

Sydney Water Corporation

North West Growth Centre Water Related Services for First Release Precincts

Preliminary Environmental Assessment

August 2007



Sydney Water Corporation ABN 49 776 225 038

115-123 Bathurst Street Sydney NSW 2000 Australia PO Box 53 Sydney South NSW 1235 Australia T: (02) 9350 4650 F: (02) 9261 3167 E: NWGCStageOne@sydneywater.com.au

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Summary

Introduction

This document includes a Project Description and Preliminary Environmental Assessment for the North West Growth Centre - Water Related Services for First Release Precincts Project (the Project) to be included with the Major Project Application form. The First Release Precincts are:

- North Kellyville
- Riverstone
- Alex Avenue
- Riverstone West
- Area 20

Sydney Water is responsible for planning for the provision of recycled water, potable water and wastewater for the Project as well as some stormwater services within the North Kellyville precinct. Infrastructure components to be constructed as part of the Project include:

- potable water trunk mains
- recycled water trunk mains
- wastewater carriers
- water pumping stations
- sewage pumping stations and upgrade of an existing sewage pumping station
- a stormwater detention basin on Smalls Creek
- amplification of Riverstone Sewage Treatment Plant
- provision of recycled water facilities at Quakers Hill Sewage Treatment Plant
- water and recycled water reservoir infrastructure at Cudgegong Road.

Key environmental issues

The preliminary environmental investigations presented in this report indicate that the construction of the infrastructure and the provision of recycled water may result in issues in the areas of:

- terrestrial ecology
- human health
- indigenous heritage
- surface water quality and hydrology
- soils and groundwater.

These issues will require further detailed consideration and it is proposed that these issues will form the focus of the Environmental Assessment (EA), under Part 3A of the Environmental Planning and Assessment Act 1979.

Sydney Water will prepare a draft Statement of Commitments to be included in the EA to describe how these issues will be managed throughout implementation of the Project.



Minor environmental issues

The preliminary environmental investigations presented in this report suggest that the following environmental issues are unlikely to significantly affect the environment, and could be readily managed through the preparation and implementation of standard work procedures and environmental mitigation measures:

- soils and groundwater (construction)
- surface water quality and hydrology (construction)
- non-indigenous heritage
- waste management
- hazardous materials
- aquatic ecology
- noise and vibration
- visual amenity
- air quality
- traffic
- land use and tenure
- social / economic.

It is proposed that these issues be addressed and managed through Sydney Water's Statement of Commitments and the Conditions of Approval for the Project, which will determine the requirements for environmental management.



Glossary and abbreviations

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 1992. These guidelines provide reference levels for comparison with water quality results in storages and inflows.

Aquatic Organisms: Organisms which live in water - stored water, river and streams.

Australian Drinking Water Guidelines (ADWG): The guidelines provide summary of the criteria, which represents the basis for identifying acceptable water quality.

BASIX: Building Sustainability Index.

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.

Bubble licence condition: A condition within the wastewater treatment plant licences that covers more than one plant. The condition sets standards for pollution reduction across all of the plants as a whole, rather than individually.

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

Calcium (Ca): A naturally occurring element which can enter the water from the catchments. It may also be added to water in the treatment process to reduce the acidity levels.

CAMBA: Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment.

Catchment: An area of land surrounding a dam or water storage. Rain falling over the catchment drains to the dam and may contain nutrients, minerals and other contaminants collected from the land surfaces. May also refer to areas served by a wastewater or stormwater system.

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

Chlorine (CI): A naturally occurring element. To ensure good quality drinking water, chlorine is added to kill bacteria that may cause disease. We test for the residual chlorine that needs to be present to make sure that the water is disinfected all the way to your tap. The health guideline value for chlorine depends on the type used. Some systems use 'free' chlorine (5 mg/L) and others use monochloramines (3 mg/L)

Chlorophyll A: Produced by plants and indicates the potential presence of algae in stored water.

CMP: Conservation Management Plan.

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.

DACHA: Darug Aboriginal Cultural Heritage Assessments.

DCAC: Darug Custodian Aboriginal Corporation.

DECC: Department of Environment and Climate Change, the primary NSW public sector organisation responsible for protecting the environment.

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



DoH: Department of Health.

DoP: Department of Planning.

Director General: DG

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.

DLALC: Deerubbin Local Aboriginal Land Council.

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

DTAC: Darug Tribal Aboriginal Corporation.

Dual reticulation: A water supply system that provides two types of water services to each property. It requires two separate pipe systems in the roads and properties: a drinking water system suitable for indoor use and requiring high quality water, and a recycled water system for water that can be used outdoors and to flush toilets etc.

Ecologically Sustainable Development (ESD): Ecologically sustainable development - 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, plus 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 reuse: Effluent reuse is a process where treated wastewater is recycled for useful purposes and is not discharged to a natural waterway. The treated water may be used in industry, for golf courses or to water plants.

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

EA: Environmental Assessment.

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

EMP: Environmental Management Plan

EMS: Environmental Management System, the framework for the management of environmental issues.

Environmental Flows: Water provided for the environment to sustain and, where necessary, restore ecological processes and biodiversity of water-dependent ecosystems.

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.

EPA: Environmental Protection Authority

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

EPLs: Environment Protection Licences issued by the Department of Environment and Climate Change (DECC).

Estuary: The lowermost point of a river system that is a mixture of fresh water and sea water.



Evaporation: Liquid water from the rivers, dams and oceans is converted by the sun to water vapour which rises back into the atmosphere as a gas through a process called Evaporation.

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

Gigajoule (GJ): A measure of energy equal to a billion joules.

Gigalitre (GL): A measure of volume equal to a billion litres.

GIS: Geographic information system.

Greenhouse effect: Warming of the Earth's atmosphere as a result of increases in carbon dioxide and other gases.

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, which contribute to the warming of the Earth's atmosphere.

Grey water: Domestic wastewater from sources other than toilets - for example, water from washing machines and dishwashers.

GCC: Growth Centres Commission

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).

ha: hectare

Iron (Fe): A naturally occurring element that occurs at low levels in water and may be responsible for taste and staining problems. It is measured in milligrams per litre (mg/L).

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

JAMBA: Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their Environment.

Kilolitre (kL): One thousand litres of water or one tonne.

LEP: Local Environment Plan - a statutory planning instrument.

LGA: Local Government Area.

Leached: The collection of minerals, elements and salts in water as it passes through the environment.

Litre (L): A measure of liquid volume.

Macroinvertebrate: Animals without backbones greater than 1 millimetre long that live in the water column, on the water surface or on the bottom of a waterway.

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. It is measured in milligrams per litre (mg/L).

Megalitre (ML): A measurement of volume equal to one million litres.

Microfiltration: A pressure-driven membrane operation in which very fine particles or other suspended matter are separated from a liquid. Microfiltration is capable of removing suspended solids, bacteria or other impurities. Membrane pore sizes are slightly larger than those used for ultrafiltration.

Microgram (ug/L): Unit of measurement which is equivalent to 0.001 of a milligram.

Microgram per litre (ug/L): Unit of measurement which is equivalent to 0.001 of a milligram expressed per litre.

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 expressed per litre.

Millilitre (mL): Unit of measurement which is equivalent to 0.001 of a litre.

Millimetre (mm): Unit of measurement which is equivalent to 0.001 of a metre.

Mineral Elements: Naturally occurring elements which can enter the water from the catchments.

National Guidelines for Water Recycling: Managing Health and Environmental Risks: Natural Resource Management Ministerial Council, Environmental Protection and Heritage Council, Australian Health Ministers Conference - National Guidelines for Water Recycling: Managing Health and Environmental Risks (2006).

NSW Guidelines for Urban and Residential Use of Reclaimed Water: NSW Guidelines for Urban and Residential Use of Reclaimed Water (NSW Recycled Water Coordination Committee, 1993).

Environmental Guidelines – Use of effluent by irrigation: Environmental Guidelines – Use of effluent by irrigation (DEC 2004).

Naturally Occurring: Within the natural environment as minerals, elements, salts, and other contaminants.

NH&MRC Guidelines: Advisory standards established by the NH&MRC with respect to the performance of products to ensure they are within safe levels. The latest drinking water guidelines were agreed in 2004.

NH&MRC: The National Health and Medical Research Council that is an advisory body to the Australian Government.

Nitrogen (N): A naturally occurring element that can enter the water from the catchments. Is used by plants as a nutrient.

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

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

NPWS: National Parks and Wildlife Service

OH&S: 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.

Organic: Of animal or vegetable origin.

Organism: Any living animal or plant.

Ozone: A form of oxygen with three rather than the normal two oxygen atoms, a strong oxidising agent.

PAD: Potential archaeological deposit

Parasites: An organism that relies on a host organism to grow.

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

Per capita: For each head of population.

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.



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

POEO Act: Protection of the Environment Operations Act.

Pollutants: Contaminants in water 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.

Potable: Fit or suitable for drinking.

Preliminary Environmental Assessment: PEA

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.

Renewable resource: A resource that is replenished at the same rate it is used.

REP: Regional Environmental Plan - a statutory 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 humanmade water storage areas, usually on high land. From these storage facilities the water flows through a system of mains and smaller pipes to homes, shops, factories, schools and public places.

RHRWP: Rouse Hill Recycled Water Plant.

ROTAP: Rare or Threatened Australian Plants.

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

SCA: Sydney Catchment Authority, the NSW Government agency responsible for managing and protecting Sydney's catchments and supplying bulk water to Sydney Water and a number of local councils.

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.

Sewage: The wastewater from homes, offices, shops, factories and other premises discharged to the sewer. About 99 per cent of sewage is water.

Sewerage system: The network of pipes, pumping stations and treatment plants used to collect, transport, treat and discharge sewage (wastewater).

SPS: Sewage pumping station.

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

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. This untreated water is carried in stormwater channels and discharged directly into creeks, rivers, the harbour and the ocean.



STP: Sewage treatment plant - a facility to improve sewage quality before discharge to receiving waters.

SOE: Statement of 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 ESD.

TSC Act: Threatened Species Conservation Act 1995

Total Dissolved Solids: Dissolved salts in water.

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)

Upgrade: To improve something.

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 system: The system of pipes and pump stations for collecting and transporting wastewater from each property to the wastewater (sewage) treatment plant.

Wastewater treatment plant: Wastewater treatment plants treat wastewater, also known as sewage, from the sewerage system. Once the waste is treated it is then either discharged to the environment or it is recycled as effluent reuse.

Wastewater treatment - High rate primary: Wastewater treatment that provides less than full primary treatment due to high flow rates.

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 fine organic solids.

Wastewater treatment - Tertiary: The third stage in the purification of wastewater. This process consists largely of the removal of 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; seasonal and highly influenced by the weather.

Water filtration plants (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 stations (WPS): Water pumping stations house mechanical pumping equipment used to lift water from lower ground to higher ground through pipes.

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

Water reuse: The use of water more than once, following treatment of wastewater to an appropriate quality standard and delivery to the point of use.

Water Sensitive Urban Design (WSUD): Incorporates a range of initiatives designed to reduce the impact of urban stormwater discharge.



Water Treatment Plant: See Water Filtration Plant.

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. There are many different types of wetlands which can be found all the way from the coast to the middle of the Australian continent. The many types of wetlands may also be referred to as marshes, mangroves, swamps, bogs or billabongs. Wetlands are rich in biodiversity and are the home to many unique wildlife species. They can also provide a seasonal home for migratory birds from all over the world. 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.

WSWRI: Western Sydney Recycled Water Initiative





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1 Introduction

1.1 Purpose of this report

This Preliminary Environmental Assessment (PEA) has been prepared to support Sydney Water's project application for the North West Growth Centre - Water Related Services for First Release Precincts (the Project). This report identifies potential environmental impacts associated with the Project to allow the NSW Department of Planning (DoP) to issue Director-General's (DG's) requirements for an Environmental Assessment (EA).

1.2 **Project background**

Sydney's population is currently expanding, with an estimated five million people expected to reside within the greater Sydney region by 2030. In response to the projected population growth, the NSW Government is planning for Sydney's future through the *Metropolitan Strategy City of Cities – A Plan for Sydney's Future* (Metropolitan Strategy).

The Metropolitan Strategy is based on anticipated population, economic and demographic trends, and has been developed with five aims:

- Enhance livability
- Strengthen economic competitiveness
- Ensure fairness
- Protect the environment
- Improve governance.

In 2006 the NSW Government confirmed that two major growth centres in Sydney; the North West and South West Growth Centres, would play a key role in the Government's Metropolitan Strategy. The North West and the South West Growth Centres are the last two remaining areas available within the Sydney basin for new urban development. They represent an opportunity to deliver well-designed urban development for future generations.

The North West Growth Centre (NWGC) (Figure 1) will contain about 66,000 new dwellings and the South West Growth Centre about 115,000 new dwellings catering for thirty to forty percent of Sydney's growth over the next 30 years. Extensive new regional infrastructure is required in these development areas, including infrastructure for the provision of water, recycled water and wastewater services.

Several development precincts within the North West Growth Centre have been announced for early release. These First Release Precincts include:

- North Kellyville
- Riverstone
- Alex Avenue
- Riverstone West
- Area 20

The Project area consists of these precincts as shown in Figure 2. Some of the Project pipelines are outside these areas. The Colebee precinct is also a first release precinct, however this precinct is not part of this project as it is currently being developed by the private sector.

1.2.1 Metropolitan Water Plan

The NSW Government's 2006 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 during drought and non-drought times, while minimising the costs to the community and the environment.



One of the strategies outlined in the 2006 Metropolitan Water Plan is the Western Sydney Recycled Water Initiative (WSRWI). This initiative aims to maximise the beneficial use of recycled water, saving up to 27 billion litres of drinking water per year by 2015.

One component of the WSRWI is providing recycled water for new dwellings in the Growth Centres. Recycled water will be provided for toilet flushing and garden watering through a dual reticulation pipe system.

In addition, the WSRWI includes the Replacement Flows Project, which will substitute up to 18 billion litres of drinking water currently being released each year from Warragamba Dam into the Hawkesbury-Nepean River with highly treated recycled water. The project will connect Penrith, St Marys and Quakers Hill Sewage Treatment Plants (STPs) to allow treated wastewater from the three plants to be further treated at a new advanced water treatment plant at St Marys. The highly treated recycled water will then be released into the Hawkesbury-Nepean River below Penrith Weir.

1.3 Urban planning context

1.3.1 Growth Centres Commission

The Growth Centres Commission (GCC) has been established to ensure that new development in the Growth Centres proceeds with infrastructure and services planned, funded and linked to the sequence of land release. The Commission is responsible for working with infrastructure agencies (including Sydney Water), industry, local councils, landowners and the community to make the plans for the Growth Centres a reality. Sydney Water is supporting the GCC by planning water related infrastructure for the Growth Centres to meet the proposed urban development timeframes.

1.3.2 Staging of land release

Sydney Water's development of sustainable, integrated water related services for future growth areas has been timed to meet the GCC's land development program. Lot development in the First Release Precincts will begin progressively from 2009. Initial lot development in the North West Growth Centre will be in North Kellyville. Lot development in future release areas is subject to determination by the GCC. Planning is currently being carried out to identify servicing options for water, recycled water and wastewater for all the First Release Precincts as well as stormwater for North Kellyville.

1.4 Description of the project area

The Project Area comprises the First Release Precincts described in detail below.

1.4.1 North Kellyville

The North Kellyville precinct is bounded by Samantha Riley Drive to the south, Second Ponds, Caddies and Smalls Creeks to the west, Cattai Creek to the east and at the most northerly point by the junction of Second Ponds Creek and Cattai Creek. The precinct has a total area of 707 hectares (ha) and is characterised by predominantly rural residential development. North Kellyville is located in the Baulkham Hills Local Government Area (LGA) and is shown in Figure 2.

The North Kellyville precinct will provide for the release of a total of 4,500 new dwellings to cater for an estimated 12,600 people and will benefit from its proximity to existing residential areas and the planned Rouse Hill Regional Centre.

North Kellyville precinct has been identified as a First Release Precinct as it is adjacent to existing urban development and has easy access to water and wastewater services. Sydney Water is to install trunk pipelines for the supply of potable water, recycled water and wastewater, as well as stormwater drainage services.

1.4.2 Riverstone

Riverstone precinct is bounded by Bandon Road to the north, Schofields Road to the south, Richmond Rail Line to the west and First Ponds Creek and Windsor Road to the east. The precinct has a total area of 1,149 ha and is characterised by a mix of urban development around the train



stations, rural residential development and the Riverstone Scheduled Lands. Riverstone is located in Blacktown LGA and is shown in Figure 2.

Riverstone precinct is expected to accommodate around 8,500 new dwellings over the next 25 to 30 years. The Precinct will be supported by a Town Centre adjacent to the Riverstone Rail Station.

1.4.3 Alex Avenue

Alex Avenue precinct is bounded by Burdekin Road to the south, Schofields Road to the north, Richmond Rail Line to the west and the Second Ponds Creek release area to the east. The precinct has a total area of about 450 ha and is characterised by rural residential, intensive animal and agricultural activities, with some community facilities including two schools. Alex Avenue is located in Blacktown LGA and is shown in Figure 2.

Alex Avenue precinct is expected to provide for around 7,000 dwellings over the next 25 to 30 years. The precinct will be supported by a Town Centre in the vicinity of the Richmond Railway Line. Smaller neighbourhood centres will provide local retail and community services. Schofields Road will be an important regional road link to the east and west. The planning process for the Alex Avenue precinct is being coordinated in conjunction with planning for the Riverstone Precinct.

1.4.4 Riverstone West

Riverstone West precinct is bounded by Bandon Road to the north, Richmond Rail Line to the east, Garfield Road to the south and Eastern Creek to the west as shown on Figure 2. The precinct has a total area of 290 ha and is within the Blacktown LGA. The precinct has extensive areas of flood-affected land with about 40 ha of existing industrial land. The original proposal to develop 500 residential lots has been superseded with a proposal to develop an additional 65 ha of industrial land, totalling 105 ha of industrial land.

1.4.5 Area 20

Area 20 precinct is bounded by Schofields Road to the south, Second Ponds Creek to the west and the Windsor Road to the north east as shown on Figure 2. The precinct has a total area of 100 ha. Area 20 is in the Blacktown LGA close to Rouse Hill Regional Centre. It is proposed to develop around 1500 dwellings to serve a population of about 4,200.

1.5 Stakeholder and community consultation

1.5.1 Consultation approach

Sydney Water will develop and implement a Stakeholder Consultation and Communications Strategy, which will include a range of activities to keep key stakeholders involved and informed throughout the Project. Key stakeholders fall into three main groups as outlined below.

1.5.2 Government stakeholders

As the coordinating agency, the Growth Centres Commission has been working with key Government stakeholders, including Sydney Water, involved in all aspects of the precinct planning process. Sydney Water will also consult with these stakeholders regarding the delivery of water, wastewater and recycled water infrastructure in the First Release Precincts. Government stakeholder issues will be recorded and addressed in the Environmental Assessment (EA). In addition, each stakeholder will be invited to comment on the final EA document when it is released for public exhibition and any further issues or concerns will be addressed in the Preferred Project Report.

Key Government stakeholders to be consulted include:

- Growth Centres Commission
- Department of Planning
- Department of Environment and Climate Change
- Department of Water and Energy



- Department of Health
- Baulkham Hills Shire Council
- Blacktown City Council
- Hawkesbury City Council
- Integral Energy
- Transport Infrastructure Development Corporation
- Rail Corp
- Roads and Traffic Authority
- Hawkesbury Nepean Catchment Management Authority

1.6 Aboriginal stakeholders

It is anticipated that the following Aboriginal stakeholder groups will have an interest in the Project:

- Darug Custodian Aboriginal Corporation (DCAC)
- Deerubbin Local Aboriginal Land Council (DLALC)
- Darug Tribal Aboriginal Corporation (DTAC)
- Darug Aboriginal Cultural Heritage Assessments (DACHA)

Consultation with these groups has been initiated in accordance with the Interim Aboriginal Community Consultation Requirements for Applicants (2004) prepared by DECC. Further consultation will be undertaken during the EA.

1.7 Community stakeholders

Members of the broader community have also been actively involved in the precinct planning process through the GCC. Local landowners, environmental groups, community development and rezoning coordination groups and developers have been consulted throughout the precinct planning process. The GCC has organised a number of Open Days for the North Kellyville Precinct. Sydney Water has been in attendance to answer questions from the community regarding water related infrastructure. In addition, Sydney Water has worked closely with the GCC to deliver favourable outcomes for the community.

Sydney Water will continue to keep the broader community informed about the Project and about the EA through newsletters, advertisements and letters and members of the community will be invited to make a submission on the EA. As with our other key stakeholder groups, community issues and concerns will be addressed in the Preferred Project Report.

1.8 The proponent

Sydney Water Corporation (Sydney Water), a statutory State owned corporation wholly owned by the New South Wales Government, is the proponent of the Project.



2 Project description

2.1 Key elements of the project

Sydney Water is responsible for the planning and provision of recycled water, potable water and wastewater in the Project area, as well as some stormwater services within the North Kellyville precinct. Infrastructure components to be constructed as part of the Project include the following:

- Potable water trunk mains
- Recycled water trunk mains
- Wastewater carriers
- Water pumping stations
- Sewage pumping stations and upgrade of an existing sewage pumping station
- A stormwater detention basin in Smalls Creek
- Amplification to Riverstone Sewage Treatment Plant
- Provision of recycled water facilities at Quakers Hill Sewage Treatment Plant
- Water and recycled water reservoir infrastructure at Cudgegong Road.

Figure 3 shows the major components of the Project in each precinct. Potable water, recycled water and wastewater pipes will be installed below ground. Smaller reticulation mains will be constructed by developers. They are not part of the proposed Project.

2.2 Potable water

2.2.1 North Kellyville

New potable water infrastructure to be constructed in North Kellyville would consist of about 6.0 kilometres (km) of trunk mains with pipeline sections ranging in size from 200 to 450 millimetres (mm) in diameter. About 1.5 km of these pipelines would be installed adjacent to the new development area in the existing suburb of Kellyville.

One potable water pipeline would run southwards along the length of Barry Road, west along Withers Road then south along Hezlett Road until the junction of Samantha Riley Drive and continue along James Mileham Drive, Geemna Avenue and Acres Road. A second pipeline would run south from Kendal Place along Foxall Road then along Samantha Riley Drive and through an existing pathway to Marella Drive. These two pipelines would be connected to existing potable water pipelines in Kellyville.

Potable water mains would be supplied from Parklea Reservoir by the water pumping station and Kellyville Elevated Reservoir which were built as part of the Rouse Hill Stage 3 development.

2.2.2 Riverstone, Alex Avenue & Riverstone West

Major infrastructure needs to be provided to service the First Release Precincts of Riverstone, Alex Avenue and Riverstone West. The infrastructure includes a potable surface and elevated reservoir, pumping stations and chlorine dosing facilities at the Cudgegong Road site, a water pumping station along Rouse Road and about 11.5 km of new trunkmains varying in size from 1200mm to 300mm in diameter, located in various roadways, drainage reserves and existing easements. Potable water mains would be supplied from Parklea Reservoir via a proposed water pumping station located along Rouse Road to the proposed reservoirs at Cudgegong Road.

Existing communities and rural residential land that are currently serviced by the Marayong system will be transferred to the proposed potable water supply system.



2.2.3 Area 20

The Area 20 precinct is located entirely within the Parklea water supply system. Existing potable water infrastructure has capacity to be extended into this area. It is proposed that developers will deliver mains that need to be provided along Schofields Road, Cudgegong Road and Rouse Road.

2.2.4 Description of land

The potable water pipelines will transverse areas of Blacktown City Council and Baulkham Hills Shire Council Local Government Areas (LGAs). Some land is within private ownership. Descriptions of the land affected by pipelines associated with the Project will be provided in the EA.

2.3 Recycled water

2.3.1 North Kellyville

The recycled water infrastructure needed to serve North Kellyville would comprise about 3.7 km of new pipeline, with pipeline diameters ranging in size from 250 to 450 mm. All pipelines would be located within the precinct.

The new recycled water pipelines would connect to the existing recycled water infrastructure that serves the suburb of Kellyville. The recycled water would be supplied by the existing Rouse Hill Recycled Water Plant (RHRWP).

One recycled water pipeline would run southwards along the length of Barry Road, west along Withers Road then south along Hezlett Road until the junction of Samantha Riley Drive. A second pipeline would run south from Kendal Place along Foxall Road to Samantha Riley Drive. These two pipelines would be connected with a third pipeline along Samantha Riley Drive, which would be connected to existing recycled water pipelines in Kellyville.

2.3.2 Riverstone, Alex Avenue and Riverstone West

Major recycled water infrastructure needs to be provided to service the initial precinct areas of Riverstone, Alex Avenue and Riverstone West. The infrastructure will include recycled surface and elevated reservoirs, pumping stations and chlorine dosing facilities at the Cudgegong Road site. About 11.5 km of new trunkmains, varying in size from 300mm to 900mm, will be located in various roadways and reserves.

Initially recycled water will be sourced from the Quakers Hill STP and pumped to the Cudgegong Road site.

At strategic locations within the recycled water system there will be links with the potable water system to enable "topping-up" with potable water during peak demand or when sufficient recycled water is unavailable.

2.3.3 Area 20

The precinct known as Area 20 is located entirely within the Parklea North recycled water supply system. The existing recycled water infrastructure has sufficient capacity to be extended into this area. It is proposed that developers will deliver new mains along Schofields Road, Cudgegong Road and Rouse Road separately to this Project.

2.3.4 Description of Land

The recycled water pipelines will transverse areas of Blacktown City Council and Baulkham Hills Shire Council LGAs. Some land is within private ownership. Descriptions of the land affected by pipelines associated with the Project will be provided in the EA.



2.4 Wastewater

2.4.1 North Kellyville

Two new wastewater carrier mains are proposed:

- The Cattai Creek Carrier, which will follow the Cattai Creek corridor
- The North Kellyville Carrier, which will follow the Smalls Creek corridor.

The Cattai Creek Carrier is to serve the eastern and northern sides of the development area, while the North Kellyville Carrier is to service the western and southern portions.

Wastewater would be transported via existing pumping stations and pipelines to RHRWP for tertiary treatment and disinfection.

2.4.2 Riverstone, Riverstone West and Alex Avenue

Four new wastewater carrier mains, a new Sewage Pumping Station (SPS) and rising main and upgrade to an existing SPS are proposed.

The four proposed carriers are:

- the Chain of Ponds Creek Carrier, which would follow the Killarney Chain of Ponds Creek corridor.
- the First Ponds Creek Carrier, which would follow the First Ponds Creek corridor.
- the Level Crossing Carrier.
- the Alex Avenue Carrier.

The Chain of Ponds Creek Carrier and First Ponds Creek Carrier would serve the eastern side of the Riverstone and Alex Avenue Precincts and discharge into the proposed SPS and wastewater would then be transferred via rising main to Riverstone STP. The proposed site for the SPS is currently privately owned and will need to be acquired by Sydney Water.

The existing Riverstone Carrier and proposed Alex Avenue Carrier would serve the western side of the Riverstone, Alex Avenue and part of the Riverstone West Precincts, discharging into an existing SPS. The Level Crossing Carrier will serve the remaining part of the Riverstone Precinct and also discharge into an SPS and wastewater would then be transferred to Riverstone STP. An SPS will be upgraded as a component of this Project.

2.4.3 Area 20

Area 20 is within the Rouse Hill Sewerage Catchment and will drain to the RHRWP. The site is currently serviced by the Second Ponds Creek Carrier and no additional wastewater infrastructure is proposed to be constructed by Sydney Water.

2.4.4 Description of land

The wastewater pipelines will traverse areas of Blacktown City Council, Hawkesbury City Council and Baulkham Hills Shire Council LGAs. Some land is within private ownership. Descriptions of the land affected by pipelines associated with the Project will be provided in the EA.

2.5 Stormwater

2.5.1 North Kellyville

Responsibility for trunk drainage lies with both Baulkham Hills Shire Council and Sydney Water. Baulkham Hills Shire Council will have responsibility along the western corridor of Cattai Creek and Sydney Water along Second Ponds, Caddies and Smalls Creeks.

Results from stormwater planning and modelling has identified that the area from the centreline of Second Ponds, Caddies and Smalls Creeks to the 1:100 year flood line is to be acquired by Sydney Water and form part of the trunk drainage corridor for the Rouse Hill Project Area stormwater catchment. The construction of a basin, known as Basin 6 was also identified as an



extended detention wetland that would reduce phosphorus and other pollutant loads as well as reduce peak urban flows. Basin 6 will require the construction of an overflow spillway. The spillway and resultant ponding will be located along Smalls Creek, most likely north of Withers Road and contained within the area of the 1:100 year flood line.

2.6 Sewage and water pumping stations

2.6.1 Sewage pumping stations

One new sewage pumping station (SPS) and upgrade of an existing SPS is required for the Project.

The proposed site for the new SPS will need to be acquired by Sydney Water and will be located along Old Hawkesbury Road. The proposed rising main will discharge into Riverstone STP.

The existing SPS is located within Sydney Water owned land and the proposed upgrade will include pumps, electrical supply and the rising main.

2.6.2 Water pumping stations

In total, six water pumping stations are proposed to be constructed. Three will be located at the Cudgegong Road reservoir site; one to transfer water from the potable water reservoir to the potable water elevated reservoir, one to transfer potable water to the recycled water system and one to transfer recycled water from the recycled surface reservoir to the recycled elevated reservoir. Of the three remaining water pumping stations, two will be located at Quakers Hill STP, one to transfer recycled water from the recycled water treatment plant to the proposed on-site reservoir and the other to transfer recycled water from Quakers Hill STP to the Cudgegong Road reservoir site. The third water pumping station will transfer potable water from the Parklea water supply system to the Cudgegong Road reservoir site. The water pumping station will be located at Quakers Hill STP and the other to transfer recycled water from the transfer potable water from the Parklea water supply system to the Cudgegong Road reservoir site. The water pumping station will be located along Rouse Road, within private land that is proposed to be acquired by Sydney Water.

2.6.3 Description of land

Some land required will be in private land. Descriptions of the land affected will be provided in the EA.

Location and Address	Lot and DP Number	Land Owner	Local Government Area
Cudgegong Road Reservoir	Lot 4 DP 564381	Sydney Water	Blacktown City Council
	Lot 1 DP 567502	Sydney Water	Blacktown City Council
	Lot 1 DP 569723	Sydney Water	Blacktown City Council
	Part Lot 3 DP 569723	Private	Blacktown City Council
	Part Lot 2 DP 567502	Private	Blacktown City Council
Quakers Hill STP	Lot 1 DP 1029672	Sydney Water	Blacktown City
Quakers Road, Quakers Hill			Council
New South Wales 2763			

Table 2-1 Water pumping stations land tenure



Location and Address	Lot and DP Number	Land Owner	Local Government Area
Rouse Road	Lot 100 DP 1049793	Private	Blacktown City Council

2.7 Riverstone sewage treatment plant

2.7.1 Key elements

The Riverstone sewage treatment plant (STP) will be amplified initially from about 2 Megalitres per day (ML/d) to 9.2 ML/d to cater for the full development from the early release areas of Riverstone, Alex Avenue and Riverstone West and subsequently augmented for the ultimate development of the North West Growth Centre catchment.

Water quality modelling will be undertaken to determine the appropriate effluent quality for Riverstone STP. However, the amplified Riverstone STP will include the following:

- Primary/secondary and tertiary treatment facilities
- Sludge/biosolids processing and handling facilities
- Odour collection and treatment facilities
- Control systems
- Power supplies and necessary electrical switchgear.

Riverstone STP must comply with the 'bubble licence' condition set by the Department of Environment and Climate Change (DECC). The 'bubble licence' condition involves combined annual load limits on total nitrogen (TN) and total phosphorus (TP) for all STPs (Quakers Hill, Riverstone and St Marys) discharging in the South Creek Catchment.

Specific load limits and concentration limits other than TP and TN are also imposed on Riverstone STP for a number of pollutants as part of the Environment Protection Licence (EPL).

The amplified Riverstone STP will be required to comply with the bubble licence for TN and TP loads and other concentration limits as required in the EPL.

2.7.2 Description of land

Table 2-2 Riverstone STP land tenure

Location and Address	Lot and DP Number	Land Owner	Local Government Area
Riverstone STP Bandon Road Vineyard New South Wales 2763	Lot 1 DP 594977	Sydney Water	Blacktown City Council

2.8 Quakers Hill sewage treatment plant

2.8.1 Key elements

A 10 ML/d recycled water facility would be built at Quakers Hill STP site to meet the residential recycled water demand in the North West Growth Centre.

The treatment process units for the recycled water facility at Quakers Hill STP would be similar to RHRWP process units. The process adopted for the recycled water plant would be ultraviolet



disinfection followed by superchlorination. This process has been approved by the Department of Health (DoH) for RHRWP.

The recycled water facility at Quakers Hill would meet *NSW Guidelines for Urban & Residential Use of Reclaimed Water* (NSW Recycled Water Coordination Committee, 1993) and the *Natural Resource Management Ministerial Council, Environmental Protection and Heritage Council, Australian Health Ministers Conference - National Guidelines for Water Recycling: Managing Health and Environmental Risks* (2006). Sydney Water and DoH have agreed to a multi barrier approach to the treatment of recycled water for non-potable residential use in order to safeguard public health.

Quakers Hill STP will require the construction of additional treatment processes to produce recycled water quality product. Infrastructure will include, recycled water treatment plant (ultraviolet and super chlorination), two pumping stations, storage reservoir, size to be determined and associated pipework.

2.8.2 Description of land

Location and Address	Lot and DP Number	Land Owner	Local Government Area
Quakers Hill STP Quakers Road, Quakers Hill New South Wales 2763	Lot 1 DP 1029672	Sydney Water	Blacktown City Council

Table 2-3 Quakers Hill STP land tenure

2.9 Reservoir infrastructure

2.9.1 Cudgegong Road reservoir

It is proposed to locate the main reservoir infrastructure for the entire North West Growth Centre off Cudgegong Road at Rouse Hill. The proposed site is located on Sydney Water owned land, which was acquired for the purpose of a reservoir site. An additional small parcel of land would also need to be acquired for this component of the Project.

The Project will involve the construction of one 40 ML potable water surface reservoir, one 4 ML elevated potable reservoir, one 10 ML recycled water surface reservoir and one 2 ML recycled water elevated reservoir, two pumping stations, an electrical substation, a chlorination tank and pipelines.

2.9.2 Description of land

Some land required will be in private land. Descriptions of the land affected will be provided in the EA.

Table 2-4 Reservoir infrastructure land tenure

Location and Address	Lot and DP Number	Land Owner	Local Government Area
Cudgegong Road Reservoir	Lot 4 DP 564381	Sydney Water	Blacktown City Council
	Lot 1 DP 567502	Sydney Water	Blacktown City Council



Location and Address	Lot and DP Number	Land Owner	Local Government Area
	Lot 1 DP 569723	Sydney Water	Blacktown City Council
	Part Lot 3 DP 569723	Private	Blacktown City Council
	Part Lot 2 DP 567502	Private	Blacktown City Council

2.10 **Project phases**

2.10.1 Pre-construction activities

Pre-construction activities will include geotechnical and other physical or environmental surveys and detailed design of the infrastructure for the Project.

2.10.2 Construction phase

Potable and recycled water

The majority of potable and recycled water pipelines are proposed to be located in road verge areas, as footways are poorly defined and contain minor water mains, trees and other utilities. Small sections of the potable pipeline will be constructed in public reserves and vacant land. The preferred alignments have been chosen to avoid existing obstacles and minimise construction difficulty. As such, minimal clearing will be required for the construction of recycled water and potable water pipelines.

Due to the size requirements of the potable and recycled water pipelines, shared trenches are not a viable option for the installation of these pipelines. Potable water pipelines will be positioned on the opposite side of the street to recycled water pipelines. This will allow properly engineered bedding and backfill techniques to be used.

The size of the potable and recycled water pipeline trenches will generally be up to 1.7 metres (m) wide. The minimum trench depth will be between 950mm and 1500mm. The total construction footprint is expected to be about 6m wide.

Wastewater

Construction of the wastewater carriers will be primarily by trenching. Boring techniques will be used at most creek crossings and in environmentally sensitive areas where practicable. The trench depth will generally be between 2 and 3m below the ground's surface, but is dependent on topography and as such may be deeper or shallower in some areas. The total construction footprint is expected to be about 6m wide.

Construction techniques

Trenching

The majority of the pipeline route would be laid using trenching technology. Trenching is the preferred method as it allows access to the pipeline during construction. Construction activities associated with trenching may include:

- shoring and dewatering of trenches, depending on trench depth and groundwater levels
- laying the pipeline in a trench
- construction of maintenance holes
- covering the trench with excavated soil, compacting and restoring trenches and any surroundings disturbed by the construction work.



Boring

Boring would be used where appropriate to minimise disturbance in locations where there are particular environmental, safety, access or surface feature issues. Boring includes the construction of a launch shaft about 6m long by 3m wide and 3m deep and an exit shaft of similar or smaller size.

Reservoirs and water pumping stations

Construction will involve levelling the reservoir and WPS footprints, plus 2m around the outside of each reservoir and pumping station, to at least 0.5m below the ground. The base of each reservoir and pumping station must be flat, so excavations may be deeper on one side if the site is sloping. Pipelines entering and exiting the site would be constructed in trenches around 2m deep.

Construction equipment

Machinery to be used for excavations for pipelines, reservoirs and pumping stations would typically include excavators and a small compactor. Rockbreakers (possibly operated by air compressor/s) may also be required where bedrock is encountered during excavation. Spoil is likely to be stored on site and used to backfill pipeline trenches.

Site remediation

Site remediation will include restoration of pavements, driveways, roads, footpaths, turf and vegetation. This restoration would occur progressively throughout construction as sections of the pipelines are completed.

2.10.3 Operation phase

Riverstone STP

Riverstone STP will be attended from 7am to 4pm during weekdays by a team of production officers. After hours, the plant is monitored and controlled automatically by a control system. Production Officers are contacted via pager service or from the Sydney Water Operations Centre in the event of an alarm requiring after hours response. Staff can remotely interface with the plant via the control system.

Surplus effluent will be discharged to Eastern Creek upstream of South Creek which subsequently discharges to the Hawkesbury-Nepean River.

The quantity of screenings and grit collected will increase proportional to the flow to the STP and will be managed appropriately. Biosolids products will also increase and will be beneficially used in horticulture and/or agriculture markets in compliance with the NSW EPA *Environmental Guideline:* Use and Disposal of Biosolids Products (1997).

Energy and chemical consumptions are expected to increase proportional to the incoming sewage flow to the STP. Odours generated from various process units will be collected, treated and contained within the STP's buffer zone.

Quakers Hill STP

Quakers Hill STP is operated by staff in a similar manner to that described above for Riverstone STP. Tertiary treated wastewater will be further processed using UV disinfection and superchlorination.

Energy and chemical hypochlorite use for superchlorination will increase proportional to the volume of recycled water treated.

Sewage pumping stations

Sewage pumping stations would be routinely inspected and serviced with repairs carried out as necessary. Operation of the SPSs will be monitored remotely with the provision of telemetry units.

During operation, pumps will create minimal noise, which will be kept within the limits of the Industrial Noise Policy (EPA 2000).



Water pumping stations

Water pumping stations would be routinely inspected and serviced with repairs carried out as necessary. Operation of the WPSs will be monitored remotely with the provision of telemetry units.

During operation, pumps will create minimal noise, which will be kept within the limits of the Industrial Noise Policy (EPA 2000).

Pipelines

All water, recycled water and sewage pipelines would be routinely inspected and repaired as necessary. Critical valves would be routinely exercised to ensure they are in operating condition.



3 Planning and development process

3.1 NSW planning legislation

3.1.1 Environmental Planning and Assessment Act 1979

The Environmental Planning and Assessment Act 1979 (EP&A Act), the associated Environmental Planning and Assessment Regulation 2000 (EP&A Regulation), and environmental planning instruments made under the EP&A Act provide the framework for the assessment of environmental impacts and planning approval of development proposals in NSW. Part 3A of the EP&A Act establishes an assessment and approval regime for major infrastructure projects. Part 3A applies to development that is declared to be a Part 3A project by either a State Environmental Planning Policy or Ministerial Order.

On 29 July 2005 the then Minister for Infrastructure and Planning made an order declaring activities for which the proponent is also the determining authority (within the meaning of Part 5 of the EP&A Act) and for which the proponent also considers that an environmental impact statement should be prepared, to be a project to which Part 3A of the EPA&A Act applies.

Sydney Water, as proponent, has determined that the Project is considered likely to have a significant effect on the environment and, but for Part 3A, would have otherwise prepared an environmental impact statement. As a result the Project constitutes development to which Part 3A of the EP&A Act applies. In a letter dated 7 August 2007 Sydney Water sought confirmation from the Department of Planning (DoP) that the Project is a project to which Part 3A of the EP&A Act applies. In a letter dated 13 August 2007 the DoP provided confirmation that Part 3A of the EP&A Act applies to the Project.

3.1.2 State Environmental Planning Policy (Sydney Region Growth Centres) 2006

This Policy provides the initial environmental planning controls for the release of land within the Sydney Region Growth Centres. Detailed land use and development control will be progressively included on completion of the precinct planning process for individual precincts. This Policy will prevail over any other local planning policies administered by the local councils.

The aims of the policy are to:

- 1. co-ordinate the release of land for residential, employment and other urban development in the North West and South West Growth Centres of the Sydney Region
- 2. enable the Minister from time to time to designate land in those Growth Centres as ready for release for development
- 3. provide for comprehensive planning for those Growth Centres
- 4. enable the establishment of vibrant, sustainable and livable neighborhoods that provide for community well-being and high quality local amenity
- 5. provide controls for the sustainability of land in those Growth Centres that has conservation value
- 6. provide for the orderly and economic provision of infrastructure in and to those Growth Centres
- 7. provide development controls in order to protect the health of the waterways in those Growth Centres
- 8. protect and enhance land with natural and cultural heritage value
- 9. provide land use and development controls that will contribute to the conservation of biodiversity.

3.1.3 Local planning instruments

The area to be serviced by the Project is located within the Baulkham Hills, Blacktown and Hawkesbury LGAs. There are three Local Environment Plans (LEPs) relevant to the Project:



- Baulkham Hills LEP 2005 (Baulkham Hills LEP)
- Blacktown LEP 1988 (Blacktown LEP)
- Hawkesbury LEP 1989 (Hawkesbury LEP)

In the Baulkham Hills LGA the Project area is predominantly zoned Rural 1(a) under the Baulkham Hills LEP. A small number of components of the Project also fall in areas zoned Light Industry 4(b), Open Space 6(a) (Exist and Prop Public Recreation), Residential 2(b) and Special Uses 5(a) and 5(b) (Existing and Proposed Roads).

The construction and operation of the Project is permissible in all local land use zonings in the Baulkham Hills LGA. The Baulkham Hills LEP adopts the *Environmental Planning and Assessment Model Provisions 1980* (the Model Provisions), and development consent is therefore not required.

In the Blacktown LGA the Project area is predominantly in Zone No 1 (a) (General Rural Zone) under the Blacktown LEP. A small number of components of the Project also fall in other zones.

The construction and operation of the Project is permissible with consent in all local land use zonings. Under Clause 5 of the Blacktown LEP, the Model Provisions are adopted for the purposes of the Plan, and development consent is therefore not required.

In the Hawkesbury LGA the Project area is located in Zone MA (Mixed Agriculture) and Zone RL (Rural Living). The construction and operation of the Project is permissible without consent in these land use zonings.

3.1.4 Regional planning instruments

A number of Regional Environmental Plans (REPs) and State Environmental Planning Policies (SEPPs) are also relevant to the Project. These include:

- REP 19 Rouse Hill Development Area
- REP 20 Hawkesbury-Nepean River
- SEPP 19 Bushland in Urban Areas
- SEPP 33 Hazardous and Offensive Development.

The objectives and requirements of these environmental plans will be considered further in the development of the Project and the preparation of the EA.



3.1.5 Other legislation

Table 3-1 Legislation requirements

Legislation	Relevant requirements	Analysis of project application
Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Commonwealth)	 Approval of the Commonwealth Minister for Environment and Heritage is required for any action that may have a significant impact on matters of national significance. These matters are: World Heritage properties National Heritage Places Ramsar wetlands Migratory species, threatened species, or ecological communities listed in the EPBC Act Commonwealth land and Commonwealth marine areas Nuclear actions. 	The Project does not impact on Commonwealth Land. Potential for impact on ecological communities or threatened species listed on EPBC Act.
Sydney Water Act 1994	A person must not discharge any substance into a work owned by the Corporation except with the written agreement of the Corporation. Allows Sydney Water to open and break up the soil and pavement of a public road or public reserve without further approval.	Trade Waste Agreements will be negotiated with customers who are discharging tradewastes to sewer. Approvals are not required under the <i>Roads Act 1993</i> .
Occupational Health & Safety Act 2000 & Regulation 2001	Requires a manifest be kept at premises where dangerous goods are stored and handled in quantities that exceed the relevant quantities specified in Schedule 5 of the Regulation. Also requires that WorkCover is notified of the presence of the dangerous goods (these requirements commenced on 1 September 2006).	Chemical storage and handling of dangerous goods will be required for the operation of the Project. The requirement for a manifest and notification to WorkCover will be assessed for each site when quantities are determined.



Legislation	Relevant requirements	Analysis of project application
National Parks and Wildlife Act 1974	This Act provides for the protection, preservation and management of all Aboriginal relics throughout New South Wales. A Section 90 permit is required prior to the destruction of any known Aboriginal archaeological sites. A Section 87 application is required prior to the excavation of potential archaeological deposits. These permits are not required for a project approved under Part 3A of the EP&A Act.	Desktop studies indicate that Aboriginal sites may be located in undisturbed areas particularly along creeklines. Aboriginal archaeology surveys will be undertaken within those areas that are proposed to be disturbed and may contain archaeological deposits. Appropriate management actions will be implemented, such as boring, to minimise indigenous cultural impacts.
Protection of the Environment Operations Act 1997	This Act administered by the Department of Environment and Climate Change (DECC) requires licences for environmental protection including waste, air, water and noise pollution control. Under this Act it is an offence to pollute without the appropriate licence. The legal definition of 'water pollution' includes the introduction of any matter, solid, liquid or gas into waters which changes the physical, chemical or biological condition of the water. The owner or operator of a premise that is engaged in scheduled activities is required to hold an environment protection licence.	Environmental Protection Licences may be required for the construction and operation of the Project. Sydney Water will liaise with the DECC to determine appropriate licence requirements. Section 75(V) of the EP&A Act states that an authorisation of an environment protection licence cannot be refused if it is necessary for carrying out an approved project. This only applies to new environment protection licences.



Legislation	Relevant requirements	Analysis of project application
Threatened Species Conservation Act 1995 (TSC Act)	The TSC Act provides protection for threatened plants and animals native to NSW (excluding fish and marine vegetation, which are protected under the <i>Fisheries Management Act</i> <i>1994</i>), endangered ecological communities and critical habitat and integrates the conservation of threatened species into development control processes under the EP&A Act. A licence for harming or picking threatened species, endangered populations or endangered ecological community can be sought under Part 6 of the TSC Act. If it is likely that there will be a significant effect on threatened species or communities the preparation of a species impact statement is required.	Flora and fauna surveys will be conducted to determine the presence of threatened species within areas containing native vegetation or native fauna habitats at locations where significant construction disturbances will occur. The GCC is currently in the process of applying for Biodiversity Certification for the Growth Centres. Sydney Water must consider and be consistent with the mechanisms proposed to achieve positive conservation outcomes for Western Sydney
	The Act also contains provisions for the Minister for Climate Change, Environment and Water to certify Environmental Planning Instruments (EPIs) if satisfied that they will bring an overall improvement or maintenance in biodiversity values. Biodiversity must be maintained or improved for certification to be conferred.	



Legislation	Relevant requirements	Analysis of project application
Fisheries Management Act 1994 (FMA Act)	The Act provides for the conservation of the State's aquatic resources and is administered by the Department of Primary Industries (formerly New South Wales Fisheries). The Act requires that potential impacts of activities on aquatic habitat will be addressed during the environmental planning and assessment process.	It is considered unlikely, based on currently available information that the Project will trigger the need for a species impact statement under this Act. The Project will not obstruct fish passage.
	A licence for harm to threatened species or damage to a habitat can be sought under Part 7A of the FMA Act. If it is likely that there will be a significant effect on threatened species or habitat the preparation of a species impact statement is required.	
	Habitat Protection Plans No 1 (General) and 3 (Hawkesbury- Nepean River System) apply to the area.	
	A Permit will be required under s219 if a fish passage is obstructed due to work at a weir or other similar structure, but this permit is not required for a project under Part 3A of the EP&A Act. Similarly, permits under s201 & 205 of the FMA Act are not required for Part 3A projects.	
Water Management Act 2000	Approvals may be necessary following the gazettal of a water sharing plan for the Sydney area/Hawkesbury-Nepean River. projects approved under Part 3A of the EP&A Act are not required to obtain approvals under sections 89, 90 or 91 of the Act.	This legislation will be complied with following the gazettal of the water sharing plan for the metropolitan area which includes the Hawkesbury-Nepean River.
Heritage Act 1997	This Act provides for the conservation of the State's natural and built heritage. Under the Act, no item of historic heritage may be disturbed without an excavation permit from the Heritage Council (Section 60 for items listed on the State Heritage Register and Section 139 for 'relic' items). Excavation permits are not required for projects approved under Part 3A of the EP&A Act.	No significant non-indigenous heritage items have been identified that will be directly affected by the Project.



4 Preliminary environmental assessment

4.1 Risk analysis

A preliminary environmental risk analysis was undertaken for the Project to identify key environmental issues. The methodology for the risk analysis was taken from Sydney Water's Corporate Risk Management System which is based on Australian Standard AS/NZS 4360:1999 Risk Management and Environmental Risk Management – Principles and Process (Standards Australia, 2000). Consideration was given to both the construction and operation phases of the Project. A multidisciplinary approach was taken to the analysis, drawing on key internal stakeholders and Sydney Water environmental management personnel involved in the Project.

The risk analysis process followed a number of steps:

- Identification of components of the surrounding environment that may be impacted by the Project
- Identification of activities during construction and operation that may affect the environment component
- Identification of potential environmental impacts as a result of the proposed activities.

A qualitative ranking of consequence and likelihood was undertaken, and the risk considered in light of proposed control measures. Where residual risk was considered of concern these issues were categorised as key environmental issues for the Project.

4.2 Key environmental issues

The following factors have been identified as the key environmental issues for the Project:

- terrestrial ecology
- human health
- indigenous heritage
- surface water quality and hydrology
- soils and groundwater.

For each issue the existing environment is described, an assessment of key issues in light of the scope of the Project is provided and conclusions for the EA have been formulated.

4.2.1 Terrestrial ecology

Existing environment

The Project sits primarily on the landscape feature referred to as the 'Cumberland Plain', with a smaller proportion of the Project area on the Sydney Sandstone Plateau. The native vegetation in the area is extensively cleared and highly fragmented due to the semi-rural nature of the land, however a number of significant large patches of vegetation remain particularly in creeklines, open space zones and road verges.

The Project includes both ridgetops and alluvial gullies and incorporates two soil landscape types: the Blacktown soil landscape and the Hawkesbury soil landscape. As such, there is a complex mosaic of vegetation types throughout the Project area.

Terrestrial flora

The DECC has produced a series of vegetation maps for the Cumberland Plain. The DECC mapped the vegetation within the Project area as Shale Plains Woodland (a component of Cumberland Plain Woodland), Shale Sandstone Transition Forest (Low and High Sandstone Influence), Alluvial Woodland (a component of both River-flat Eucalypt Forest and Swamp Oak Floodplain Forest), Upper Georges River Sandstone Woodland, Western Sandstone Gully Forest,



Cooks River Castlereagh Ironbark Forest and Shale/Gravel Transitional Forest. A large portion of the eastern section of North Kellyville has been mapped as unclassified.

Flora and fauna surveys for the Project have further classified the following vegetation communities in the Project area:

- Cumberland Plain Woodland
- River-flat Eucalypt Forest
- Sandstone Ridgetop Woodland
- Shale Sandstone Transition Forest
- Upper Georges River Sandstone Woodland
- Western Sandstone Gully Forest
- Shale Gravel Transition Forest
- Swamp Oak Floodplain Forest.

Cumberland Plain Woodland and Shale Sandstone Transition Forest (both high and low sandstone influence) are both listed as endangered ecological communities under the TSC Act and EPBC Act. River-flat Eucalypt Forest, Shale Gravel Transition Forest and Swamp Oak Floodplain Forest are listed as endangered ecological communities under the TSC Act, but not under the EPBC Act.

Searches of the EPBC Act Online Database and the National Parks and Wildlife Sevices (NPWS) Atlas of New South Wales Wildlife Database were undertaken to identify recordings of plant species of conservation significance within the region. Seventeen threatened flora species were recorded in the Project area according to the search undertaken on the NPWS Atlas of New South Wales Wildlife Database. Sixteen threatened flora species were recorded in the Project area according to the search undertaken on the EPBC Act Online Database.

A number of flora species of regional significance have been recorded within the Project area and some of these are considered to be inadequately conserved in Western Sydney. These species of regional significance provide a regional context for the threatened flora and vegetation communities. Whilst there is no legal obligation for these species to be conserved they should be conserved where possible to assist with the conservation of the region's biodiversity.

Numerous flora species recorded within the Project are listed as noxious weeds. In some cases areas contain severe weed infestation, particularly adjacent to the creeklines.

Terrestrial fauna

Searches were undertaken of the EPBC Act Online Database and the NPWS Atlas of New South Wales Wildlife Database and previous studies were considered to prepare a list of potential fauna species in the Project areas. Twenty five native mammals, 176 native birds, 23 reptiles and 17 frogs and one snail were identified from these sources. In addition to these, a number of introduced animals have also been recorded. Of those native species previously recorded, 22 are listed under the Schedules to the EPBC and/or TSC Acts. Based on existing knowledge of the diversity of fauna habitats present within the Project area, combined with, a review of standard geological texts and the findings of the previous ecological studies, there is the potential that all these State and nationally listed threatened species previously recorded in the study region may be present within, or in the vicinity of, the Project area.

Assessment of key issues

Based on a preliminary assessment of the potential impacts to terrestrial flora and fauna the Project is likely to impact directly and indirectly on a number of threatened vegetation communities. These vegetation communities are likely to provide habitat for a range of threatened plant and animal species.

The flora and fauna assessment being carried out as part of the EA will identify the presence and extent of protected terrestrial ecology (as defined under the EPBC Act and NP&W Act), critical habitat, threatened species, populations, ecological communities (as defined under the EPBC Act



and TSC Act) and Rare or Threatened Australian Plants (ROTAPs) in the proposed pipeline alignments and infrastructure curtilage.

Referral to the Federal Minister for the Environment would be required if the proposed development is likely to have a significant impact under the EPBC Act on listed threatened species and migratory bird species (including JAMBA and CAMBA species). Parts of the Project (Cudgegong Reservoir site, Riverstone, Riverstone West and Alex Avenue) have already been referred to the Federal Minister for the Environment under the EPBC Act. The Minister has determined that these sites are not a controlled action. Further preliminary investigations of the entire Project Area have identified that another referral is required for Shale Sandstone Transition Forest.

Mitigation measures such as boring beneath creeks to ensure that biodiversity values are maintained will be considered during the flora and fauna assessment.

In addition to the flora and fauna assessments undertaken by Sydney Water for this Project, the GCC has prepared a draft Conservation Plan to obtain biodiversity certification for the Growth Centres SEPP. This plan identifies the existing biodiversity values within the North West Growth Centres and proposes a suite of mechanisms to achieve positive conservation outcomes for Western Sydney, and more broadly, the Sydney Basin. The aim of the plan is to streamline the development assessment process and provide for the future urban growth of Sydney whilst protecting the natural environment. Sydney Water will take into consideration the draft Conservation Plan and the biodiversity certification conditions when undertaking the EA for the Project.

Conclusions

The potential impact on terrestrial flora and fauna associated with the construction of the Project is considered a key issue and as such will be further examined as part of the EA.

4.2.2 Human health

Existing environment

Human health needs to be considered as part of the Project due to the fact that water related services are essential to public health. The provision of safe drinking water and sewage services is required to ensure that exposure to microbial hazards is minimised. The Project area is currently provided with limited potable water and sewage services which cover the relatively limited existing development. The area immediately south of the North Kellyville precinct is also provided with recycled water services from the RHRWP. These "mains" services will be extended into the precincts and developers will make connections to individual lots.

The Project will also involve the provision of recycled water services. Recycled water can have a wide variety of uses including:

- Urban Non-Potable Reuse:
 - residential (garden watering, toilet flushing and car washing)
 - closed system toilet flushing (office or factory systems with no direct human contact with recycled water)
 - municipal with uncontrolled public access (irrigation of open spaces, parks, golf courses, sportsgrounds, dust suppression, construction sites and ornamental water bodies).
- Recreational Impoundments Reuse:
 - passive recreation ornamental water bodies.
- Industrial Reuse:
 - closed system cooling water
 - open system for dust suppression.



Assessment of key issues

Health risks associated with recycled water could arise from its pathogen or toxicant (chemical) content. The presence of harmful chemicals in municipal wastewater is most likely to arise from industrial wastes. Provided that industrial discharges are properly controlled, through a comprehensive trade waste management system, the low levels of chemicals in recycled water are usually not of concern.

Pathogen risks from the microbiological content of the recycled water are usually the dominant risk for non-potable applications of recycled water. The major risk of human contact with treated wastewater is infection from viruses, bacteria, protozoa and helminths. Because there is a wide range of potentially infectious micro-organisms, it is impractical to specify water quality fully in terms of each of them. However it is possible, for practical applications, to work to an acceptable level of risk to public health using indicator pathogens.

The recycled water which would be provided would be to the standard of urban non-potable reuse as defined by the Natural Resource Management Ministerial Council, Environmental Protection and Heritage Council, Australian Health Ministers Conference - National Guidelines for Water Recycling: Managing Health and Environmental Risks (2006) and the NSW Guidelines for Urban and Residential Use of Reclaimed Water (NSW Recycled Water Coordination Committee, 1993). The Environmental Guidelines – Use of effluent by irrigation (DEC 2004) are also being applied to the Project.

Conclusions

Sydney Water is not seeking approval for the actual end use of recycled water. However, the potential health risks from the use of recycled water will be assessed in the EA. Appropriate safeguards and mitigation measures that would be implemented upon operation of the recycled water system to reduce or manage the identified risks will also be documented. Irrigation and industrial users of recycled water will be subject to separate environmental assessment and planning approval.

The Project will be refined in accordance with the risk management framework outlined by the *National Guidelines for Water Recycling – Managing Health and Environmental Risks* as part of the EA. The provision of potable and sewage services will be managed through Sydney Water's Integrated Management System procedures. These are used throughout Sydney Water's operations to ensure the reduction in pathogen and toxicant levels so as to mitigate the risk of impact on human health. These procedures and mitigation measures will be outlined in the EA.

4.2.3 Indigenous heritage

Existing environment

Within the Project area there are many recorded indigenous heritage sites. This reflects the extent of intense archaeological investigations over the last two decades and the landform, vegetation, geology and geomorphology of the area. While there are a lot of known sites it is anticipated that many more exist and the data that has been compiled to date does not reflect the overall nature of indigenous heritage value likely to occur in the area.

Site types which have been recorded in Western Sydney include the following types:

- Open campsites, where a range of camping and other activities would have taken place. Stone tools are the usual evidence of these locations.
- Scarred trees, where bark from trees has been removed to produce items of material culture such as shields, water carriers, food containers and canoes. These only survive where trees older than 200 years still grow (and subject to bushfire damage).
- Ceremonial sites, where initiation and other religious ceremonies took place and which were sometimes marked by the presence of earth mounds (bora rings). The identification of these locations depends on traditional knowledge and absence of farming/residential impacts.
- Grinding groove sites, where stone axes were sharpened. These sites are only found where sandstone outcrops occur, usually around the margins of the Cumberland Plain.



- Engraving or pigment art sites, which are evidence of artistic behaviour. The presence of these sites also depends on the outcropping of sandstone platforms and/or rock shelters.
- Quarry sites, which occur where natural resources, mainly stone for making tools, have been extracted. These depend on naturally outcropping raw material such as silcrete and silicified tuff.

These site types occur across all parts of the Cumberland Plain, however in the Project area a search of the DECC Aboriginal Heritage Information Management System indicates that the most likely site type to be encountered is the open camp site, scarred trees, and stone tool quarries. Because the Project area includes shale sandstone transition, and some Hawkesbury Sandstone geology, shelters with art and or occupation evidence, grinding grooves and, more rarely, engraving sites, also occur.

The Project area falls within the boundaries of the Deerubbin Local Aboriginal Land Council. The area also falls within the area of interest of two Native Title claimant groups, the Darug Tribal Aboriginal Corporation and the Darug Custodians Aboriginal Corporation. Darug Aboriginal Cultural Heritage Assessments also have an interest in the area.

Assessment of the key issues

Based on a preliminary assessment of the potential impacts to indigenous heritage the Project is likely to impact directly and indirectly on known archaeological sites and potential archaeological deposits (PADs).

Pipelines for the potable water and recycled water will generally be laid along roadways and in road verges and wastewater carriers will be placed in creek lines. Any potential impacts are most likely to occur in creek lines where prior disturbance has been naturally limited by the landform. Due to the level of disturbance it is unlikely that items of indigenous heritage value will be found on the road verges.

The STP sites have been previously disturbed so it is unlikely that any known indigenous heritage sites or PADs will be found at these locations.

Conclusions

Archaeological surveys of the proposed pipeline routes are being undertaken to fully investigate the extent of known archaeological sites and PADs. An assessment of the cultural heritage significance will be completed. The Aboriginal groups identified above are being consulted as part of the survey in accordance with National Parks and Wildlife Act 1974: Part 6 Approvals – Interim Community Consultation Requirements for Applicants (NPWS December 2004).

It is envisaged that current best practice for both assessment and management of indigenous cultural heritage, namely the application of a strategic management model which identifies a conservation outcome at the outset and which aims to conserve cultural landscapes at a regional scale, will be applied. Such practice is incorporated into the *Precinct Assessment Method for Aboriginal Cultural Heritage in the Sydney Growth Centres* (Growth Centres Commission 2006), which will also be used as a guideline.

Management measures to ensure known sites are avoided and protected during construction will be implemented. Potentially sensitive and undisturbed areas will be avoided by using techniques such as boring where possible.

4.2.4 Surface water quality and hydrology

Existing environment

The Project area incorporates freshwater creeks that are tributaries and sub-tributaries of the Hawkesbury-Nepean River, namely Cattai Creek, Smalls Creek, Second Ponds Creek, Eastern Creek and South Creek. Water quality in the area is highly dependent on catchment uses, and is currently impacted by urban stormwater runoff, STP discharges, sewage overflows, industrial discharges and agricultural runoff.



The majority of the creeks monitored by Baulkham Hills Shire Council within the Cattai Creek catchment were reported as falling into the "mid range" category in the Council's 2005 State of Environment (SOE) report. This means that most sites had twenty six to 75 percent compliance with *ANZECC (2000) Guidelines for Fresh and Marine Water Quality*. Blacktown City Council's 2004-2005 SOE report lists creeks within the Project area as having fifty to sixty six percent compliance *ANZECC (2000) Guidelines for Fresh and Marine Water Quality*. Further desktop studies have found that a number of the creeks within the Project area have elevated N and P concentrations.

Creek flows in the Project area are primarily a result of the discharge of treated effluent.

Assessment of the key issues

Preliminary environmental investigations undertaken by Sydney Water indicate that potential changes to creek and river water quality and quantity may result from the operation of the Project. The primary potential impact may be due to increased volumes of treated effluent discharging from the Riverstone STP. The use of recycled water for irrigation purposes may also have potential to impact on water quality and aquatic ecology in local freshwater creeks.

Conclusions

The potential impact on water quality associated with the irrigation of recycled water on gardens and the upgrade and amplification of the Riverstone STP is considered a key issue and as such will be further examined in the EA. The impact of effluent discharge from RHRWP has already been considered in a previous Environmental Impact Assessment and is not part of this Project.

4.2.5 Soils and groundwater

Existing environment

The geology and soils across the Project area are relatively diverse. As a result they are discussed separately under the headings below.

North Kellyville

Blacktown and Hawkesbury soil landscapes dominate the North Kellyville precinct with almost all of the proposed housing development occurring on the Blacktown soil landscape. The *Western Sydney Salinity Potential Map* (DNR 2002) shows the Blacktown and Hawkesbury soil landscapes as having a moderate and low salinity potential, respectively.

Electromagnetic survey results indicate a low salt load in the upper 6m of soil in most of the area. Pockets of high conductivity were found at high elevations at depths below 100cm. These high readings indicate potentially high saline conditions, however soil samples taken in the area (from 0-100cm) did not detect any significant levels of salinity.

Limited existing data from licensed bores near and within the proposed Project area suggest that the groundwater resources occur at significant depth (> 20m).

Riverstone/Alex Avenue/Area 20/Riverstone West

Riverstone, Alex Avenue, Area 20 and Riverstone West Precincts are dominated by slope gradients in the zero to three percent range. These slope gradients slow down surface and subsurface water flows, increasing the risk of salinity in at risk soil types. Three soil landscapes dominate these precincts, the Blacktown soil landscape on the higher parts and Berkshire Park and South Creek soil landscapes in the low lying areas. Most of the proposed new urban developments are likely to be located on the Blacktown soil landscape. The Blacktown and Berkshire Park soil landscapes are identified on the Western Sydney Salinity Potential map (DNR 2002) as having a moderate salinity potential. The South Creek soil landscape is shown to have a high salinity potential.

Electromagnetic surveys (targeting the 3-5 m soil layer) have been undertaken in the Project area. Soils in the highest part of the landscape are not saline but are thought to contribute to saline conditions downslope as a result of movement of interflow containing salt. Downslope salinity appears to be exacerbated where these soils have been irrigated in the past.



The lower parts of the landscape exhibit high to extreme levels of salinity in the surface and/or subsoils. These areas are located where interflow and surface runoff is impeded allowing salt to concentrate. Salt scalds have been found in a number of locations within the four investigation areas.

Groundwater records for the area are limited. Data held by Sydney Water indicate that the groundwater in bores located in the Riverstone and Riverstone West Precincts is significantly saline and shallow in landscapes containing Bringelly Shale overlain by clay. Available data show that usable groundwater resources are very deep.

Assessment of key issues

The *Environmental Guidelines – Use of effluent by irrigation* (DEC 2004) have been taken into account as part of the assessment of this key issue. Based on assessment of the potential impacts associated with the application of recycled water for garden irrigation in the North Kellyville, Riverstone, Alex Avenue, Area 20 and Riverstone West Precincts, the application of recycled water to these precincts will introduce higher levels of salt and nutrients into the environment than Sydney Water's current potable water supply sources.

The use of recycled water may potentially result in:

- increases in soil salinity
- > raising of the water table, enabling salt to rise into surface soil
- changes in catchment hydrology and the subsequent introduction of more salt and nutrients into the landscape. Potentially leading to:
 - mobilisation of salts in already salt effected soils
 - eutrophication of ground and/or surface waters
 - accelerated deterioration of future built environment
 - increased cadmium uptake by plants grown for food, and contamination of soils with boron and chlorine.

Conclusions

The potential impact on soils and groundwater associated with the Project, particularly in relation to the application of recycled water on gardens, is considered a key issue and as such will be further examined as part of the EA.

4.3 Other environmental issues

Other environmental issues that are considered only to be of minor concern are summarised in the following table.



Issue	Potential impacts and mitigation measures	Conclusions
Soils and Groundwater (Construction)	Construction activities will result in the exposure of soils to erosion. Due to erosion potential, erosion and sedimentation controls will be developed, implemented and maintained. The exposure of soils is not expected to have a significant effect on downstream water	Standard construction erosion and sediment control practices to manage erosion will be developed and implemented for this Project. It is considered that construction activities associated with the Project will not cause any significant risk to soils and groundwater within the Project area and therefore is not considered a key issue.
	quality or the aquatic environment, due to the use of appropriate management measures.	
	Any areas identified as affected by soil salinity will be appropriately managed to mitigate impacts.	
	Desktop risk assessment and field inspections will be undertaken to determine areas of potential land contamination. Contaminated land assessments will be undertaken prior to construction where there is potential for contamination to exist.	
Surface Water Quality and Hydrology (Construction)	Construction activities may result in the generation of sediment laden runoff during rain events. This is not expected to have a significant effect on downstream water quality or the aquatic environment, due to the use of appropriate management measures to prevent off-site discharges.	Standard sediment control practices to manage surface water and stormwater runoff will be developed and implemented for this Project.
		It is considered that construction activities associated with the Project will not cause any significant risk to surface water quality and hydrology and therefore is not considered a key issue.

Table 4-1 Other environmental issues



Issue	Potential impacts and mitigation measures	Conclusions
Non-Indigenous Heritage	Preliminary investigations have identified a small number of items of European heritage value and archaeological potential occurring within the Project area. These items are associated with the early settlement by Europeans, associated land-use patterns, road alignments, initial sub-divisions and the development of agriculture/market gardening in the area. Riverstone and its meat works economy have been identified as having local heritage interest.	It is considered highly unlikely that construction and operation activities associated with the Project will cause any significant risk to European heritage values within the Project area. European heritage is therefore not considered a key issue.
	If a potential European heritage item is likely to be impacted on during construction, then all work will cease in that area until the site can be assessed by an appropriately qualified archaeologist.	
Waste Management	Construction activities have the potential to generate both liquid and non-liquid wastes, although only relatively small quantities of each. The main waste streams for construction are:	The construction of the Project will have negligible waste impacts. Waste management measures will be developed to reduce, reuse and recycle construction
	soils and mud that are unsuitable or unable to be reused due to their geotechnical characteristics	wastes and therefore it is not considered a key issue.
	demolition waste	
	green waste (from clearing of vegetation)	
	 municipal waste (from clearing of previously "dumped" material within construction areas) 	
	 construction waste (timber, masonry, scrap metal, concrete, sand and packaging material) 	
	hazardous waste (from the removal of contaminated material)	
	 wastewater (from dewatering of trenches) 	
	 waste drilling fluids, oil and fuels (from maintenance of construction plant and equipment) 	
	 general waste from construction compound (including domestic waste and sewage). 	



Issue	Potential impacts and mitigation measures	Conclusions
	Waste material generated will be avoided or minimised through measures such as the specification of minimal packaging for construction materials and design of infrastructure to minimise resource use. Wherever possible waste materials generated will be reused and recycled. Generally the volumes of construction waste material generated by the Project will be small.	
	Operation of the proposed pipelines, storages and pumping stations will only generate waste materials during maintenance and cleaning works, during which small quantities of sediment and debris will be generated. Operation of the sewage and recycled water treatment plants will result in the generation of both solid and liquid wastes. Where possible, solid wastes will be recycled and containers such as drums returned to suppliers for re-use. Biosolids will be disposed for reuse as appropriate.	
Hazardous Materials	Minimal quantities of hazardous materials such as chemicals and fuels will be stored and used on-site during the construction process. Appropriate management measures will be implemented.	Standard mitigation measures for the transport, storage and use of these substances will be implemented during construction and operation to ensure the risk of environmental impacts from hazardous materials will be minor and therefore not considered a key issue. Operational hazards will be evaluated in the EA.
	During operation, all hazardous materials would be stored, handled and transported in accordance with relevant legislation and guidelines and as a result leakage and/or spillage of these materials into the environment will be unlikely.	
	Operation will result in increased chemical use and deliveries to all STP sites. An assessment of the hazard posed by the chemical and fuel storage and deliveries for the existing and expanded sewage treatment operations will be undertaken using the SEPP 33 guidelines as a framework.	



Issue	Potential impacts and mitigation measures	Conclusions
Aquatic Ecology	A number of major tributaries run through the Project area, most	Standard mitigation measures for the protection of
(Construction)	notably South Creek, Eastern Creek, Cattai Creek, First Ponds Creek and Second Ponds Creek. Many of the streams in the Project	aquatic ecology will be implemented during construction to ensure the risk of environmental impacts on aquatic
(Pipeline Operations)	area are degraded and considered to provide poor quality habitat, however they are expected to support a pollutant tolerant freshwater macroinvertebrate and fish community.	ecology is minimised. Standard mitigation measures would also be applied during operation of the pipelines.
	The Project area is not considered to provide suitable aquatic habitat for species listed under the FM or EPBC Acts and they are not expected to occur in the Project area.	
	The Project will include actions to avoid or mitigate impacts on aquatic ecology during construction through the use of mitigation measures such as boring beneath creeks to ensure that biodiversity values are maintained.	
	The pipeline route would be revegetated following completion of construction. Providing aquatic vegetation is maintained the potential impacts on native aquatic species would be negligible.	
	Operation of the pipelines will not generate any significant impacts on aquatic ecology, except during maintenance. Operation of the STPs has been addressed in Section 4.2.4.	



Issue	Potential impacts and mitigation measures	Conclusions
Noise & Vibration Construction will contribute to the local noise environment through: Construct	Construction noise and vibration work practices and	
	 vehicles transporting personnel and materials to and around the construction sites 	for this Project.
	 operation of construction equipment, including excavators, cranes, boring rigs, compressors and generators 	Noise impacts will be temporary during construction and minor during operation due to existing buffer zones around the sewage and water treatment plants. Noise is
	backfilling and compaction of pipeline trench	not considered to be a key issue.
	 construction of the upgrades/amplifications to the sewage and water treatment plants, the pumping stations and water storages. 	
	The proposed pipeline route will minimise impacts on sensitive receivers. Part of preferred pipeline route will pass through urban areas, although some may border residential areas in vegetated areas. Due to the progressive nature of the construction, adjacent sensitive receivers will only be affected for short durations.	
	Construction activities at the sewage and water treatment plants will have minimal noise impacts on sensitive receivers, as there are established buffer zones between the facilities and sensitive receivers. Construction activities at Cudgegong Road may also impact on surrounding landowners.	
	Standard noise controls will be implemented during the construction phase such as limiting construction activities to recommended standard daytime construction hours, the use of temporary and portable noise control measures and the implementation of other noise mitigation measures.	
	During operation buffer zones between the sewage and water treatment plants and sensitive receivers will attenuate operational noise generated from the treatment processes.	



Issue	Potential impacts and mitigation measures	Conclusions
Visual Amenity	 Views of the Project area are generally limited to adjacent landholdings and transport corridors due to undulations in the surrounding topography, existing land development and remnant vegetation. During construction the pipeline will be progressively restored so the visual impacts will be localised and moderate but of short duration. Views of the works at the sewage and water treatment plants will be limited to public roads, public open space and some private landholdings due to their location and existing visual screening. Residents to the south west of Quakers Hill STP may have filtered views of the construction works. Views of the works at Cudgegong Road, which involves the erection of elevated reservoirs, will be available from public roads and the private landowners immediately surrounding the site. These views will be filtered somewhat by vegetation cover. Temporary screening will be provided where appropriate. All completed structures associated with the Project will be consistent with the existing vistas, with the exception of the reservoirs at Cudgegong Road. 	The management of visual amenity associated with the construction and operation of the Project is not considered to be a key issue. The visual impact of the elevated reservoirs at Cudgegong Road will be evaluated in the EA. Sensitive design and maintenance of existing screening will ensure the completed Project is consistent with existing vistas.



Issue	Potential impacts and mitigation measures	Conclusions
Air Quality	Dust generation will be the main source of air quality impacts during construction of the pipelines and facilities on the STP sites. Other sources of dust during construction include vehicle movements and demolition activities. Appropriate dust management measures will be implemented throughout the duration of construction activities including: watering of exposed soils when necessary; water sprays for dust-generating excavation and demolition activities and progressive restoration of disturbed areas.	Construction activities will be undertaken in a manner that limits dust and other emissions, and mitigation measures will be developed and implemented to minimise impacts on air quality. Due to the nature of existing development in the environment, dust and emissions from plant are not likely to cause a major impact on air quality. Operational impacts will be minor. Air quality, therefore, is not considered a key issue.
	The combustion of fuels by construction equipment and vehicular movements will also contribute to emissions within the local environment with proper maintenance and operation contributing to the minimisation of this impact.	
	Operation will not generate any significant dust or combustion emissions. Odour generation will be negligible and will be managed in accordance with standard Sydney Water's operation procedures. Existing buffer zones around the STPs will also ensure that sensitive receivers are distant from potential odour sources.	



Issue	Potential impacts and mitigation measures	Conclusions
Traffic	Construction of the pipelines and upgrade/amplification work at the sewage and water treatment plants has the potential to cause localised traffic delays and diversions, due to:	The impacts of the Project on traffic will be temporary and minor. Work practices will be developed to minimise construction traffic impacts on the surrounding road network and disruptions from work undertaken within road reserves. The impacts on traffic within the region will be minimal, short-term and localised and therefore traffic is not considered to be a key issue.
	 additional vehicle movements to and from the construction sites 	
	 short-term closure of sections of road reserve and traffic lanes, to allow the safe installation of pipelines within existing road easements 	
	restricted or modified access to adjacent properties.	
	Consultation will take place with affected landowners prior to commencement of construction activities.	
	Qualified traffic controllers will complete all road diversions and traffic management activities. Consultation will be undertaken with Roads and Traffic Authority and local government regarding works that may impact roads or traffic.	
	Short-term increases in traffic will be experienced in suburban areas adjacent to the pipeline route. The existing access roads to all sewage and water treatment plants have sufficient capacity to cope with the short-term increase in traffic movements to and from the sites without any significant impact on local traffic movements. There is sufficient space available on the sewage and water treatment plants to accommodate construction vehicles, machinery and trucks.	
	Operation of the pipelines and sewage and water treatment plants is unlikely to have an impact on traffic in the region.	



Issue	Potential impacts and mitigation measures	Conclusions
Greenhouse Gases and Energy	 Construction will involve a variety of energy resources and sources of greenhouse gas emissions including: trucks accessing the construction sites vehicles transporting personnel and materials to and around the construction sites electricity and other fuels used by construction equipment. Various materials will also be consumed during construction including concrete, steel, timber, and water and these materials have embodied energy. Energy efficiency measures will be included in the design and operation of all infrastructure to minimise energy use. Sydney Water has set a goal of being carbon neutral by 2020 and is committed to achieving a sixty percent reduction in energy related emissions by 2012. Sydney Water will achieve overall carbon neutrality through a combination of reduced demand, energy efficiency, renewable energy and offsets. 	Construction activities will not cause a significant increase in greenhouse emissions or energy consumption. Given the relatively capacity and energy usage of the upgraded/amplified sewage and water treatment plants compared to conventional water treatment processes it is considered unlikely that operation activities will cause a significant increase in greenhouse emissions or energy consumption within the region. Consequently greenhouse gases and energy are not considered a key issue.



Issue	Potential impacts and mitigation measures	Conclusions
Land Use and Tenure The pipelines are located adjacent to exeasements, with the exception of the stocarriers, to minimise land use impacts. In progressive rehabilitation following distures the proposed upgrades and/or amplificate water treatment plants will be located with Riverstone and Quakers Hill. These sites by Sydney Water for sewage and water such the proposed development will not existing land use of this site. The proposed reservoir site at Cudgego which is currently owned by Sydney Wa area of land that is currently owned by p Operation of the proposed advanced was pipelines are not expected to have any seland use. The creation of the easements result in minor constraints to future and Occasional maintenance of the pipelines term constraints to activities, however, the sub-surface and will not prevent current be undertaken. The overall impact of the operation of was be positive, as they are essential to facil potential of the North West Growth Center States and service and will potential of the North West Growth Center States and service and will potential of the North West Growth Center States and service and will potential of the North West Growth Center States and service and will potential of the North West Growth Center States and service and service and will potential of the North West Growth Center States and States	The pipelines are located adjacent to existing road or other easements, with the exception of the stormwater basin and sewer carriers, to minimise land use impacts. Construction will involve progressive rehabilitation following disturbance. The proposed upgrades and/or amplifications to the sewage and water treatment plants will be located within the existing sites at Riverstone and Quakers Hill. These sites are owned and operated by Sydney Water for sewage and water treatment purposes and as such the proposed development will not have an impact on the existing land use of this site.	Consultation with all potentially affected landowners will be undertaken prior to construction. It is considered unlikely that construction and operation activities associated with the Project will cause any significant risk to land use and tenure within the Project area. It is therefore not considered a key issue.
	The proposed reservoir site at Cudgegong Road covers land part of which is currently owned by Sydney Water combined with a small area of land that is currently owned by private land owners.	
	Operation of the proposed advanced water treatment plant and pipelines are not expected to have any significant impact on existing land use. The creation of the easements for the pipelines will only result in minor constraints to future and existing land uses. Occasional maintenance of the pipelines may cause limited, short term constraints to activities, however, the proposed pipelines will be sub-surface and will not prevent current land uses from continuing to be undertaken.	
	The overall impact of the operation of water related services would be positive, as they are essential to facilitating the development potential of the North West Growth Centre.	



Issue	Potential impacts and mitigation measures	Conclusions
Social /Economic	Sydney's North West is a major growth centre and the Project area forms only part of the overall development that will occur in the region over the next 20 to 30 years. The Project is integral to the release of the First Release Precincts and the overall development and as such has a positive economic impact. It also has a positive social impact through provision of essential public health services such as potable water supply and sewerage. Provision of recycled water for non-potable uses contributes to overall water conservation and also has a positive impact on the sustainability of the region.	The Project will generally provide only positive social and economic impacts through the facilitation of development, which is provided with appropriate public health essential services. It is not considered that the Project will pose a significant risk to the social and economic environment and therefore it is not considered a key issue. A consultation strategy to ensure there is effective and ongoing liaison with the community and key stakeholders will be developed in EA.
	The socio-economic impacts of housing development in the northwest sector are being assessed via a separate process. The additional socio-economic impacts associated with the proposed provision of water related services would be negligible.	



5 Proposed scope of environmental assessment

As discussed in Section 4, there are a number of issues that are crucial to the Project that will be assessed in more detail in the EA. It is proposed that the EA only assesses the following key issues as all other issues will be managed through development of the detailed design with the application of best practice mitigation measures:

- Terrestrial flora and fauna
- Human health
- Indigenous heritage
- Surface water quality and hydrology
- Soils and groundwater.

The EA will also focus on any further key issues that are identified by the DoP and other agencies through the initial stakeholder consultation. All requirements for the EA from the Director-General of the DoP will be addressed through the EA and community consultation process.



Figures





North West Growth Centre
Local Government Area Boundary

Figure 1 – North West Growth Centre





Area Precinct Boundary

Stage One Precincts

Figure 2 – North West Growth Centres First Release Precincts





Figure 3 – Proposed water related services