A of the EP&A Act came into force on 1 August 2005. It outlines key steps required for the assessment and approval of major projects in NSW that need the approval of the Minister for Planning and Infrastructure. Part 3A provides a separate streamlined and integrated development assessment and approval process for major infrastructure or other development that, in the opinion of the Minister, is of State or regional planning significance.

Under section 75B(1) of the EP&A Act, the Minister for Planning can, by order, declare that a proposed development is a project to which Part 3A of the EP&A Act applies. On 7 September 2009, the Minister for Planning issued an order for the Proposal to be assessed and determined under Part 3A of the EP&A Act due to its State and regional environmental planning significance (refer to Appendix A). Following receipt of the Ministerial order, the Huntley Growth Area, which is located immediately to the west of the Avondale Precinct, was identified for development. An amended order was declared on 29 February 2012 that includes the Huntley Development Area.

Under section 75M of the EP&A Act, the Minister for Planning may authorise or require a proponent to apply for approval of a Concept Plan for a project. On 3 November 2009 the then Minister for Planning authorised the submission of a Concept Plan under section 75M for the provision of water and wastewater services for the WDURA and AGAs.

As outlined in Chapter 3, the Proposal comprises an application for concept plan approval for the Proposal, together with an application for project approval for the initial components required to service the early release Precincts.

5.1.4 The Part 3A approval process

The Proposal is being assessed under Part 3A of the EP&A Act and the Minister for Planning and Infrastructure is the approval authority.

This EA supports Sydney Water's Concept Plan for the entire Proposal area as well as the Project Approval application to service the early release Precincts (see Section 2.1).

The Part 3A assessment and approval process for the Proposal is described below (Table 5-1).

Table 5-1 Key steps in the Part 3A approval process for the Proposal

Step in the approval process	Status and proposed timing
Sydney Water lodges major project application to the then DoP	Lodged on 3 November 2009, with accompanying Preliminary Environmental Assessment that included a project description, map and summary of key issues (Sydney Water 2009).
The (then) Director-General of DoP issued environmental assessment requirements	Original requirements issued 24 August 2010. Amended requirements issued 4 July 2011.
Sydney Water prepares EA	August 2010 – February 2011
Sydney Water lodges EA with DP&I for adequacy assessment	March 2012
DP&I puts EA on public display, seeking public comment	September 2012
Director-General of DP&I may require Sydney Water to prepare report addressing submissions and any changes to Proposal	Timeframe and scope to be decided based on submissions received.
Minister for Planning and Infrastructure decides whether to approve Proposal. Any approval may be subject to conditions.	Dependent on submissions received and the DP&I's assessment of the EA.
If approved, Sydney Water implements the Proposal in accordance with any conditions and any other approvals required.	Construction of first stage scheduled to commence in late 2013.

Preliminary environmental assessment

Sydney Water prepared a preliminary environmental assessment (PEA) to identify the likely key environmental issues associated with the Proposal. The PEA was submitted to the then DoP as part of a joint Concept Plan and Major Project application. Along with the application, Sydney Water requested that the Director-General issue environmental assessment requirements for the EA.

The key environmental issues in the PEA were identified based on a preliminary environmental risk analysis. The methodology used for the risk analysis was adopted from Sydney Water's *Corporate Risk Management Policy* (Sydney Water 2007), which is based on *Australian Standard AS/NZS 4360:1999 Risk Management and Environmental Risk Management – Principles and Process* (AS 2000).

Environmental assessment requirements

The Director-General of the DP&I issued the environmental assessment requirements, for the Proposal, to Sydney Water under section 75F for the EA on 4 July 2011 (DP&I 2011). The Director-General's Requirements (DGRs) are attached in Appendix B. This EA has been prepared to address the DGRs. Table 5-2 lists the DGRs and identifies where they have been addressed in this EA.

Table 5-2 DGRs for the EA

Item to be addressed	Requirement	Location addressed in the EA
General requirements	Executive summary	Executive summary
	A detailed description of the project including construction methods, location and alignment of project components, operational details including treatment technology and water quality standards to be applied, means of minimising wet weather infiltration, water demand management measures and interfaces with existing sewage treatment infrastructure, energy requirements and any staging. This should include a discussion of the uncommitted capacity of the Wollongong and Shellharbour Sewage Treatment Plans and their capacity to serve the Proposal.	Chapters 3 and 4
	Consideration of relevant statutory provisions including the consistency of the Proposal with the objects of the EP&A Act and permissibility.	Sections 5.1.5 and 5.2.1
	An assessment of the environmental impacts of the Proposal, with particular focus on the key assessment requirements.	Chapters 6 and 7
	A draft Statement of Commitments detailing measures for environmental mitigation, management and monitoring for the Proposal.	Chapter 10
	Justification for undertaking the Proposal with consideration of the environmental, social, and economic benefits and impacts of the Proposal.	Chapter 2 and Section 9.1.1
	Certification by the author of the EA that the information contained in the Assessment is neither false nor misleading.	Certification
Key issues	**Strategic and project justification** - the EA shall clearly outline the strategic context of the Proposal, having regard to existing and future development of West Dapto. Discuss how the Proposal relates to relevant strategic and statutory planning documents including the following: the Illawarra Regional Strategy 2007; the W*est Dapto Release Area Review Planning and Infrastructure Report* (GCC, 2008); the *Sydney Water ISS*, the *Lake Illawarra Estuary Management Study and Strategic Plan* (March 2006) the Illawarra Regional Environmental Plan No. 1, and relevant LEPs including the draft Wollongong LEP (West Dapto) 2009. The EA must describe the need for and objectives of the Proposal; alternatives considered (including an assessment of environmental costs and benefits of the Proposal relative to alternatives) and provide justification for the Proposal.	Chapters 2 and 4 and Section 9.1.1

Item to be addressed	Requirement	Location addressed in the EA
	Water quality, hydrology and soils – the EA shall include an assessment of water quality impacts arising from the construction and operation of the Proposal taking into account applicable NSW Government policies. With respect to construction, risks associated with laying pipelines, including across watercourses, acid sulfate soils, salinity, erosion and sedimentation controls and management of any discharges from the Proposal to prevent impacts to nearby watercourses, groundwater and water bodies should be addressed.	Sections 6.5, 6.3, 6.4, and 6.8
	Potential impacts on riparian areas should consider the **Riparian Corridor Management Study** (DIPNR 2004). The EA should include an assessment of the potential flood risks associated with the Proposal including a risk screening of proposed water infrastructure development areas against the benchmarks identified in the *Draft NSW Coastal Planning Guideline: Adapting to Sea Level Rise* (DoP 2009). The assessment should include the full range of flood events including probable maximum flood and proposed mitigation measures with respect to operation.	Sections 6.5 and 6.12
	Details on the impacts and management of wastewater and infrastructure must be addressed, including: • frequency and volume of overflow for dry and wet weather and pollutant load; • Location of infrastructure within riparian areas including reference to the Riparian Corridor Management Study (DIPNR 2004) • The quality of the treated wastewater in dry and wet weather • Impacts from the effluent discharge from Wollongong and or the Shellharbour Sewage Treatment Plants, particularly beyond current approved levels • Identification of wet weather effluent storage requirements.	Sections 6.5, 6.3 and 6.4
	Assess appropriate wastewater treatment technology for the removal/reduction of key pollutants and consider options to reduce readily bio-available forms of nutrients. Demonstrate how treated wastewater discharged to waterways will meet Australian and New Zealand Environment and Conservation Council (ANZECC) 2000 water quality criteria for relevant chemical and non-chemical parameters.	Section 6.3
	Measures to prevent or minimise sewage discharge or overflows and subsequent impacts to nearby watercourses, groundwater and water bodies shall be addressed.	Sections 6.4
	Human health – the EA should address the human health impacts arising from the wastewater infrastructure and processes including effluent disposal. The assessment should be undertaken in accordance with *Guidelines for Managing Risks in Recreational Water* (NHMRC, 2008).	Sections 6.3 and 6.4
	Flora and fauna – the EA should include a flora and fauna impact assessment taking into consideration impacts on any threatened species, populations, ecological communities and/or critical habitat and any relevant recovery plan in accordance with the *Guidelines for Threatened Species Assessment* (DEC & DPI, 2005) and with consideration to the *Illawarra Escarpment and Coastal Plain – Bioregional Assessment* (DEC, 2003). This assessment shall include a description of actions to avoid impact in the first instance and then mitigate impacts or compensate for unavoidable impacts. The EA should address key threatening processes, justify the need for clearing any vegetation and/or habitat features and include an evaluation of potential impacts on waterways, aquatic ecosystems or riparian zones, including any in stream stormwater basins, potential for weed infestation and impacts to fish passage. Offsets should be considered for clearing native vegetation consistent with 'improve or maintain' principles. Sufficient details must be provided to demonstrate the availability of viable and achievable options to offset the impacts of the Proposal. Where the Proposal would be located adjacent to DECCW estate, the EA must identify management implications on DECCW estate from edge effects such as weed and pest management consistent with the *Guidelines for Developments Adjoining DEC Land* and identify all reasonable and feasible measures to minimise impact.	Sections 6.5, 6.3 and 6.4

Item to be addressed	Requirement	Location addressed in the EA
	Aboriginal and non-Aboriginal cultural heritage impacts – the EA shall include an assessment of Aboriginal and non-Aboriginal heritage values that may be impacted by the Proposal with details on any subsurface archaeological investigations undertaken for potential archaeological deposits. Consideration should be given to the significance of the impacts of the Proposal and any mitigation measures. The assessment must address the information and consultation requirements of the draft *Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation* (DEC, 2005a).	Sections 6.6 and 6.7
	Air quality – the EA shall include an assessment of the air quality impacts associated with the operation of the Proposal, particularly where operation is required beyond currently approved levels at the Wollongong and Shellharhour Sewage Treatment Plants, with specific reference to odour impacts. The analysis should be prepared in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC, 2005b), *Assessment and Management of Odour from Stationary Sources in NSW* (DEC, 2001a), and Technical Notes: Draft Policy: Assessment and Management of Odour form Stationary Sources in NSW (DEC, 2001b).	Section 6.10
	Noise and vibration – The EA shall include an assessment of noise and vibration impacts during construction and operation and in a cumulative context with existing development. Construction traffic noise must also be addressed. The assessment must take into account the following guidelines, as relevant: *Interim Construction Noise Guidelines* (DECC, 2009, *Environmental Criteria for Road Traffic Noise* (EPA, 1999), *Industrial Noise Policy* (EPA, 2000) and *Assessing Vibration: A Technical Guideline* (DECC, 2006).	Sections 6.9
	Hazards and Risk – the EA shall include an assessment of the hazards and risk associated with the project including details of hazardous materials used or kept on the premises during the construction and operation phases, particularly any additional risk at the Wollongong or Shellharbour Sewage Treatment Plants. The assessment must refer to the Department's Guideline *Applying SEPP 33* (DUAP, 1994). If relevant, a Preliminary Hazard Analysis in accordance with the Department's *Hazardous Industry Planning Advisory Paper No.6, Guidelines for Hazard Analysis* must be included as part of the EA.	Section 6.11
	Environmental Risk Analysis– notwithstanding the above key assessment requirements, the EA shall include an environmental risk analysis to identify potential environmental impacts associated with the project (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental risk analysis, an appropriately detailed impact assessment of this additional key environmental impact must be included in the EA.	Section 6.13
Consultation	You should undertake an appropriate and justified level of consultation with relevant parties during the preparation of the EA, including: • local, State or Commonwealth government authorities and service providers such as the NSW Ministry of Health, the NSW Office of Water, the Department of Environment, Climate Change and Water (DECCW), the Lake Illawarra Authority (LIA), the Department of Industry and Investment, the Southern Rivers Catchment Management Authority, RMS, and Shellharbour and Wollongong City Councils. • specialist interest groups, including local Aboriginal land councils; and • the local community, including affected landowners. The EA must describe the consultation process, document all community consultation undertaken to date and identify the issues raised (including where these have been addressed in the EA).	Chapter 8

Environmental Assessment exhibition and approval

DP&I reviewed the EA prior to it being publicly exhibited under section 75H. The purpose of the review was to ensure that the EA adequately addressed the DGRs. As required under the EP&A Act, DP&I will publicly exhibit the EA for at least 30 days. Section 8.3 outlines the consultation process that will be undertaken during the exhibition period.

The DP&I will receive any submissions in response to the EA and forward them to Sydney Water. The Director-General may require Sydney Water to respond to issues raised in the submissions, prepare a Preferred Project Report that outlines any proposed changes to the Proposal to minimise its environmental impact that have been made since the EA was exhibited, and provide a revised Statement of Commitments. If any significant changes are proposed to the Proposal, the Director-General may require the Preferred Project Report to be exhibited.

Following Sydney Water's response to submissions and/or Preferred Project Report, the Director-General will prepare an assessment report and provide it to the Minister to consider the Proposal. In preparing the assessment report, the Director-General would evaluate this EA, Submissions Report and/or any Preferred Project Report, giving consideration to submissions received during the exhibition period. The Minister may approve or reject the Proposal and, if approved, will determine the conditions that apply to carrying out the Proposal.

5.1.5 Consistency with objectives of the EP&A Act

Section 5 of the EP&A Act details the objectives of the Act. The Minister for Planning and infrastructure is required to consider the objects of the EP&A Act when making decisions under the Act. Table 5-3 summarises how the Proposal addresses the objectives of the EP&A Act.

Table 5-3 Consistency of the Proposal with objects of the EP&A Act

Object of the EP&A Act	Consistency of the Proposal with the object
To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.	Sydney Water has refined the Proposal to minimise its impacts on natural and artificial resources. This includes avoiding areas of high value where possible and commitments to avoid, minimise and mitigate impacts. The Proposal will also promote social and economic welfare of the community by allowing the development of the area.
To encourage the promotion and co-ordination of the orderly and economic use and development of land.	Sydney Water has worked closely with the DP&I to develop water servicing strategies that are consistent with the Department's land development program.
To encourage the protection, provision and co-ordination of communication and utility services.	The Proposal is consistent with this objective of the EP&A Act as Sydney Water will be providing a utility service to the WDURA and AGAs.
To encourage the provision of land for public purposes.	This object is not applicable because the scope of the Proposal does not include providing land for public purposes. However, if land within the WDURA and AGAs becomes available for public purposes, the Proposal would provide water related services to that land.
To encourage the provision and co-ordination of community services and facilities.	This object is not applicable because the scope of the Proposal does not include providing community services and facilities. However, the Proposal will ensure that water related services are available in the WDURA and AGAs if and when they are developed.

Object of the EP&A Act	Consistency of the Proposal with the object
To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.	The Proposal is consistent with this objective of the EP&A Act as it has been developed to avoid or otherwise minimise potential impacts on environment, where practicable. Sydney Water has developed management controls that will be implemented as part of the Proposal. Draft Statement of Commitments include management controls to protect the environment, including native flora and fauna, threatened species, populations and ecological communities, and their habitats.
To encourage ecologically sustainable development.	In developing the preferred servicing strategy to provide safe, reliable and sustainable water and wastewater services for the WDURA and AGAs, Sydney Water has utilised a sustainability planning process to ensure the Proposal is environmentally, financially, technically and socially sustainable.
To encourage the provision and maintenance of affordable housing.	This object is not applicable because the scope of the Proposal does not involve providing affordable housing. However, the Proposal will ensure water related services are available, if and when affordable housing is approved by planning authorities.
To promote the sharing of the responsibility for environmental planning between the different levels of government in the State.	Sydney Water has consulted directly with Wollongong and Shellharbour City Councils, as well as relevant government agencies such as the OEH, RMS, and Office of Water when preparing the EA to ensure their concerns are adequately addressed.
To provide increased opportunity for public involvement and participation in environmental planning and assessment.	The Part 3A process and Sydney Water's consultation initiatives (outlined in Chapter 8) provide public involvement in the planning and assessment of the Proposal.

5.1.6 Legislation that does not apply to approved Part 3A Projects

Part 3A lists approvals that are not required for a project that is approved under Part 3A of the EP&A Act. As a result, if the Minister grants approval under the former Part 3A of the EP&A Act to carry out the Proposal, the following approvals, among others, would not be required:

- the concurrence under Part 3 of the *Coastal Protection Act 1979* of the Minister administering that Part of the Act
- a permit under section 201, 205 or 219 of the *Fisheries Management Act 1994* (FM Act)
- an approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977*
- an Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974* (NPW Act)
- a water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the *Water Management Act 2000* (Water Management Act).

5.1.7 Legislation that must be applied consistently to approved Part 3A Projects

Part 3A specifies certain authorisations that cannot be refused if necessary for the carrying out of a project that has been approved under Part 3A of the EP&A Act. In addition, any conditions must be substantially consistent with the Part 3A approval. The authorisations relevant to this Proposal are:

- an environment protection licence issued under Chapter 3 of the POEO Act
- a consent under section 138 of the *Roads Act 1993.*

5.2 NSW environmental planning instruments

The EP&A Act allows for the making of EPIs at local and State levels. EPIs have statutory force under the EP&A Act and include LEPs, regional environmental plans (now deemed state environmental planning policies (SEPPs)) and SEPPs. EPIs collectively establish the permissibility of development proposals and controls (either by development standards or otherwise) for development.

Under section 75R, EPIs do not generally apply to the decision whether to approve a concept plan or project.

However, when deciding whether or not to approve a concept plan or project, the Minister may (but is not required to) take into account provisions of EPIs that would not apply (because of section 75R) to the project or concept plan if approved. EPIs potentially relevant to the Proposal are discussed below.

EPIs are also relevant to establishing the permissibility of the Proposal. Section 75J(3) of the EP&A Act and clauses 8N and 8O of the EP&A Regulations preclude approval being given under Part 3A for certain projects that would be prohibited by an EPI (although the EPI would not apply to the project if approved). These provisions apply to project approvals and some concept plans. Accordingly, it is also important to establish whether the Proposal would be permissible under the relevant EPIs.

5.2.1 State environmental planning policies

A number of SEPPs are either directly applicable to the Proposal or contain objectives and provisions that are relevant to the assessment of environmental issues and development of impact mitigation measures. The SEPPs of relevance to the proposal are discussed in this section.

State Environmental Planning Policy (Infrastructure) 2007

The Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across the State. The Proposal is permissible without consent in all LEP zonings as it involves infrastructure carried out by a public authority that meets the definition of a sewerage system and water supply system under the Infrastructure SEPP.

The Proposal involves construction and operation of a sewerage system as defined by Clause 105. As the sewerage system would be carried out by a public authority (Sydney Water), it is permissible without consent in all zones under Clause 106(1)(a) and (3)(a). The Proposal does not involve any work on land that is reserved under the NPW Act.

The Proposal involves construction and operation of a water supply system as defined by Clause 124 of the Infrastructure SEPP. As the water supply system would be carried out by a public authority (Sydney Water), it is permissible without consent in all zones under Clause 125(1) and (2). The proposal does not involve any work on land that is reserved under the NPW Act.

The consequence of these provisions is that the Proposal is permissible and may be approved under Part 3A.

State Environmental Planning Policy (Major Development) 2005

Prior to 1 October 2011, the Major Development SEPP identified development to which Part 3A of the EP&A Act applied. Schedules 1-6 of the Major Development SEPP listed various sites and types of development for which approval under Part 3A was required.

The Calderwood Precinct is one of the AGAs (refer to Figure 1-1) and includes the Calderwood site that is listed in Schedule 3 Part 28 of the Major Development SEPP. Part 28 sets out the approval framework for development within the Calderwood site. Clause 6(2) indicated that Clauses 8–15, 17–21 and 23–33 did not apply to development to the extent that it is a project to which Part 3A of the Act applies. As the Proposal is a project to which Part 3A applies, clauses 16 and 22 were the only clauses potentially relevant to the Proposal.

Clause 16 relates to prohibited development and states that:

> *Development on land within the Calderwood site that is part of a project to which Part 3A of the Act applies is prohibited if it would be prohibited were it development to which Part 4 of the Act applies.*

As the Proposal is permissible without consent, it is not prohibited under Part 4 of the Act. Therefore, clause 16 is not relevant to the Proposal.

Clause 22 relates to development standards and is not relevant to the Proposal.

State Environmental Planning Policy 14 – Coastal Wetlands

State Environmental Planning Policy 14 – Coastal Wetlands (SEPP 14) aims to ensure that coastal wetlands are preserved and protected in the environmental and economic interest of the State. Its objectives include:

- protecting valuable wetlands
- ensuring that a wide range of benefits of wetlands continue
- enabling cumulative effects of existing and proposed developments to be assessed
- encouraging developers to find alternatives to disturbing wetlands.

SEPP 14 sets out the issues to be taken into consideration by a consent authority when assessing an application for certain activities that may affect a listed wetland. Lake Illawarra is listed under SEPP 14 as a coastal wetland. Clause 6 of the SEPP provides that consent is not required if the project has been declared under Part 3A of the EP&A Act. Notwithstanding, Sydney Water has assessed potential impacts on Lake Illawarra and where necessary proposed mitigation measures to ensure any potential impacts are adequately mitigated (see Chapter 6).

State Environmental Planning Policy 33 – Hazardous and Offensive Development

State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP 33) defines potential hazardous and offensive developments and specifies the requirements for the assessment of hazards and the granting of development consents. SEPP 33 normally only applies to developments requiring development consent under Part 4 of the EP&A Act. As the Proposal is to be undertaken under Part 3A of the EP&A Act, the requirements of the SEPP do not apply to the decision to approve the Proposal.

However, the DGR requires the assessment to refer to the guideline *Applying SEPP 33:* (DUAP, 1994). If relevant, a Preliminary Hazard Analysis in accordance with the Department's *Hazardous Industry Planning Advisory Paper No 6, Guidelines for Hazard Analysis* must be included as part of the assessment. The hazard analysis is considered in Section 6.11.

State Environmental Planning Policy 44 – Koala Habitat Protection

State Environmental Planning Policy 44 – Koala Habitat Protection (SEPP 44) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas in order to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. SEPP 44 applies to LGAs listed in Schedule 1, and includes Wollongong LGA. As the Proposal is to be undertaken under Part 3A of the EP&A Act, the requirements of the SEPP do not apply to the decision to approve the Proposal.

However, the impact on Koala habitat was considered as part of the terrestrial ecology assessment. The terrestrial ecology assessment (ELA, 2011) found that the Koala (*Phascolarctos cinereus*) is considered 'unlikely' to utilise the Proposal area. A number of trees likely to be used as food sources were recorded in the Proposal area including, Cabbage Gum (*Eucalyptus amplifolia*), Forest Red Gum (*E. tereticornis*), Woollybutt (*E. longifolia*) and Coastal Grey Box (*E. bosistoana*). However, the Koala has not been recorded in the Proposal area.

State Environmental Planning Policy 55 – Remediation of Land

State Environmental Planning Policy 55 – Remediation of Land aims to promote the remediation of contaminated land to reduce the risk of harm to human health and any other aspect of the environment.

The SEPP requires any remediation work carried out as part of the Proposal to meet certain standards and notification requirements. In the event that remediation of contaminated lands is required these standards and notification requirements will be met.

State Environmental Planning Policy 71 – Coastal Protection

State Environmental Planning Policy 71 – Coastal Protection (Coastal Protection SEPP) aims to ensure:

- development in the NSW coastal zone is appropriate and suitably located
- that there is a consistent and strategic approach to coastal planning and management
- there is a clear development assessment framework for the coastal zone.

Parts of the Proposal area are located within the mapped Coastal Zone and Lake Illawarra is listed under Schedule 1 of the Coastal Protection SEPP as a Coastal Lake. Clause 8 of the Coastal Protection SEPP lists matters to be considered by a consent authority when considering a development application within the coastal zone. These matters do not apply to the decision to approve the Proposal as it is assessed under Part 3A of the EP&A Act.

State Environmental Planning Policy Rural Lands 2008

State Environmental Planning Policy Rural Lands 2008 (Rural Lands SEPP) aims to facilitate the orderly and economic use and development of rural lands for rural and related purposes. It was introduced to provide a state-wide framework to manage agriculture and the proposed planning of rural lands to provide opportunities for rural lifestyle, settlement and housing in rural communities.

The Rural Lands SEPP only relates to those parts of the Proposal area that are within the Shellharbour LGA. Clause 10 of the Rural Lands SEPP lists matters to be considered by a consent authority when considering a development application for rural land. However, these matters do not apply to the decision to approve the Proposal as it is assessed under Part 3A of the EP&A Act.

5.2.2 Illawarra Regional Environmental Plan

The Illawarra Regional Environmental Plan No 1 (Illawarra REP 1) is the only applicable REP, now deemed a SEPP, to the Proposal. The Illawarra REP 1 provides a framework for coordinated action to ensure best use of land resources, improvement in the quality of life, protection of regional needs and interests and the establishment of a stable and attractive climate for public and private investment in the Illawarra Region.

The Proposal is consistent with the aims, objectives, and provisions of Illawarra REP 1, in that it will provide the WDURA and AGAs with water and wastewater services in an ecologically sustainable manner (see Section 9.5), consistent with the broader planning objectives of the Illawarra Region.

5.2.3 Local environmental plans

The Proposal area is located within the Wollongong and Shellharbour LGAs. LEPs that apply to these LGAs are:

- Wollongong LEP (West Dapto) 2010 (WCC 2010a). This applies to Dapto town centre, Kembla Grange, Horsley and Wongawilli
- Wollongong LEP 1990 (WCC 1990). This applies to the area around Marshall Mount and Parts of Huntley and Yallah
- Wollongong LEP 2009 (WCC 2009a). This applies to the majority of the city, apart from the West Dapto region
- Shellharbour LEP 2000 (Shellharbour LEP 2000)
- Shellharbour Rural LEP 2004 (Shellharbour LEP 2004).

The Draft Shellharbour City-wide LEP (2011) was exhibited between June and September 2011. The proposed zonings in the Draft LEP are consistent with the *Standard Instrument – Principal Local Environmental Plan*.

One of the functions of LEPs is to establish land use zonings and define the objectives and development controls for each land use zone. As the Infrastructure SEPP prevails over the LEPs, the Proposal is permissible without consent within all zones (refer to Section 5.2.1).

5.3 Other NSW environmental legislation

Protection of the Environment Operations Act 1997

The POEO Act is administered by the OEH and provides for the control and regulation of water, air and noise pollution, waste transport and disposal, and littering.

It is a mandatory requirement of the POEO Act to obtain an EPL from the OEH for scheduled development work and scheduled activities (POEO Act sections 47-49). EPLs may also be sought on a voluntary basis to regulate water pollution from non-scheduled development work and activities, such as off-site discharges of stormwater from construction sites.

The Proposal relates to operating a sewage treatment system which is a scheduled activity under the POEO Act. Sydney Water holds EPLs for the Shellharbour sewage treatment system (licence number 211) and Wollongong sewage treatment system (licence number 218). As indicated in Section 3.2.2, these treatment plants are currently operating well below their approved capacity. The Proposal would expand the existing wastewater reticulation systems and utilise uncommitted capacity at the two treatment plants. Additional EPLs would not be required for the Proposal as it would be operated under EPL 211 and EPL 218.

The Proposal involves operating the Shellharbour and Wollongong sewage treatment plants to the limits of their approved capacity. The need to upgrade and or expand the sewage treatment plants will be reviewed over time to ensure there is capacity to cater for the ultimate development of the WDURA and AGAs. This may involve variations to the conditions to the EPLs in the future.

Roads Act 1993

The *Roads Act 1993* (Roads Act) is administered predominantly by the NSW RMS (formerly NSW Roads and Traffic Authority (RTA)) and local councils.

Under section 138 of the Roads Act, a person must not:

> *a) erect a structure or carry out a work in, on or over a public road, or*
>
> *b) dig up or disturb the surface of a public road, or*
>
> *c) remove or interfere with a structure, work or tree on a public road, or*
>
> *d) pump water into a public road from any land adjoining the road, or*
>
> *e) connect a road (whether public or private) to a classified road,*
>
> *otherwise than with the consent of the appropriate roads authority.*

The Proposal involves constructing infrastructure within a number of road reserves for which Wollongong Council, Shellharbour Council, or the RMS is the relevant road authority. Under Clause 5(1) of Schedule 2 of the Roads Act, a public authority does not require consent under Section 138 to exercise its functions in, on or over an unclassified road. As a public authority, Sydney Water is therefore only required to obtain consent under section 138 for works in, on or over classified roads. Classified roads include the Princes Highway, the Illawarra Highway, and the F6.

The Proposal is being assessed under Part 3A of the EP&A Act. In these circumstances consent under section 138 of the Roads Act cannot be refused where there is an approved project due to the application of section 75V of the EP&A Act. Should an approval under the Roads Act be required for future development stages, then these approvals will be sought.

Sydney Water will continue to consult with the appropriate road authority in each circumstance (RMS, Wollongong Council, and Shellharbour Council) regarding works in roads and any approvals required under the Roads Act.

Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) was developed to protect and manage the fisheries of NSW for the benefit of present and future generations. The FM Act applies to all waters within the limits of NSW, except where Commonwealth legislation applies. Provisions of the FM Act potentially relevant to the Proposal include:

- activities or works within waterways that involve dredging and reclamation, as defined under section 198A. Section 199 details circumstances under which a public authority (such as Sydney Water) may carry out dredging or reclamation. Prior to carrying out or authorising the carrying out of any dredging or reclamation work, Sydney Water must:
    - give the Minister for Primary Industries written notice of the proposed work
    - consider any matters concerning the proposed work that are raised by the Minister for Primary Industries within 28 days after the giving of the notice (or such other period as is agreed between the Minister for Primary Industries and Sydney Water)
- section 219 relates to permits for blocking fish passage. Permits under this clause are not required for projects approved under Part 3A of the EP&A Act
- Part 7A which addresses threatened species conservation associated with species listed in Schedules 4, 4A and 5 of the Act. Section 220ZF provides that an approval under Part 3A of the EP&A Act provides a defence against harm to threatened species, provided the harm is essential for carrying out the development
- two habitat protection plans have been developed under the FM Act. Under section 193 of the Act, Sydney Water must have regard to the provisions of these plans to the extent they are relevant to the Proposal. Fish Habitat Protection Plan No. 1 (General) relates to dredging and reclamation, fish passage, protection of marine vegetation and snags. This is the only protection plan prepared under the FM Act that is relevant to the Proposal.

The flora and fauna assessment undertaken for the Proposal considered potential impacts on species listed under the schedules of the FM Act. The assessment concluded that no threatened fish species, or endangered populations occur within the Proposal area.

Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) provides for the conservation of NSW natural and built heritage, including through the establishment of a State Heritage Register. Under the Heritage Act, certain works on relics (section 139) or items on the State Heritage Register (Part 4) require a permit from the Heritage Council. Permits under Part 4 or section 139 of the Heritage Act are not required for projects approved under Part 3A of the EP&A Act. Notwithstanding, Sydney Water has assessed any potential impacts on natural and built heritage items and where appropriate proposed management measures to ensure any potential impacts are adequately mitigated (see Section 6.7). Should an approval under the Heritage Act be required for future development stages, then these approvals will be sought.

National Parks and Wildlife Act 1974

The *National Parks and Widlife Act 1974* (NPW Act) provides for the establishment, care, control and management of National parks, historic sites, nature reserves, State conservation areas, Aboriginal areas and State game reserves, and is administered by OEH. The NPW Act also provides for the protection, preservation and management of Aboriginal relics and the protection of native flora and fauna in NSW.

Under the NPW Act, it is an offence to harm an Aboriginal object or Aboriginal place. Under section 87, it is a defence to a prosecution offence if:

- the harm or desecration concerned was authorised by an Aboriginal heritage impact permit
- the conditions of an Aboriginal heritage impact permit were not contravened.

Aboriginal heritage impact permits are issued under section 90 of the NPW Act. Permits under section 90 of the NPW Act are not required for projects approved under Part 3A of the EP&A Act.

An Aboriginal cultural heritage investigation was undertaken for the Proposal. The findings are discussed in Section 6.6.

The Act also provides for the management of National park land. The Proposal would not impact on any National park or land reserved under the NPW Act. Potential impacts to native flora and fauna are considered in Section 6.5.

Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) is administered by OEH and provides for the protection of critical habitat and threatened species, populations and ecological communities, and their habitats in NSW (with the exception of fish and marine plants). Species, populations and ecological communities that are considered threatened in NSW are listed in Schedules 1 and 2 of the Act. Critical habitat in NSW is listed on the OEH's website. It is an offence to damage critical habitat and/or cause harm or pick a threatened species, population or ecological community, except if the action constituting the offence was:

- authorised by a licence issued under the TSC Act or NPW Act, or
- carried out in accordance with an approval or consent granted under Part 3A of the EP&A Act.

Sydney Water has assessed the flora and fauna impacts of the Proposal in accordance with the *Guidelines for Threatened Species Assessment* (DEC & DPI, 2005) as required by the DGRs (refer to Section 6.5).

The Act also contains provisions for the Minister to grant biodiversity certification to EPIs if satisfied they would bring an overall improvement or maintenance in biodiversity values. The practical effect of biodiversity certification is that projects that are subject to Part 4 or Part 5 of the EP&A Act under the certified environmental planning instrument are taken not to significantly affect any threatened species, population, ecological community or its habitat. To date no Biodiversity Certification Orders have been applied to any EPIs in the Illawarra Region.

Coastal Protection Act 1979

The *Coastal Protection Act 1979* provides for the protection of the coastal environment of the State for the benefit of both present and future generations. One of the key objectives of the *Coastal Protection Act* is to protect, enhance, maintain and restore the environment of the coastal region, its associated ecosystems, ecological processes and biological diversity, and its water quality. Section 38 of the *Coastal Protection Act 1979* requires a public authority to obtain the concurrence of the Minister for the Environment prior to carrying out any development in the coastal zone. Due to the application of section 75U(1)(a) of the EP&A Act, the concurrence of the Minister under Part 3 of the *Coastal Protection Act 1979* is not required for a project approved under Part 3 of the EP&A Act. Should an approval under the *Coastal Protection Act 1979* be required for future development stages, then these approvals will be sought.

Water Management Act 2000

The main approvals requirements of the *Water Management Act 2000* are under sections 89 (water use approvals), 90 (water management works approvals) and 91 (activity approvals). Activity approvals include controlled activity approvals and aquifer interference approvals. As discussed in Section 5.1.6, these approvals are not required for a project approved under Part 3A of the EP&A Act. As a public authority, Sydney Water is exempt from obtaining controlled activity approvals due to the application of clause 38 of the *Water Management Regulation 2011*.

The Proposal is unlikely to require a water access licence under section 56 of the *Water Management Act 2000*. While access to water may be required during construction for dust suppression and groundwater monitoring, a water access licence is not required for these activities due to the application of the exemptions in schedule 5 of the *Water Management Regulation 2011*.

5.4 Commonwealth Environment Protection Biodiversity Conservation Act

The relevant Commonwealth legislation is the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Under the EPBC Act, approval is required from the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities (SEWPaC) for any action likely to have a significant impact on a matter of national environmental significance. Matters of national environmental significance are:

- World Heritage properties
- National Heritage places
- wetlands of international importance
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- Great Barrier Reef Marine Park
- nuclear actions.

The potential for the proposal to significantly impact on matters of national environmental significance was considered during preparation of this EA and is summarised in Table 5-4.

The EPBC Act also requires assessment and approval for actions that are likely to have a significant impact on the environment of Commonwealth land, even if the action is taken outside of Commonwealth land. When a person proposes to take an action that they believe may need approval under the EPBC Act, they must refer the proposed action to SEWPaC for assessment. The Proposal does not involve any works at Port Kembla WWTP, which is Commonwealth land leased by Sydney Water. The Proposal has not been referred to the Department of SEWPaC as it is unlikely to significantly impact on any matters of national environmental significance, nor would it impact on Commonwealth land.

Table 5-4 Summary of potential impacts on matters of national environmental significance

Matter of National Environmental Significance	Comment relating to potential impact due to the Proposal
World Heritage properties	The Proposal would not have a significant impact in any world heritage properties.
National Heritage places	The Proposal would not have a significant impact on any national heritage places.
Wetlands of international importance	The Proposal would not have a significant impact on any wetlands of international importance.
Listed threatened species and ecological communities	The Proposal would not have a significant impact on any listed threatened species or ecological communities.
Migratory species protected under international agreements	The Proposal would not have an impact in any migratory species protected under international agreements.
Commonwealth marine areas	The Proposal would not impact on any Commonwealth marine areas.
Great Barrier Reef Marine Park	The Proposal would not impact on the Great Barrier Reef Marine Park.
Nuclear actions	The Proposal does not involve a nuclear action.