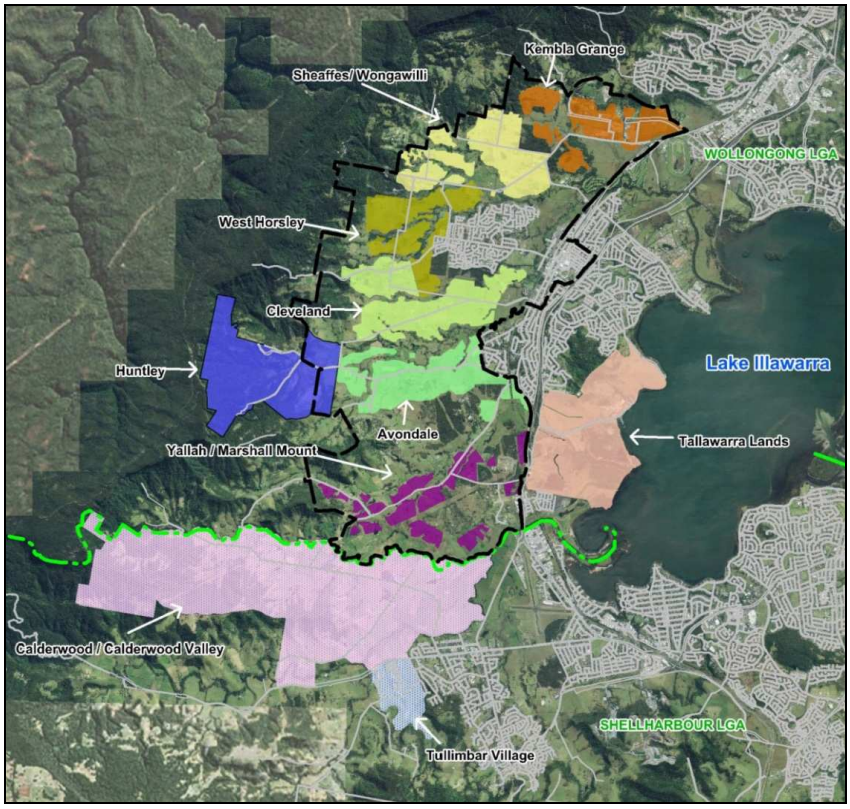
NSW GOVERNMENT | Planning & Infrastructure

MAJOR PROJECT ASSESSMENT:

Water and Wastewater Servicing West Dapto Urban Release Area and Adjacent Growth Areas

(MP09_0189)



Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

June 2013

ABBREVIATIONS

ADWF	Average Dry Weather Flow
ARI	Average Recurrence Interval
CIV	Capital Investment Value
Department	Department of Planning & Infrastructure
DGRs	Director-General's Requirements
Director-General	Director-General of the Department of Planning & Infrastructure
EA	Environmental Assessment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPI	Environmental Planning Instrument
MD SEPP	State Environmental Planning Policy (Major Development) 2005
Minister	Minister for Planning
PAC	Planning Assessment Commission
Part 3A	Part 3A of the *Environmental Planning and Assessment Act 1979*
PEA	Preliminary Environmental Assessment
PFM	Planning Focus Meeting
PPR	Preferred Project Report
Proponent	Sydney Water Corporation
RtS	Response to Submissions
TN	Total Nitrogen
TP	Total Phosphorous
TSS	Total Suspended Solids
WRP	Water Recycling Plant
WWTP	Wastewater Treatment Plant

Cover Photograph: West Dapto Urban Release Area and adjacent growth areas. *Source Water and wastewater servicing of the West Dapto Urban Release Area and Adjacent Growth Areas* (Sydney Water 2012).

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NSW Government
Department of Planning & Infrastructure

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EXECUTIVE SUMMARY

Sydney Water Corporation has lodged a Concept Plan and Project Application seeking approval for the construction and operation of water and wastewater services for the West Dapto Urban Release Area and Adjacent Growth Areas. The Concept Plan area covers the whole West Dapto Urban Release Area and Adjacent Growth Areas. The area incorporates the planned precincts of Sheaffes/Wongawilli, Kembla Grange and the residual area of West Horsley (*i.e.* that part of the precinct not covered by the October 2011 approval), which are the subject of the project application.

The proposal comprises the construction, upgrade and operation of approximately 118 kilometres of pipelines for drinking and wastewater, 4 pumping stations, 5 reservoirs and the potential upgrade of 2 wastewater treatment plants. Wastewater would be transported to existing wastewater treatment plants at Wollongong and Shellharbour. The water servicing of the whole area has a capital investment value of $250 million and is expected to generate up to 100 full-time construction jobs at any one time and five full-time operational jobs.

The Environmental Assessment for both the Concept Plan and Project Application was placed on public exhibition from 13 September 2012 to 29 October 2012 inclusive. Five submissions from the general public were received including one representing three landholders. Nine submissions were received from public authorities including the Office of Environment and Heritage, NSW Environment Protection Authority, Department of Primary Industries, Lake Illawarra Authority, Wollongong City Council and Shellharbour City Council. None of the submissions from public authorities objected to the proposal but instead raised comments for the Department's consideration and/or recommended conditions.

Key issues raised and identified during the assessment process include:

- Wastewater treatment and water quality;
- Flora and fauna;
- Heritage; and
- Noise.

The Department has undertaken a comprehensive assessment of the proposal's merits and acknowledges that the project is required to service expected growth in the Illawarra.

It is considered that the proponent's nominated environmental commitments, the impact avoidance and minimisation measures contained in the Environmental Assessment and the Department's recommended conditions of approval would ensure that the impacts associated with construction and operation of the project are mitigated or managed to acceptable levels.

The Department therefore recommends that the Concept Plan and Project Application be approved, subject to recommended conditions.

1. BACKGROUND

Predicted growth in the Illawarra region is expected to result in an additional 38,000 new dwellings. As outlined in the Illawarra Regional Strategy, the West Dapto Urban Release Area (WDURA) is capable of providing up to 19,350 new dwellings over the next 30-40 years. The Adjacent Growth Areas (AGAs) have been identified as potential development areas which provide the opportunity for additional housing should demand in WDURA be exhausted.

The WDURA consists of seven precincts including Kembla Grange, Sheaffes/Wongawilli, West Horsley, Cleveland, Avondale, Yallah/Marshall Mount and part of the Huntley Precinct. The AGAs are Tallawarra, Tullimbar Village, Calderwood and the remainder of the Huntley Precinct. (Refer **Figure 1**).

The Illawarra Urban Development Program: Update 2010 notes that West Dapto has a greenfield potential of approximately 16,000 dwellings and 8,000 dwellings in Calderwood. Of the 16 major release areas in the Illawarra Region, inclusive of West Dapto and Calderwood, 4 have been rezoned for residential purposes.

On 6 May 2011, the Joint Regional Planning Panel approved a Development Application (DA-2010/693) for a 295-lot residential subdivision on Bong Bong Road, within the West Horsley precinct. In order to facilitate this development, Sydney Water Corporation received approval for water and wastewater lead-in works for the West Horsley precinct (MP 10_0197). Construction of this subdivision has commenced.

Sydney Water Corporation is now seeking Concept Plan and Project Approval for the construction and operation of water and wastewater services for the WDURA and AGA. The proposal includes the construction and operation of water and wastewater pipelines, reservoirs, pumping stations and potential capacity or process upgrades to the Wollongong Water Recycling Plant and Shellharbour Wastewater Treatment Plant.

1.1 Location

The Proposal is located approximately 15km south west of Wollongong and is bound by the suburbs of Farmborough Heights in the north, Tullimbar Village in the south, Lake Illawarra to the east and the Illawarra Escarpment to the west. The proposed water and wastewater pipelines are to be located as shown in **Figure 2**.

1.2 Surrounding Land Use

The proposal is located on the eastern side of the Illawarra escarpment within a primarily non-urban area consisting of a mix of residential, rural residential, industrial, commercial and agricultural land uses. Key transport corridors in the area include the Princes Highway, F6 Southern Freeway and the Illawarra Railway Line.

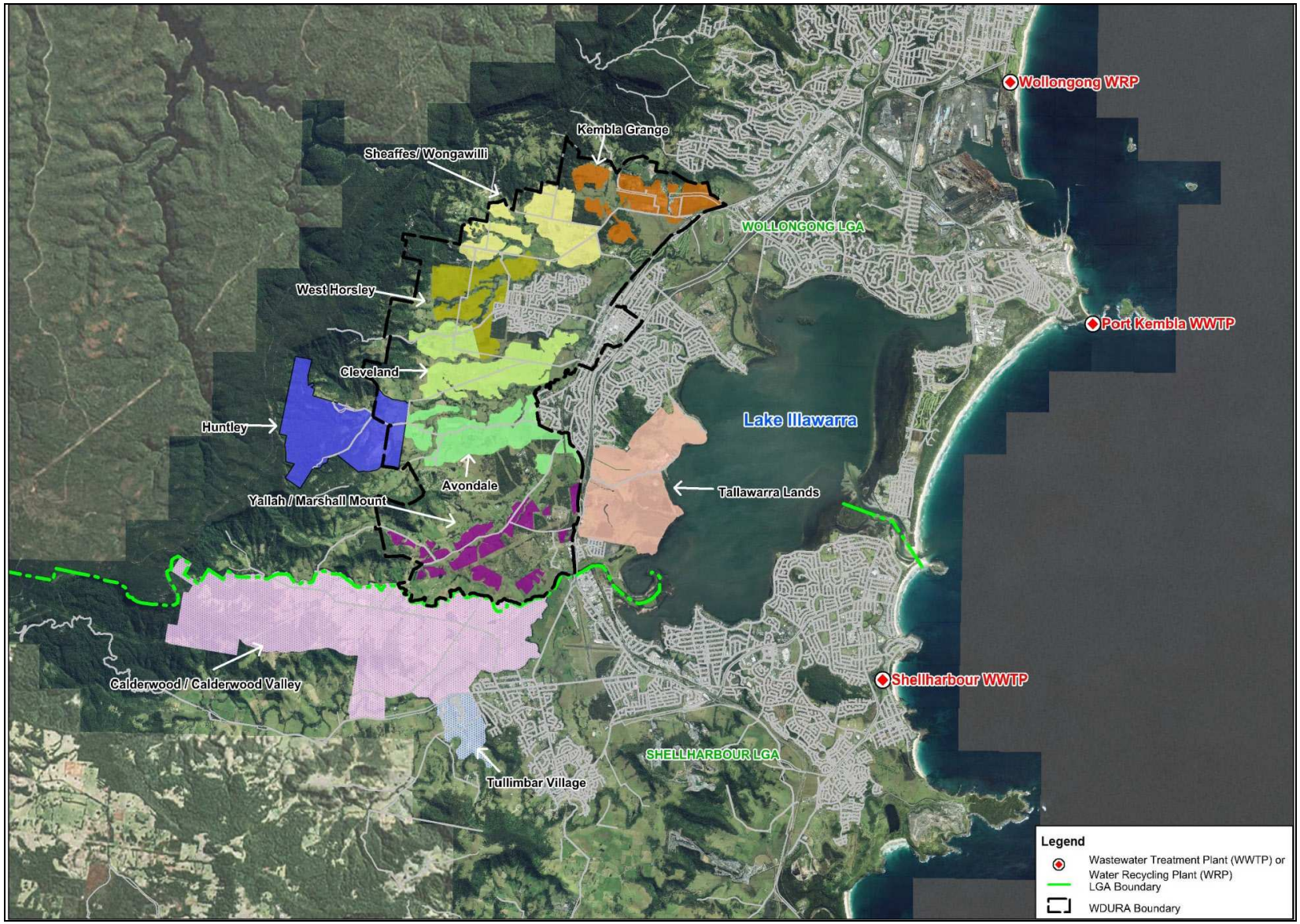

Figure 1: Proposal Location (*Source: Sydney Water, 2012*)

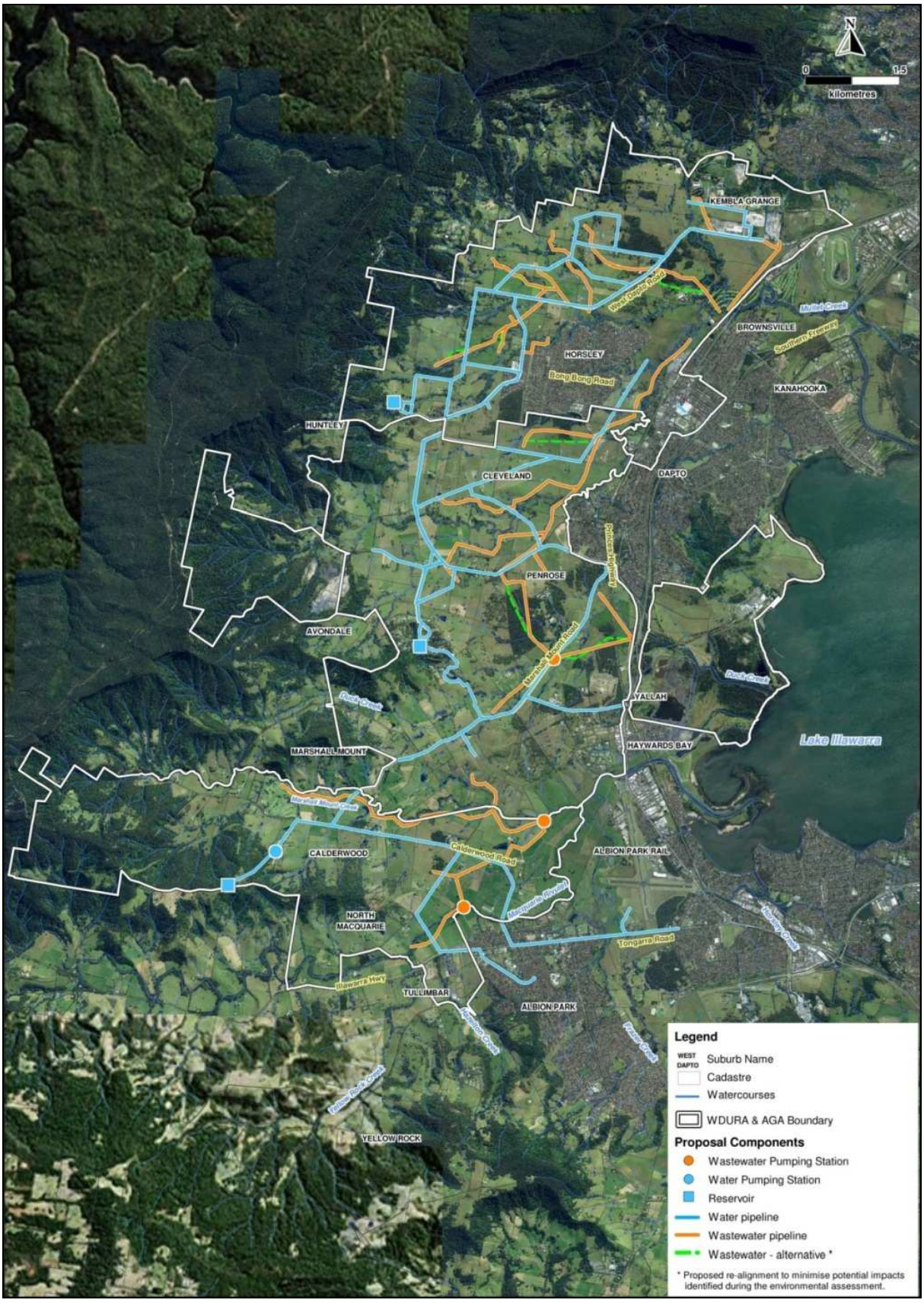

Figure 2: Concept Area Location and Indicative Location of Proposed Water and Wastewater Components (*Source: Sydney Water, 2012*)

The proposal crosses watercourses within the Lake Illawarra Catchment including Dapto Creek, Mullet Creek, Reed Creek, Robins Creek and Macquarie Rivulet. The proposal crosses land within both the Wollongong and Shellharbour local government areas.

The existing wastewater treatment plants, being Wollongong Water Recycling Plant, Shellharbour Wastewater Treatment Plant and Port Kembla Wastewater Treatment Plant, process effluent from the surrounding area. Much of the treated effluent from these plants is discharged into the adjacent marine environment, however a proportion of effluent from Wollongong Water Recycling Plant is used by Bluescope Steel.

Future land use within the proposal area is planned to change with the development of the WDURA and AGAs. The current status of each precinct is shown in **Table 1**.

Table 1: Status of WDURA and Adjacent Growth Area Precincts

Precinct	***Status***	***Comment***
Kembla Grange Employment Precinct	Rezoned Wollongong LEP (West Dapto) 2010.	Identified early release precinct.
Sheaffes/Wongawilli Precinct	Rezoned Wollongong LEP (West Dapto) 2010.	Identified early release precinct.
West Horsley Precinct	Rezoned Wollongong LEP (West Dapto) 2010.	Development Application for a 295-lot residential subdivision on Bong Bong Rd approved on 6 May 2011. Approval for water and wastewater lead in works (MP 10_0197) to service the new Brook Reach Estate granted 18 October 2011.
Cleveland Precinct (Stage 3)	Part of WDURA identified in the Illawarra Regional Strategy 2006-2031. Zoned for rural purposes under Wollongong LEP 2009.	Council considering a planning proposal to allow residential development north of Cleveland Rd.
Avondale Precinct (Stage 4 – includes Huntley development site)	Part of WDURA identified in the Illawarra Regional Strategy 2006-2031.Majority is zoned rural under Wollongong LEP 2009.	Huntley development site is located to the west of this precinct. It has been zoned to allow for residential development and a golf course has also been approved and is under construction.
Yallah/Marshall Mount Precinct	Wollongong Council is currently preparing a draft LEP to rezone this precinct.	This precinct is a 'free stage' i.e. It could be developed out of sequence.
Tallawarra Lands Growth Area	Concept Plan application (MP 09_0131) lodged in September 2009 by TRUenergy for a mixed-use development consisting of residential, commercial, industrial, retail, public open space, recreation facilities, conservation areas and riparian corridors.	Approved by the PAC on 23 May 2013.
Calderwood Growth Area (including Calderwood Valley)	Calderwood Urban Development Project is gazetted as a significant site under Schedule 3 of the *SEPP MD 2005.*	Project Application for stage 1 was refused by the PAC in April 2012. Delfin Lend Lease lodged an appeal. A judgement not yet handed down.
Tullimbar Village Growth Area	This precinct has been rezoned and approved for development. It is located close to existing water and wastewater services.	An urban release area located within Shellharbour LGA; zoned in 1995 and is one quarter developed and has guaranteed water and sewer capacity.

2. PROPOSED PROJECT

2.1. Project Description

Sydney Water Corporation has applied for Concept Plan approval under Section 75M and for a Project Application under Section 75J of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the construction and operation of water and wastewater services for the WDURA and AGA.

The Concept Plan seeks to supply water and wastewater services for Kembla Grange, Sheaffes/Wongawilli, West Horsley, Cleveland, Avondale, Yallah/Marshall Mount, Tallawarra, Huntley, Calderwood and Tullimbar Village growth precincts. The Concept Plan area is expected to be fully developed by 2048. The Concept Plan area is shown in **Figure 2** (outlined in white) and includes:

- drinking water reservoirs, pipelines, pumping stations and pressure release valves; and
- wastewater pipelines, pumping stations and upgrades to the Wollongong Water Recycling Plant and Shellharbour Wastewater Treatment Plant.

The Project Application seeks approval for the portion of the Concept Plan that provides:

- drinking water services in Kembla Grange, Sheaffes/Wongawilli, West Horsley, Cleveland and parts of Avondale and four reservoirs at Avondale and Marshall Mount; and
- wastewater services in Kembla Grange, Sheaffes/Wongawilli, West Horsley and Cleveland including the upgrade of one wastewater pumping station in Kembla Grange.

The Project Application area is shown in **Figure 3** (outlined in red) and is expected to be fully developed by 2021.

Those areas outside the Project Application area (that is the remaining Concept Plan area) will be subject to separate approval.

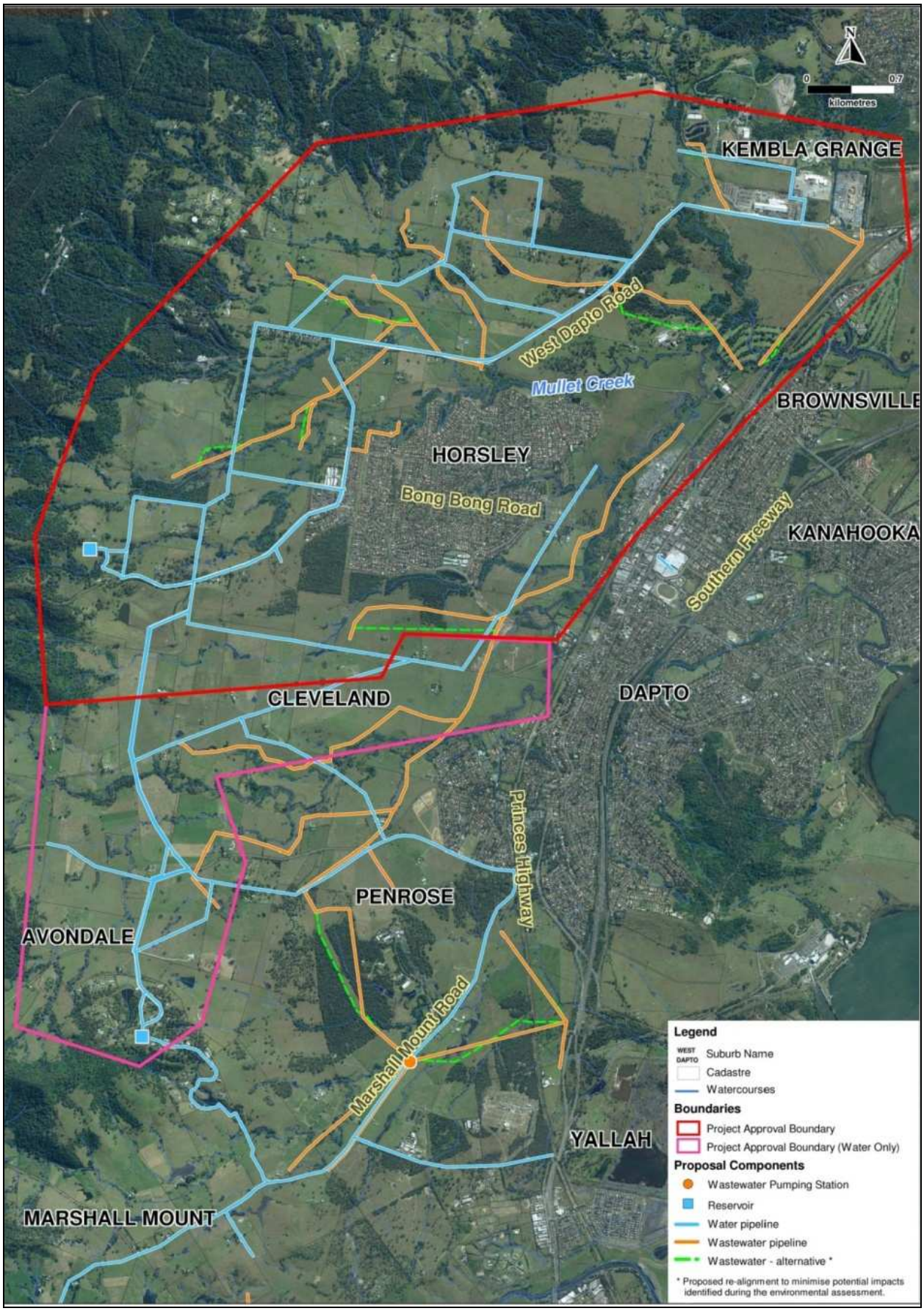

Figure 3: Project Area Location and Indicative Location of Proposed Water and Wastewater Components (*Source: Sydney Water, 2012*)

2.2. Concept Plan and Project Application Description

The key components of the Concept Plan and Project Application are listed in **Table 2** below.

Table 2: Concept Plan and Project Application Components

Aspect	*Concept Plan*	*Project Application*
Drinking Water Reservoirs	5 reservoirs; 2 at both Avondale and Marshall Mount, 1 at Calderwood.	2 reservoirs at Avondale and 2 reservoirs at Marshall Mount.
Pressure Reducing Valves	Potentially less than 5 (to be finalised at detailed design of subsequent stages).	2 pressure reducing valves located in Dapto and Wongawilli.
Drinking Water pipelines	Approximately 15km of new pipelines from the Illawarra Water Filtration Plant to the new reservoirs. Approximately 65km of new pipelines from the new reservoirs to the supply areas. Upgrade of 3km of existing pipelines from Dapto and Wongawilli Reservoirs.	A total of 45km of new and upgraded water pipelines specifically connecting into the existing Sydney Water network in Kembla Grange, Sheaffes/ Wongawilli, West Horsley, Cleveland and parts of Avondale.
Water Pumping Station	1 water pumping station at Calderwood.	None proposed as part of the Project Application.
Wastewater pipelines	Approximately 45km of new wastewater pipelines including 5km of pressure pipelines. Upgrade of the existing Dapto carrier.	A total of 25km of new wastewater pipelines connecting into the existing Sydney wastewater network.
Wastewater pumping station upgrade	3 new wastewater pumping stations in Yallah and Calderwood. Upgrade of 3 existing wastewater pumping stations.	Upgrade of 1 wastewater pumping station at Kembla Grange.
Treatment Plants	Upgrade of Wollongong Water Recycling Plant from 59 ML/day to 62.2 ML/day, if required. Upgrade of Shellharbour Wastewater Treatment Plant from 20 ML/day to 22.2 ML/day, if required.	None proposed as part of the Project Application.

Aspect	*Concept Plan and Project Application*
Water Related Ancillary infrastructure	Scour valves, scour lines and air valves.
Wastewater Related Ancillary infrastructure	Directed and uncontrolled overflows. Maintenance structures to allow inspection of the wastewater pipes. A number of vent shafts to be located above ground along the wastewater pipeline. Vent shafts would be up to 19m tall and 0.3m in diameter.
Associated Construction Facilities	Associated construction facilities and activities such as site compounds, environmental controls and construction access tracks.
Construction	Trenched and trenchless pipeline construction methodologies requiring a construction corridor between 6-10m wide. Trenches would be between 1.3-1.7m wide with the pipeline being between 1.5m deep for the water pipelines and 3-5m deep for wastewater pipelines. Construction launch and exit shafts of approximately 6m long by 3m wide to the pipeline depth may be required along with additional space to accommodate plant and equipment for trenchless pipeline construction.

2.3. Project Need and Justification

The development of the West Dapto area began over 20 years ago and commenced with the release of the suburb of Horsley. Due to the high infrastructure costs and low housing demand further development did not proceed. The Illawarra Regional Strategy 2006-2031 has since identified West Dapto as a priority new release area for the region and it is expected that this new release area will deliver approximately 19,000 new dwellings over the next 30 to 40 years.

The Illawarra Regional Strategy estimates that population growth in the region is expected to increase by 47,600 over 25 years, therefore requiring an additional 38,000 new dwellings. The Illawarra Urban Development Program has identified a greenfield potential of approximately 32,000 dwellings within 16 major release areas (including West Dapto with 16,000 and Calderwood with 8,000). The shortfall of 6,000 dwellings is expected to be met by infill development.

The Program has estimated that 1,520 dwellings are required per year to meet the target of 38,000 new dwellings over 25 years. Of the major growth areas identified, approximately 19% are zoned and service ready. To support the new release areas, the Program identifies the delivery of key infrastructure such as the extension of the trunk networks of water, sewer and power as a key step in the land supply process. This is further strengthened through the objectives of the Wollongong Local Environmental Plan (West Dapto) 2010, requiring satisfactory arrangements be made for the provision of designated State public infrastructure before subdivision of land in an urban release area to satisfy needs that arise from development on the land, but only if the land is developed intensively for urban purposes.

The Illawarra Regional Action Plan: Community Discussion Paper also identifies the provision of critical infrastructure to support new urban development as a priority action. The Action Plan aims to manage urban development in key release areas, such as West Dapto, by improving development assessment timeframes and providing a coordinated approach to the identification, timing and delivery of critical infrastructure.

The project was identified as part of the Sydney Water's Integrated Servicing Strategy for the provision of water and wastewater services to the WDURA and AGAs up to the year 2050. The project is also consistent with the Regional Action Plan for the Illawarra South Coast which was established under NSW 2021. NSW 2021 is a 10 year plan that guides policy and is based on five strategies to rebuild the economy including: return quality services; renovate infrastructure; strengthen local environment and communities; and restore accountability to government.

The Concept Plan and Project Applications are consistent with priorities identified in the Regional Action Plan for the Illawarra/South Coast. In particular the project is consistent with the priority to deliver infrastructure to support population needs by, investing in infrastructure for the region; prepare Regional Growth Plans that incorporate land use, infrastructure and transport planning; and co-ordinate the planning, development and infrastructure for new urban land release areas.

The Department considers the provision of water and wastewater services for the WDURA and AGAs is justified given the need to secure public infrastructure to support the development of the release areas. The project is consistent with NSW 2021, the Regional Action Plan for the Illawarra South Coast, the Illawarra Regional Strategy and the Illawarra Regional Action Plan: Community Discussion Paper.

3. STATUTORY CONTEXT

3.1. Major Project

On 7 September 2009, the Minister for Planning declared the proposal to be subject to Part 3A of the EP&A Act under Section 75B of that Act as a project of State or Regional planning significance as:

- it will provide essential water and wastewater infrastructure to the WDURA which has been identified by the Illawarra Regional Strategy as a priority new release area to cater for major population growth;
- it will provide water and wastewater infrastructure necessary to cater for the growth needs of the Illawarra region, an area that is fundamental to the State economy through its commercial, industrial, trade and maritime activity; and
- it will provide specific regional infrastructure requirements as identified in the State Infrastructure Strategy 2006-07 to 2015-16.

The Minister for Planning and Infrastructure is therefore the approval authority.

Part 3A of the EP&A Act, as in force immediately before its repeal on 1 October 2011 and as modified by Schedule 6A to the Act, continues to apply to transitional Part 3A projects. Director-General's Environmental Assessment Requirements (DGRs) were issued (on the 18 November 2009 and amended on 4 July 2011) in respect of this proposal prior to 1 October 2011. The proposal is therefore a transitional Part 3A project.

Consequently, this report has been prepared in accordance with the requirements of Part 3A and associated regulations, and the Minister (or his delegate) may approve or disapprove of the carrying out of the project under Section 75J of the Act.

3.2. Delegations

On 27 February 2013, the Minister for Planning delegated responsibility for the determination of the Concept Plan and Project Application under Part 3A of the EP&A Act to the Executive Director, Development Assessment Systems and Approvals where:

- the relevant local council has not made an objection; and
- a political disclosure statement has not been made, and
- there are less than 25 public submissions in the nature of objections.

The local council has not objected to this proposal, a political disclosure statement has not been made and no public submissions objecting to the proposal were received. Therefore, the Executive Director, Development Assessment, Systems and Approvals can determine the Concept Plan and Project Application under delegated authority.

3.3. Existing Approvals

In order to facilitate development of an early release area within the West Horsley precinct, Sydney Water Corporation applied for and received approval, on the 18 October 2011, for water and wastewater lead-in works for the West Horsley precinct (MP 10_0197). This Project Approval is located within the area covered by the Concept Plan.

3.4. Permissibility

The project is located on land the subject to a range of environmental planning instruments and is permissible in all land use zones.

State Environmental Planning Policy (Infrastructure) 2007 allows the development of public infrastructure for the purposes of sewage reticulation systems and water reticulation systems to be permissible without development consent on any land. Therefore the Concept Plan and Project Application are permissible without consent on any land.

3.5. Objects of the EP&A Act

Decisions made under the EP&A Act must have regard to the objects of the Act, as set out in Section 5 of the Act. The relevant objects are:

(a) to encourage:
- *(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
- *(ii) the promotion and co-ordination of the orderly and economic use and development of land,*
- *(iii) the protection, provision and co-ordination of communication and utility services,*
- *(iv) the provision of land for public purposes,*
- *(v) the provision and co-ordination of community services and facilities, and*
- *(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and*
- *(vii) ecologically sustainable development, and*
- *(viii) the provision and maintenance of affordable housing, and*

(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and

(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.

The proposal does not raise significant issues relating to land for public purposes, community services and facilities or affordable housing. With respect to ecologically sustainable development, the EP&A Act adopts the definition in the *Protection of the Environment Administration Act 1991*. This is discussed further in **Section 3.6**.

The agency and community consultation undertaken as part of the assessment process (refer **Section 4**), address objects 5(b) and (c) of the EP&A Act.

3.6. Ecologically Sustainable Development

The EP&A Act adopts the definition of Ecologically Sustainable Development (ESD) found in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ESD requires the effective integration of economic and environmental considerations in decision-making processes and that ESD can be achieved through the implementation of:

(a) the precautionary principle,
(b) inter-generational equity,
(c) conservation of biological diversity and ecological integrity,
(d) improved valuation, pricing and incentive mechanisms.

It is important to recognise that while the EP&A Act requires that the principles of ESD be encouraged, it provides other objects that must be equally included in the decision-making process for any proposal.

The Department has considered the need to encourage the principles of ESD, in addition to the need for the proper management and conservation of natural resources such as: the orderly

development of land; considering land use; the need for the project as a whole; and the protection of the environment including threatened species and endangered ecological communities.

The Department considers that the project generally promotes the principles of ESD as it is proposed to be undertaken in a manner that minimises environmental impacts, and considers inter-generational equity through provision of water and wastewater services over the longer term for the WDURA and AGAs.

3.7. Statement of Compliance

In accordance with Section 75I of the EP&A Act, the Department is satisfied that the Director-General's Environmental Assessment Requirements have been complied with.

4. CONSULTATION AND SUBMISSIONS

4.1. Exhibition

Under Section 75H(3) of the EP&A Act, the Director-General is required to make the EA of an application publicly available for at least 30 days. After accepting the EA, the Department publicly exhibited it from 13 September 2012 until 29 October 2012 (53 days) on the Department's website, and at the following locations:

- Shellharbour City Council, Lamerton Crescent, Shellharbour City Centre;
- Wollongong City Council, 41 Burelli Street, Wollongong;
- Dapto District Library, 93-109 Princes Highway, Dapto;
- Albion Park Library, Russell Street, Albion Park;
- Nature Conservation Council, level 2/5 Wilson Street, Newtown; and
- Department of Planning and Infrastructure, Information Centre, Bridge Street, Sydney.

The Department also advertised the public exhibition in the Wollongong Advertiser newspaper on 12 September 2012 as well as the Illawarra Mercury and Lake Times newspapers on 13 September 2013 and notified relevant State and local government authorities in writing.

The Department received 14 submissions. A total of 9 submissions were from public authorities and 5 submissions from the general public. A summary of the issues raised in submissions is provided below.

4.2. Public Authority Submissions

Nine submissions were received from public authorities all of which raised issues for the Department's consideration but did not object to the proposals. All submissions received from public authorities are summarised below:

Catchment Management Authority (CMA) Southern Rivers commented broadly on minimising impacts to creeks, rivers, riparian zones and ecology (threatened species, populations and ecological communities and habitats).

Department of Primary Industries (DPI) includes **Fisheries NSW**, the **NSW Office of Water (NOW)** and **NSW Crown Lands** and raised issues associated with watercourse crossings (underboring and launch and receival points, stabilisation of beds and banks, soil erosion, pipeline width, access tracks), water quality (pollutant load impact on inland water), ecology (impact on riparian zones and wetlands), construction techniques (underboring), soils and groundwater, monitoring, rehabilitation, fish passage, route and feasibility studies, groundwater. It was requested that consent conditions in relation to these issues be imposed. Fisheries NSW also noted satisfaction with safeguards and mitigation measures

regarding water quality and flooding, ecology, soils and groundwater. Crown Lands requested early consultation prior to finalisation of pipeline alignments on Crown Land.

Environment Protection Authority (EPA) raised issues in relation to water quality (marine water quality impacts including the assimilative capacity of Lake Illawarra, bypasses at Port Kembla Wastewater Treatment Plant, water quality modelling, and stormwater) noise and vibration. Conditions were requested for additional monitoring to confirm the predictions in relation to discharge design capacity of the Treatment Plants or to commit to upgrading Treatment Plants or processes if monitoring indicates that capacity would be exceeded. The EPA also noted general concurrence with assessment results in relation to geology, soils, contaminated land and groundwater.

Lake Illawarra Authority (LIA) raised issues with water quality (impact on Lake Illawarra particularly Koona Bay and Koonwarra Bay together with any increase to pollutant loads to the Lake and concern that the Environmental Protection Licences permitted load increases) and sought clarification of the use of leak tight pipes in the modelling. Future monitoring of wastewater flow impacts on inland waters was requested and notification of overflow events.

Office of Environment and Heritage (OEH) – The Heritage Branch raised issues in relation to non-Aboriginal heritage items which have been assessed as being of State significance (Avondale Homestead and Mount Marshall Homestead, Outbuildings and Gardens). Recommended conditions for the Department's consideration regarding construction management were provided. Comments on ecology including the offset package, Aboriginal heritage and floodplain risk management were also provided.

Roads and Maritime Services (RMS) requested conditions regarding construction methodologies for road crossings, reinstatement works and other approvals and consultation.

Shellharbour City Council raised issues with the location of infrastructure works, construction techniques, staging of proposal, water assessment inclusions (employment lands and Calderwood Valley), consultation, water quality (upgrade of Shellharbour Wastewater Treatment Plant, impact of increased loads on Lake Illawarra and stormwater particularly in relation to Barrack Swamp and Little Lake), and ecology (vegetation clearing, Endangered Ecological Communities and Threatened Species).

Wollongong City Council raised issues relating to water quality (nutrient loads to marine and inland waters inclusive of Lake Illawarra and overflow control), construction techniques, groundwater, ecology, traffic, construction hours, location of infrastructure within road reserve and Non-Aboriginal heritage. The Council notes satisfaction with the measures to reduce erosion, construction noise and raised no objections regarding stormwater and flooding. However, the Council requests consultation regarding the future final road alignments and pipelines, and inclusion in stakeholder and community consultation.

4.3. Public Submissions

Five public submissions were received. None of the submissions objected to the proposal however issues relating to the extension of pipeline to North Marshall Mount Road, final location of project components, consideration of future services, public consultation, public liability and insurance and impact on and access to private land were raised. The Department has considered the key issues raised in submissions in its assessment of the proposal.

4.4. Proponent's Response to Submissions

The Proponent provided a response to the issues raised in submissions on 25 February 2013 (refer **Appendix C**). An assessment of the proposal as presented to the Department is provided in **Section 5** of this report.

5. ASSESSMENT

The Department considers the key environmental issues for the project to be:

- Wastewater treatment and quality;
- Flora and fauna;
- Heritage and;
- Noise.

5.1. Wastewater Treatment and Water Quality

5.1.1 Background

Wastewater Treatment

Wastewater from the area is to be treated at the Shellharbour Wastewater Treatment Plant, Wollongong Water Recycling Plant or Port Kembla Wastewater Treatment Plant. The proponent holds Environmental Protection Licences for both the Wollongong (inclusive of Port Kembla) and Shellharbour wastewater systems which set limits for concentrations of sewage discharges (loads), overflow frequencies and volumes.

The Wollongong Water Recycling Plant has an approved capacity to receive and treat 59 ML/d Average Dry Weather Flow of wastewater. It currently treats 43 ML/d and recycles 20-22ML/d. There is an approximate spare treatment capacity of 16ML/d. Effluent is discharged via two ocean outfall discharge points located 1km east of the plant. There is also an emergency outfall via Port Kembla Wastewater Treatment Plant located off Red Point, Port Kembla.

The Shellharbour Wastewater Treatment Plant has approval to treat 20ML/d Average Dry Weather Flow of wastewater and currently treats 14ML/d, resulting in an uncommitted treatment capacity of 6ML/d. Waste from this plant discharges to the ocean off Barrack Point or to Barrack Creek in emergencies.

Upgrades to Wollongong Water Recycling Plant and Shellharbour Wastewater Treatment Plant are likely to be required between 2031 and 2048. This depends on the rate of development of WDURA and AGAs and the volume of wastewater requiring treatment. Upgrades to these plants are part included in the Concept Plan Application and include the following:

- increasing the capacity of Wollongong Water Recycling Plant to 62.2ML/d Average Dry Weather Flow (or 5%); and
- increasing the capacity of the Shellharbour Wastewater Treatment Plant to 22.2ML/d Average Dry Weather Flow (or 10%).

The proponent has agreed to a commitment that requires the provision of additional capacity at the any relevant plant prior to any additional connections being commissioned.

Port Kembla Wastewater Treatment Plant is predicted to exceed the Environmental Protection Licences treatment volume limits sometime after 2031. Potential upgrade to this plant is not part of the Concept Plan application. Any upgrade to this plant would be assessed and considered under a separate application.

Wastewater Discharge

With regards to wastewater discharge, it is recognised that ambient background marine concentrations of total nitrogen, total phosphorus and ammonia either exceed or are close to the current *Australian Water Quality Guidelines for Fresh and Marine Waters, Australian and New Zealand Guidelines for Fresh and Marine Water Quality* default trigger levels. Modelling of the Concept Plan area indicate key pollutant loads at each plant are below the existing Environmental Protection Licences' annual load limits.

Overflows

The existing systems are designed with overflow structures to prevent wastewater back-up when hydraulic capacity is exceeded such as in large wet weather events or system malfunction is experienced. This requires that discharge to the stormwater system is diluted thereby reducing the risk to the environment and human health.

The Environment Protection Licence for Wollongong Water Recycling Plant states that the wet weather overflow performance must not exceed 43 overflows in any 10 year period up to June 2013, after which the performance must not exceed 40 overflows in any 10 year period. Dry weather overflows must not exceed 26 in any reporting period.

The Shellharbour Environment Protection Licence specifies a wet weather performance of no more than 45 overflows in any 10 year period or 4 dry weather events reaching waterways per reporting period.

The proposal has been designed with a hydraulic capacity to meet a target of 0 dry weather overflows under normal operation and to meet the flows from an additional 35,000 lots by 2048; and to limit the amount of wet weather infiltration to no more than 1% of rainfall ingress and to meet the limits set in the Environmental Protection Licence for wet weather overflows.

The proposal is expected to comply with the targets set in the Environment Protection Licence for Wollongong Water Recycling Plant.

There is likely to be exceedances in the frequency limits of the Shellharbour Environmental Protection Licence at 2 locations after 2031. The proponent commits to ongoing monitoring of these 2 locations and to remedying this closer to the time those exceedances are predicted (beyond 2031).

5.1.2 Department's Consideration

The following issues were considered in the Department's assessment of the wastewater treatment and water quality components of the project:

- Modelling and data suitability;
- Wastewater Discharges to Treatment Plants;
- Future Upgrades to Treatment Plants;
- Overflow Frequency and Pollutant Loads; and
- Impacts on Lake Illawarra.

Modelling and Data Suitability

Modelling of the proposal indicates that there will be no noticeable impact to the marine environment and the overall impact from implementing the Illawarra Wastewater Strategy was a net benefit to the environment due to the substantial improvement to the environment around the Bellambi and Port Kembla ocean outfalls. It is noted and accepted that modelling was not undertaken for substances that were either below the limit of reading or the limit of reading was below the objectives specified by *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000).

The EPA raised concerns regarding the wastewater data used for modelling and sought clarification in relation to ANZECC default trigger levels for ammonia in the coastal zone. A statistical technique (bootstrapping) was used as a consequence of insufficient wastewater data. Data representative of current treatment levels was obtained monthly between mid 2007- 2010, however the model used requires hourly input. Therefore the bootstrapping technique developed a synthetic data set using actual recorded data.

The EPA also noted that increased ammonia levels were present which exceed the ANZECC default trigger values for this pollutant. The proponent acknowledged that any contribution of Total Nitrogen or ammonia from any source would increase the ammonia concentration in the coastal

zone and attributed the elevated background levels of ammonia to upwelling (the movement of cold, nutrient enriched, deep water to the surface), an accepted phenomenon which occurs in coastal waters off the coast from Sydney and Wollongong.

The Department accepts that the modelling process adopted is consistent with the Illawarra Wastewater Strategy Environmental Impact Statement (EIS) and that the predictions made in that EIS were confirmed in the verification report. Monitoring proposed to identify exceedances of pollutant loads specified in the Environmental Protection Licences would result in corrective actions to reduce impacts being considered annually.

The Department is satisfied that the modelling undertaken is sufficient to enable the Department to form a view of the impacts associated with the Concept Plan and Project Approval, as it is:

- based on real data;
- represents realistic outcomes, with elevated background levels of ammonia attributable to a natural phenomenon (and predictions for this substance below threshold levels);
- predicts that wastewater contribution is small in comparison to stormwater; and
- continual improvement forms part of compliance with the Environmental Protection Licence.

Wastewater Discharges to Treatment Plants

Modelling shows that discharges to the Wollongong Water Recycling Plant and Shellharbour Wastewater Treatment Plant would comply with the existing pollutant load limits and volume discharges established in the respective Environmental Protection Licences.

While the EPA raised concerns regarding the Port Kembla Wastewater Treatment Plant, the Department notes that the upgrade of this treatment plant will be subject to a separate approval. Any discussion regarding the Port Kembla Wastewater Treatment Plant is limited to the consequential impacts on Wollongong Water Recycling Plant due to the shared Environmental Protection Licence, with changes at either plant likely to affect the whole system and any potential upgrades. Notwithstanding, it is recognised that as a consequence of primary treatment, discharges to the outfall during large wet weather events will result in a range of contaminants exceeding the ANZECC 2000 trigger values for water quality.

The EPA recommends conditions for additional monitoring together with a commitment to upgrade the treatment plants or processes in the event that monitoring indicates the capacity of the treatment plant would be exceeded.

The proponent commits to monitoring the performance of the treatment plants. Should monitoring indicate a capacity exceedance is likely then Sydney Water is to implement future upgrades to the plants and/or networks operation and amend the relevant Environmental Protection Licences. The Department, together with the EPA, supports this approach.

The Department does not agree that additional monitoring is required at this time to confirm the predictions made in the EA but instead recommends a further assessment requirement on the Concept Plan approval requiring the proponent to demonstrate that discharges during wet or dry weather resulting from any upgrade will be no greater than the predictions made in the EA.

The Department accepts that the Shellharbour Wastewater Treatment Plant has sufficient capacity within its current approval to accept expected flows until approximately 2031 and therefore the impacts of discharge to receiving waters have been previously addressed. The Department notes that modelling indicates that varying outfall design affects the dispersal of effluent, however no changes to either outfall design are proposed. This is despite the inefficiencies and poor hydrodynamic mixing being noted at the Shellharbour outfall.

Although modelling incorporated the recent upgrade/reconfiguration of the outlet nozzles to the diffuser at the Shellharbour Wastewater Treatment Plant to avoid interaction of the pits (within the

ocean floor), ocean outfall buoyant mixing is incomplete for the plume when it reaches the sea surface (at the end of the near-field zone). The Department notes that the EPA generally expects that guideline objectives be met within the near field zone, since the discharge structure can be appropriately reconfigured.

The Department also recognises the role of the outfall configuration and technology in improving water quality outcomes. Accordingly, the Department recommends that a further assessment requirement be imposed on the Concept Plan approval requiring the proponent to consider options to improve outfall design, particularly at Shellharbour.

Future Upgrades to Treatment Plants

The EPA raised concerns with the treatment plant capacity, outfall design and effect on dilution at Wollongong Water Recycling Plant. The Proponent clarified that Wollongong Water Recycling Plant is anticipated to only discharge at 70% of the design capacity at full development (in 2048) assuming current reuse of recycled water (20-22 ML/day) by industry. Therefore the approved discharge volumes stated in the Environmental Protection Licence would not change as a result of any capacity upgrade. Any future assessment would be in relation to treatment capacity and construction impacts as the impacts of existing licenced discharges have been addressed in previous assessment for those operations. Provided that these do not change as a result of the proposal, no further assessment of discharge is necessary.

Inflows to Shellharbour Wastewater Treatment Plant at full development are forecast to exceed the plant's approved treatment capacity by 2.2ML/day Average Dry Weather Flow between 2031 and 2048 which will need to be addressed. As stated previously, the proponent has committed to monitoring inflows and ensuring that additional assessment and approvals are obtained prior to any further connections to the system that would see the approved capacities being exceeded.

The Department recognises that before the area covered by the Concept Plan is fully developed, the plants' approved capacities are likely to be reached. Given that this is not expected to be until after 2031, some 18 years away, it is possible that there will be changes to the predicted development which may require upgrade or alternative wastewater treatment earlier or later than this date. The Department supports the Proponent's approach to undertake technological investigations and construction/operational impact assessment closer to the time that upgrades will be required (where inflows from the development will exceed the plants' capacities to accept). Further, future assessment should also consider dry and wet weather effluent storage requirements, measures to prevent or minimise sewage discharge or overflows and a review of human health where changes are likely to result from the proposal.

Alternatives to increasing capacity such as improving treatment processes or technology were not considered as part of the Concept Plan. Imposition of a future assessment requirement is recommended and requires that alternate technologies be considered and that justification of any decision to not use best available technology which is economically achievable after taking into account environmental, economic and social considerations.

Even though the Department concurs that immediate assessment is not necessary for the purposes of the proposal, it is important that Sydney Water regularly reviews the need for any upgrades which takes into account any changes to the rate of development, government priorities and funding arrangements. Sydney Water must be cognisant of the operation of Wollongong Wastewater Recycling Plant and Shellharbour Wastewater Treatment Plant and the wastewater flows they receive, to ensure that planning for increased inflows occurs in a timely manner such that no breaches of its operating conditions result.

Overflow Frequency and Pollutant Loads

The proposal was designed to achieve no new dry weather overflows and no overflows at new directed overflow locations. New directed overflows would be designed exclusively to cater for a catastrophic system failure and not wet weather flows. Modelling shows that existing overflow

locations will continue to overflow and in some cases increase in pollutant load and frequency during wet weather events in future scenarios.

Wastewater overflows in the Barrack Creek and Mullet Creek catchments have the greatest potential for impacts to environmental values. When the wastewater pollutant load contribution is considered with the stormwater pollutant loads, the maximum pollutant load that can be assimilated by these catchments may be exceeded. Should this occur, it would be likely to result in the accumulation of nutrients which support growth of algae and other aquatic organisms; and oxygen depletion as it decays (known as eutrophication) in both the creek and locally within Lake Illawarra.

Exceedances of overflow frequency are expected at two locations within the Shellharbour system (in Barracks Creek catchment) in 2048 (at full development) and:

- only occur during wet weather events which vary in magnitude, duration and frequency;
- are based on modelling (not monitoring) and therefore, may not eventuate depending on the growth rate of the WDURA and AGAs;
- result in an overall reduction in pollutant loading;
- load/events from wastewater are relatively minor compared to contributions from stormwater (14% of the annual load of Total Nitrogen and 10.2% of the annual load of Total Phosphorus were due to wet weather overflows and hence approximately 86–90% respectively attributable to stormwater in 2048);
- are relatively minor (a single overflow event above the frequency target for 1 location and 3 events at the other); and
- the proponent has committed to monitoring these overflow points and upgrading the system (via dual pipelines and upgrades to storage and pumping capacities at the wastewater pumping stations) if exceedances are likely to occur.

Future reductions in the likelihood of overflow events exceeding approved frequency is recommended in the Concept Plan approval as part of the wastewater plant upgrades.

It is noted that Environment Protection Licence monitoring of wastewater and beaches is ongoing. Works currently being undertaken as part of the SewerFix program[*] are expected to reduce the number of overflows with a substantial decline in the annual overflow frequency to Port Kembla Beach (from 4.6 in 2009 to 0.5 in 2048).

The EPA raised concerns regarding inadequate consideration of the combined (wastewater and stormwater) contaminant loads of sewage overflows and stormwater input from the broader development proposal. Stormwater was also raised by the Shellharbour City Council. The proponent considered this matter to be beyond the scope of the project given that this issue forms part of the precinct development approval which is assessed by other parties. The Department agrees with this position since:

- precinct planning remains incomplete;
- adequate detailed modelling was undertaken with annual stormwater loads estimated per sub-catchment for Total Suspended Solids, Total Nitrogen, Total Phosphorus and faecal coliforms and methodology (based on the *State of the Environment 2011* (DSEWPC, 2011)) involved identifying six land use classes together with estimates of their individual areas;
- overflow load/events from wastewater are relatively minor compared to contributions from stormwater;
- the system is designed using leak-tight wastewater pipes (such as fully welded polyethylene pipes); and

[*] 'Sewerfix wet weather overflow abatement program' is a process linked to the EPL to manage overflows and overflow reduction which is negotiated with the EPA. 'Sewerfix' is an alliance that technically only applies to the Wollongong licence however, the same process applies to Shellharbour although it is managed directly by Sydney Water.

- the Proponent will continue to monitor the system for compliance with the Environment Protection Licences.

Water quality from overflows has the potential to exceed the relevant objectives for primary and or secondary recreational areas within the Budjong Creek, Barrack Creek and Horsley and Connor Creek catchments. The Department notes that faecal coliforms and enterococci bacteria can survive for 3 days following overflows. Advice from NSW Department of Health recommends avoidance during and at least 1 day following an event at ocean beaches and 3 days following an event at estuarine sites. The Department accepts that the events are infrequent and due to rapid bacterial die off are likely to result in short term impacts only. The duration of wastewater discharging to sand (a beach near Shellharbour and to Shellharbour South Beach) is between 14 to 28 hours. This is also covered by the Department of Health's advice.

Impacts on Lake Illawarra

Supporting information was requested by the EPA in relation to the assimilative capacity of Lake Illawarra. The Proponent advised that the assumption that the Lake was fairly resilient was based on the review of water quality data and reports including the draft Condition Assessment of Lake Illawarra (Lake Illawarra Authority, 2010). Although, the proposal fails to achieve Australian and New Zealand guidelines for fresh and marine water quality, nutrient concentrations for estuarine aquatic ecosystems, derived trigger values identified in the draft Condition Assessment, which indicate existing water quality, are generally met. Recently, nutrient concentrations in the lake have declined with poorest water quality being largely attributable to stormwater runoff following rain events.

The Lake Illawarra Authority, Wollongong and Shellharbour City Councils considered that there should be no net increase in pollutant loads discharged to Lake Illawarra as a result of the overflows from the proposal.

The proponent argues that modelling indicates pollution reduction targets in the Environment Protection Licences for dry weather overflows would be achieved for both the Wollongong and Shellharbour systems whereas for wet weather only two overflow points in the Shellharbour system would be exceeded for frequency after 2031. The proponent expects that future system upgrades may be required to maintain the overflow frequency within Environment Protection Licence limits. Further, the future system has been designed using leak-tight wastewater pipelines to transport wastewater to treatment plants and then seeks to discharge at coastal, rather than inland locations and avoid impact to the Lake. On this basis the proponent concludes that discharges are appropriately managed as the project was designed to comply with both the Integrated Servicing Strategy and the Environment Protection Licences.

The Department acknowledges that the assessment was based on modelling with predicted exceedances based on certain assumptions which are considered appropriate. The proposal uses uncommitted spare capacity at the treatment plants and will be continually monitored in accordance with Environment Protection Licence requirements and corrective action undertaken in the event of a prospective exceedance.

The Department recognises that wastewater overflow locations are an essential part of a wastewater system ensuring that when the hydraulic capacity of the system is exceeded it is able to discharge, thereby preventing wastewater back-up into homes and subsequent risks to the environment and human health. Further, it is noted that wet weather overflows are likely to be dispersed and diluted rapidly by stormwater. The Department also accepts:

- the small contribution of wastewater pollutant loads relative to stormwater;
- that the estimated pollutant loads would be below the annual load limits specified in the Environment Protection Licences; and
- the improved assimilative capacity of Lake since 2005.

When and if treatment plants are upgraded, a further assessment requirement is recommended that requires consideration of measures to prevent or minimise sewage discharges or overflows and subsequent impacts to nearby watercourses, groundwater and water bodies.

The Department notes that overflow events are considered to be relatively short-lived, infrequent and resulting in minor impacts that are reversible. Risk to public health from wet weather events are also considered to be temporary due to bacterial die off and unlikely as the NSW Department of Health and the OEH advise that swimming should be avoided during, and at least one day after, heavy rain at ocean beaches, at least three days at lagoons, estuaries and rivers and to avoid swimming near stormwater drains or wastewater outfalls.

Overall, the Department considers that the proposal is acceptable as it will operate within existing water quality limits set within the Environmental Protection Licence. However, to ensure acceptable water quality is maintained and potentially improved over time, the Department recommends future environmental assessment requirements, that would require the proponent to:

- consider options to improve outfall design, particularly at Shellharbour;
- consider the use of alternate technologies for any future upgrades to treatment plants and to provide justification for any decision to not use best available technology; and
- implement measures to prevent or minimise sewage discharges or overflows and subsequent impacts to nearby watercourses, groundwater and water bodies.

5.2. Flora and Fauna

5.2.1 Background

One vegetation community, Illawarra Lowland Grassy Woodland, listed as an Endangered Ecological Community (EEC) under the *Threatened Species Conservation Act 1995* (TSC Act) is likely to be directly impacted by the proposal. Eight threatened flora species are known or have the potential to occur in the area. Only *Lespedeza juncea* subsp. *sericea*, was identified in the field assessment area, however the pipeline has been realigned to avoid impact to this species. Habitat for 13 threatened fauna species, comprising 7 microbat, 1 megachiropteran bat, 2 owls and 3 birds, maybe impacted by the proposal.

A total of 3.38 hectares of vegetation may be directly affected in the Concept Plan area. Approximately 1.28 hectares of native vegetation is proposed to be cleared for the project area at four locations and 2.1 hectares of native vegetation within the remaining Concept Plan area at 6 locations. This includes removal of 18 hollow bearing trees within the project area.

Table 3: Vegetation Impacts

Vegetation Type	*Project Area (ha)*	*Remaining Concept Area (ha)*	*Total Area*
Illawarra Lowland Grassy Woodland	**0.96**	1.13	2.09
Other Native Vegetation	0.32	0.97	1.29
Total	**1.28**	**2.10**	**3.38**

Impacts are based on a worst case scenario. Water pipelines are proposed to be located within the road reserve and the location is dependent on the finalisation of the road network which will be determined by the relevant council. Vegetation impacts from construction of the reservoir sites are also based on a worst case scenario of clearing all vegetation on site, however this is unlikely.

5.2.2 Department's Consideration

Project Application Area

Approximately 0.96 hectares of Illawarra Lowland Grassy Woodland would be cleared in the project area to facilitate the proposal. An additional 0.32 hectares of other native vegetation would also be cleared for construction of the reservoirs. This is detailed in **Table 4**.

The area covered by the Project Application is located wholly within the Wollongong Local Government Area. Water pipelines will be co-located with future road alignments and the assessment based on the proposed road alignment provided by Wollongong Council. Any impacts from clearing for roadways and water pipes are considered by Sydney Water to be shared with Wollongong Council. Sydney Water proposes to continue consultation with council during the detailed design process to confirm the locations of the future road corridors. As the design of the road network progresses there is the potential for road and subsequent pipeline alignment changes to result in changes (and likely reductions) to vegetation impacts.

Table 4: Vegetation Impacts in the Project Area

Vegetation Types	*Proposed Clearing (ha)*				
	Wastewater Pipelines	*Water Pipelines*	*Pumping Stations*	*Reservoirs*	***Total***
Illawarra Lowland Grassy Woodland (EEC)	**0.15**	0.47	-	0.34	0.96
Other Native Vegetation	-	-	-	0.32	0.32
Total	**0.15**	**0.47**	**-**	**0.66**	**1.28**

Project Reservoirs

Up to 0.34 hectares of Illawarra Lowland Grassy Woodland and 3 hollow bearing trees would cleared for the construction of reservoirs at Avondale. The EA indicates that the reservoir at Avondale could be located within the existing cleared area (refer **Figure 4**) and therefore impacts to extant vegetation could be avoided.

Given that this vegetation has been classified as Illawarra Lowland Grassy Woodland, the Department is of the opinion that all efforts to avoid any clearing should be made. To this end, the Department recommends a condition in the Project Approval, which encourages avoidance of any Illawarra Lowland Grassy Woodland at the Avondale site. Should detailed design indicate that total avoidance is not possible, further approval must be sought from the Director-General which demonstrates why this is the case and what alternatives have been considered, before clearing at this site commences. Total avoidance of vegetation at this site would result in reducing the impacts of the project on Illawarra Lowland Grassy Woodland from 1.28 hectares to 0.94 hectares.

The Marshall Mount reservoir site is largely cleared with remnant scattered Forest Red Gum trees. The construction at this location will affect the vegetation in the centre of the site and up to 8 hollow bearing trees will be affected. No Illawarra Lowland Grassy Woodland is present at the Mount Marshall reservoir site. Up to 0.32 hectares of "other native vegetation", including 8 hollow bearing trees would be cleared to enable construction of the reservoirs.

The Department agrees that this impact is not significant and that measures such as further refinement to avoid native vegetation and installation of nest boxes are appropriate. The Department recommends that a landscaping and rehabilitation management plan be prepared for all reservoirs sites. This plan is to include measures for rehabilitation which take into account the existing vegetation both on and surrounding the site as well as attributes that would encourage its use by native fauna from the surrounding area.

Wastewater Pipelines

Alignments for wastewater pipelines are less flexible due to engineering and hydraulic design constraints. As a result, there is less scope to avoid vegetation without consequential effects to the

pipeline alignment. Avoidance has been considered and further impacts were avoided by relocating the pipeline to an area containing approximately 0.15 hectares of modified Illawarra Lowland Grassy Woodland with no native understorey and away from a dense stand of the Illawarra Lowland Grassy Woodland at Kembla Grange.

Impacts to threatened fauna are predominantly related to habitat loss, including the loss of hollow bearing trees. Up to 18 hollow bearing trees would be removed as part of the project. Significant impact on hollow-dependent fauna is considered unlikely due to the limited number of hollow bearing trees in the project area to be removed.

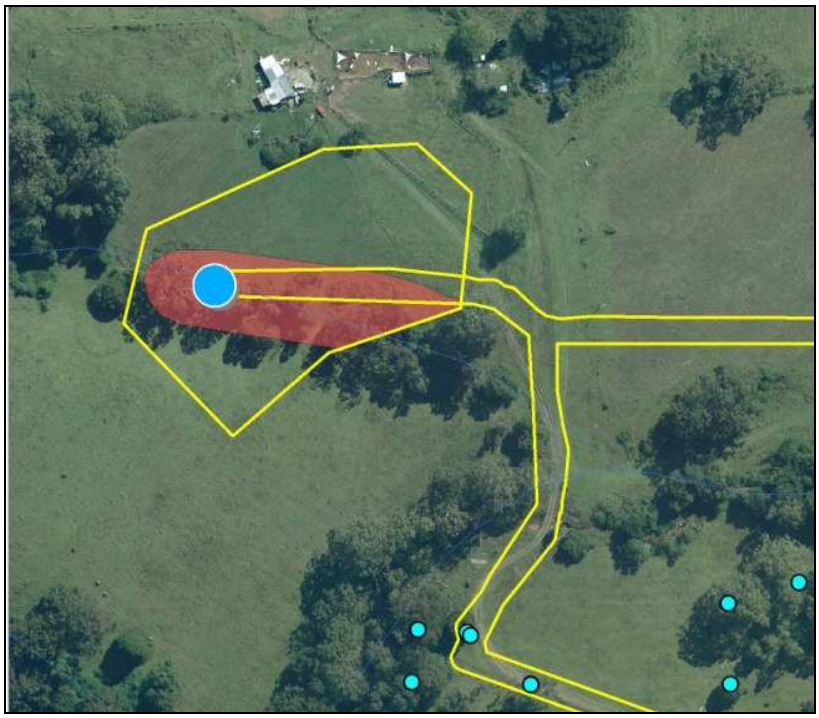

Figure 4: Avondale Reservoir Site

Water Pipelines

Water pipelines will follow the future road network across the development area. It is accepted that water pipeline alignment will largely be determined by the relevant council. Up to 0.47 hectares of Illawarra Lowland Grassy Woodland would be affected by construction of the road network/water pipeline. Recommending conditions which require the proponent to avoid endangered ecological communities or other native vegetation in placing water pipelines would be of limited value, if a third party, in this case Council, were to clear it in the future.

It is understood that Wollongong Council is considering the potential impacts of the development, including the road network, on biodiversity and is in discussions with the OEH regarding potential biodiversity certification of the WDURA and AGA. The calculation of impacts resulting from the road network is to be included and incorporate the impacts from the water pipeline placement.

Construction of the water pipeline would not occur prior to the finalisation of the road network and would likely coincide. The Department accepts that there will be shared impacts. Notwithstanding, as the biodiversity certification process has not been formalised, it cannot be accepted that this process will provide certainty or an offset to the impacts of the proposal at this time. Until such time as this process is formalised, the Department is of the opinion that Sydney Water should continue discussions with Council regarding road locations with a view to minimising impacts to native vegetation, including endangered ecological communities.

The OEH stated in its submission that the impacts of the proposal should be offset and that any offset should be provided prior to clearing of any EECs. The Department concurs with this

approach, but accepts that it is difficult to resolve given that the actual impacts are likely to total less than one hectare and that it will be dependent on finishing the road network and where an alternative assessment and offsetting process is under consideration. Notwithstanding, the Department has recommended a series of conditions which take into account the desire to offset the impacts and for those measures to be implemented prior to the impact occurring. Further, the Department acknowledges that the clearing is likely to be limited and that provision of a land offset may not be achievable.

The Department accepts that, should biodiversity certification of the WDURA and AGA occur the impacts of the wastewater pipeline will be addressed. Should biodiversity certification not occur prior to water pipeline construction, the Department recommends that the proponent be required to identify offset measures (by land, management actions or other research) for the impacts of clearing 0.47 hectares of Illawarra Lowland Grassy Woodland prior to clearing. This area may be reduced following recalculation of the actual impacts once construction is complete.

Remaining Concept Plan Area

Impacts to flora and fauna in the remaining Concept Plan area are based on a preliminary footprint that is subject to further design and assessment to determine the level of impacts. Impacts were calculated on preliminary designs assuming a 10m wide pipeline corridor, a 50m x 50m footprint for a wastewater pumping station and clearing of the reservoir sites. These are detailed in **Table 5.**

Table 5: Vegetation Impacts in Remaining Concept Area

Vegetation Types	*Proposed Clearing (ha)*				
	Wastewater Pipelines	*Water Pipelines*	*Pumping Stations*	*Reservoirs*	***Total***
Illawarra Lowland Grassy Woodland (EEC)	**0.44**	0.65	-	0.04	1.13
Other Native Vegetation	0.36	0.36	0.25	-	0.97
Total	**0.80**	**1.01**	**0.25**	**0.04**	**2.10**

These impacts are expected to be further reduced through the design process. As part of the Concept Plan approval, the Department has set requirements for revising the flora and fauna investigations to take into account temporal changes in the environment, given the development horizon of up to 30 to 40 years. The requirements include the need to consider impact avoidance or minimisation. Where this cannot be achieved, offset measures for impacts must be identified.

Biodiversity Offset

While a biodiversity offset package has not been established at this stage, the Proponent states that consideration will be given to offsetting impacts to achieve an "improve or maintain" outcome once the extent of clearing or impact has been confirmed. Any offset would be proportional to the impact of Sydney Water's activities within shared infrastructure corridors (*i.e.* water pipelines). Nonetheless, no specific commitment to an offset package is included as part of the proposal, for either the project or concept.

The OEH submission states the position that offsets should be required for all native vegetation types impacted not just EECs as the other vegetation communities provide habitat for threatened species. The OEH also recommends that quantification of the offsets is provided in accordance with *OEH Interim Policy on Assessing and Offsetting Biodiversity Impact of Part 3A, State Significant Development (SSD and State Significant Infrastructure (SSI) Projects*, that biodiversity offsets are secured prior to vegetation clearing and that additional offsets are secured for any additional areas impacted due to varied alignments that were not assessed.

Based on the discussion above, it is likely that the impacts to Illawarra Lowland Grassy Woodland for the project will be reduced to a maximum of 0.15 hectares where the Illawarra Lowland Grassy

Woodland at the Avondale site will not be affected and that along the water pipeline alignment (as part of the road reserve) would be included in any consideration of impacts by Council (refer to **Table 4**). The Department considers it unreasonable to apply the offsets policy for this area. Instead, it is recommended that, if biodiversity certification does not eventuate prior to construction of the water pipeline, that measures to offset the impact must be approved prior to clearing of Illawarra Lowland Grassy Woodland.

With regards to the remaining Concept Plan area, the Department accepts that there is likely to be a significant development horizon, however it is recommended that any future project assessments be required to consider any biodiversity certification and where this does not exist, the Department has recommended a future assessment requirement that the proponent be required to develop offset measures as part of future assessments.

5.3. Non Aboriginal Heritage

5.3.1 Background

Significance assessments were undertaken for 75 items in the Concept Plan area however, the impact of works on the heritage significance of the items was not assessed. Within the Project Application area a total of 24 items would be impacted with 11 locally significant items being directly impacted. No items of State significance are directly impacted by the project. A total of 13 items are indirectly impacted including 1 State significant item and 12 locally significant items. The locally listed items that are impacted are outlined in **Table 6**.

An additional 22 items (within the Concept Plan area) are impacted including a direct impact to a single locally significant item and indirect impact to 21 items (1 state significant and 17 locally significant and 3 with no heritage significance). Sydney Water asserts that the portion of Wongawilli Rail (item 195) and the Modern House and farm buildings (item 24b), which would both be directly impacted, have no heritage significance.

Six items are listed on the Register of the National Estate of which two are also on the State Heritage Register (Dapto Railway Station and Station Master's Residence). Cleveland Homestead and Marshall Mount Homestead may be indirectly affected however, Avondale, originally identified as being impacted by the water pipeline, is no longer identified as being impacted as the map of the proposed/future road network (where the water pipelines would be located) has been superseded.

Vibration is the main indirect impact and may affect a total of 31 items (12 within the Project Application area and 19 within the Concept Plan area) with vibration anticipated and measures for vibration to be considered at the time of construction. Vibration damage to heritage items may occur where items are located in close proximity to work areas from construction machinery mainly engaged in compaction of surfaces following pipeline construction or jack hammering of rock or existing infrastructure.

The primary mitigation measure is to avoid non-Aboriginal heritage items via refinement of pipeline alignments during detailed design. Where this is not feasible archival recording is proposed prior to heritage items being removed or damaged. In addition, construction workers would be trained in procedures should non-Aboriginal items be encountered. Indirect impacts, including vibration, will be managed in accordance with the German Standard DIN 4150: Part 3 – 1999 which includes assigning safe working distances. Further, the proponent commits to revising the location of infrastructure to increase the distance to heritage items and undertaking an assessment of potential vibration impacts prior to construction where plant/activities are located within 50m of an heritage item to ensure maintenance of safe vibration limits (3mm/s). Also, the proponent will replace the equipment for smaller non-vibratory variety where this threshold is not achieved. Vibration monitoring may be undertaken (where vibration impacts are likely) with potential for site specific measures considered following final design.

Table 6 Directly Impacted Locally Listed Items

Area	*Historical items*	*Heritage register listings*	*Impact*	*Mitigation*	*Significance of item*
Project	Settler's Cemetery (Kembla Grange Cemetery) (item 2)	Local Wollongong LEP 1990	Direct impact on known or unknown burial sites particularly outside the boundary fence from water pipeline.	• Remote sensing survey • Processes in accordance with NSW Health Directive: Burials – Exhumation of Human Remains (DoH, 2008) • Burial treated in ethical and respectful manner in accordance with denominational beliefs	Graves are in two groups and dated from early to mid-1900s with several isolated marked graves. The significance of item is historical, associative and social. Potential impacts on unknown historical grave sites have not been assessed.
Project	Brisbane Grove (item 18)	Local Wollongong LEP 1990	Direct impact on some farm buildings including dairy which may result in demolition from wastewater pipeline.	• Realign 25m to north west • If rerouting not practical, alternatives such as underboring should be investigated. • If outbuildings to be demolished then archival record in accordance with How to Prepare Archival Records for Heritage Items (NSW Heritage Office, 1998)	Significance of item is both historical (example of late nineteenth century homestead and dairy buildings) and associative (with prominent local family).
Project	Wongawilli Rail (item 195)	Local - West Dapto LEP 2010	Series of water and wastewater pipelines will intersect or run parallel to the unlisted portion of the line.	• Cease works and consult archaeologist if relics identified. • No mitigation proposed as no impact to heritage listed portion of the line.	The listed portion is the terminal only and will not be impacted. The significance of rail line is vested in the alignment and continuing operation of the private rail line (rare example) and not the physical fabric which has been renewed.
Concept	Mark's Villa (item 140)	No recorded listing on LEP but considered to be of local heritage significance.	Direct impact from a water pipeline through Wanalama, the dairy complex and the separate feedlot which will destroy the items.	• Reroute by 15m to avoid item • If rerouting not practical and demolition proposed then archival record in accordance with How to Prepare Archival Records for Heritage Items (NSW Heritage Office, 1998).	Also known as the homestead of Wanalama 1 (a former dairy) is the oldest building onsite with construction date of c1880. The item provides an intact example of an early house and dairy and linkages to prominent historical figures. Additionally, the item is of local research significance due to the original site of Mark's Villa being located adjacent to the Illawarra Highway and having extant subsurface archaeological record potentially including the original foundations.

Table 7 Impacted State significant items

Area	*Historical items*	*Heritage register listings*	*Impact*	*Mitigation*	*Significance of item*
Project	Cleveland homestead and outbuilding (item 47)	Register of the National Estate (RNE) National Trust Register Wollongong LEP 1990	Indirect Impact from a wastewater pipeline on remnant widely spaced trees from the tree lined drive.	Pipelines to be located to avoid trees.	Significant homestead and associated dairy in history of local area and good example of early Georgian (1840s) style. Potential archaeological deposits to reveal early lifestyles of the region. However, item compromised as in state of disrepair.
Concept	Marshall Mount homestead, gardens and outbuildings (item 64)	Register of the National Estate National Trust Register Wollongong LEP 1990 Assessed as State significant	Indirect Impact from a water pipeline if constructed along south eastern side of Marshall Mount Road on the gardens and one outbuilding.	• Sufficient space within road reserve to accommodate pipeline without direct impact on this item. • Vibration impacts anticipated depending on alignment which will be managed in accordance with German Standard DIN 4150: Part 3 – 1986. • Consider implementation of vibration mitigation measures at time of construction.	The significance of the item is for historical, associative, aesthetic and technical values. The garden retains its original features, including circular driveway, raised garden beds and ornamental Moreton Bay Figs.

The primary mitigation measure is to avoid non-Aboriginal heritage items via refinement of pipeline alignments during detailed design. Where this is not feasible archival recording is proposed prior to heritage items being removed or damaged. In addition, construction workers would be trained in procedures should non-Aboriginal items be encountered. Indirect impacts, including vibration, will be managed in accordance with the German Standard DIN 4150: Part 3 – 1999 which includes assigning safe working distances. Further, the proponent commits to revising the location of infrastructure to increase the distance to heritage items, undertaking an assessment of potential vibration impacts prior to construction where plant/activities are located within 50m of an heritage item to ensure maintenance of safe vibration limits (3mm/s). Also, the proponent will replace the equipment for smaller non-vibratory variety where this threshold is not achieved. Vibration monitoring may be undertaken (where vibration impacts are likely) with potential for site specific measures considered following final design.

5.3.2 Department's Consideration

Project Application Area

Impact to Wongawilli Rail (item 195) is confined to the unlisted portion of the item and the proponent commits to underboring the operational railway line where the pipelines intersect with the line and trenching parallel pipelines. As such no impacts are anticipated to the non-listed portion of the line as this is confined to the terminus located within Wongawilli Colliery land which will not be affected. The Department accepts this approach.

The Department considers any impact on Brisbane Grove (item 18) could be avoided and therefore recommends a condition requiring such. The initial assessment of Cleveland (item 47) indicates that remnant trees from the tree lined drive may have been impacted however, the proponent has since committed to locating the pipelines to avoid the trees and the Department supports this approach.

Five archaeological items including a cemetery may be impacted by the project. The Department has recommended conditions to ensure these items are managed and mitigated appropriately.

For all remaining items, the Department considers that a heritage management plan would be beneficial but notes that the proponent considers this plan to be unnecessary since it results in duplication as relevant measures would be managed through Sydney Water's contract with the construction contractor. This argument is not supported as:

- a contract is a financial arrangement;
- the number of items in the vicinity of works requiring measures to be tailored to manage and minimise impacts indicates the need for a consolidated approach;
- it is not clear how:
  - the OEH (Heritage Branch) and the Department could review the management measures to ensure that appropriate measures are incorporated such as vibration controls near indirectly impacts items;
  - the effectiveness of these measures will be reviewed;
  - changes would be made where measures were shown to be ineffective; and,
- assurance that construction workers will be inducted for heritage impacts including procedures for dealing with previously unidentified heritage objects.

The Department has recommended a condition requiring the proponent to prepare and implement actions as part of the Construction Environment Management Plan to manage non-Aboriginal heritage in consultation with OEH (Heritage Branch) that also ensures that indirect impacts such as vibration are suitably addressed and are specific to individual items. The recommended condition will also ensure that appropriate construction methods and plants are used to ensure impacts to heritage items are minimised and specific procedures for dealing with previously unidentified heritage objects are developed. Notwithstanding, the proponent may use an existing CEMP or management plan where that plan meets the requirements of the condition.

The Department notes that the OEH (Heritage Branch) requests that any archaeological investigations be overseen by an excavation director who satisfies the Heritage Council's Criteria for the Assessment of Excavation Directors (July, 2011). While the proponent committed to monitoring by a suitably qualified archaeologist in the event of excavations of the six new potential archaeological sites (items 182-187), the Department considers that this does not provide the same level of experienced in overseeing the works and therefore a condition consistent with the OEH recommendation is included.

Concept Plan Area

Discrepancies between the EA and Appendix G: Non-Aboriginal Heritage Assessment were raised by the OEH (Heritage Branch) in relation to the potential impact on Marshall Mount Homestead. The Department notes that this was resolved with the submission of an Updated Appendix 1 to Appendix G: Non-Aboriginal Heritage Assessment which confirmed adequate area within the road reserve to construct the pipeline without impacting the item although vibration is anticipated and Sydney Water commits to consideration of measures at the time of construction.

The OEH (Heritage Branch) considered any impacts on Marshall Mount (item 64) to be unacceptable and recommended conditions in relation to the management of items which have local or above significance, approval of the excavation director for items requiring excavation if an impact cannot be avoided, revised assessment should design vary over the development timeframe of the proposal and a requirement for the submission of a historic Construction Environment Management Plan.

The Department acknowledges the Heritage Branch concerns and considers any impacts on Mark's Villa (item 140) and Marshall Mount (item 64) should be avoided given the ease of avoidance indicated by the proponent. Therefore, the Department recommends the imposition of an appropriate condition to ensure that no impact occurs to either of these items.

The Department considers that given the timeframe of future development and inherent potential design variation/s, the assessment of impacts should be reviewed and revised as appropriate for any items located within or near the Concept Plan area in future project assessments. Additionally, the significance assessment in the EA did not involve discussion on the impacts of the works on the significance of the item and this should also be addressed in future assessments by including Statements of Heritage Impact for each item.

5.4. Noise

5.4.1 Background

Land use within the area consists primarily of rural or semi-rural residential with several commercial, industrial and residential areas also existing in the developed areas located at Horsley, South Dapto and Albion Park. Both existing and future land uses were assessed. However, given that the proposal will precede further residential development, background levels for existing land uses were considered for both construction and operation.

Construction Noise

A quantitative construction noise assessment of the proposal was undertaken based on the Interim Construction Noise Guidelines (DECC, 2009) and includes consideration of general mitigation measures. Construction at Avondale and Marshall Mount reservoirs will exceed noise management levels at the closest residence. These are therefore considered 'highly noise affected' with construction noise predicted to be greater than 75 dB(A). Noise exceedances of up to 38dB(A) and 36dB(A) are anticipated at Avondale and Marshall Mount Reservoirs respectively for a maximum duration of 2 weeks.

Noise impacts from the construction of drinking water pipelines will be greater than for wastewater pipelines since they are typically built in road reserves and are therefore generally closer to sensitive land uses. Most locations within 25m of the pipeline construction are likely to be 'highly

noise affected' (above 75dB(A)). The minimum distance of a pipeline from a residence is 10m assuming a dwelling setback of seven metres from the front boundary. The existing urban areas of Horsley and Albion Park are the main localities to be impacted where 4.5km of pipeline will be constructed adjacent to 300 existing residences with construction estimates of 30m and 20m per day at Horsley and Albion Park respectively. The duration of works at individual locations would vary depending on depth of excavation and construction method, however, a maximum duration of two weeks of intermittent work is anticipated at any location where trenching is used.

General construction noise management measures proposed include source controls such as time constraints, scheduling, equipment restrictions; path controls such as noise barriers, increased distance, site access; and receptor controls such as temporary relocation, noise monitoring and community information and notification. The proponent asserts that a 10dB(A) noise reduction at the most affected locations could be achieved by ensuring that equipment is operating optimally, mufflers on diesel engines are of good quality and stockpiles are strategically located to provide shielding.

Construction work hours would be in accordance with Interim Construction Noise Guidelines except for night work associated with pipeline construction (micro tunnelling/directional drilling and truck deliveries of oversized materials). There is potential for out of hours work for micro tunnelling/directional drilling in order to increase the machinery's efficiency (due to soft strata when continually operated) and to reduce the risk of the drilling head becoming stuck thereby requiring excavations to retrieve equipment. Out of hours work for the delivery of oversized items minimises the impact on the road network since deliveries would be scheduled to avoid peak traffic and occur during the shoulder periods either side of standard hours.

Receivers within 500m of infrastructure sites could be exposed to noise levels that exceed the 35dB(A) management level for out of hours work. However, the proponent claims that out of hours work for micro tunnelling/directional drilling would halve the overall construction time for these activities which are generally either in greenfield areas not close existing dwellings (creek crossings) and indistinguishable from noise level of traffic (under major roads/traffic intersection).

Construction Road Traffic

Construction traffic impacts were assessed in accordance with Environmental Criteria for Road Traffic Noise (EPA 1999). Total traffic movements of 134, 148 and 40 per day are estimated for the water pipelines, wastewater pipelines and reservoirs/pumping stations respectively with approximately half attributed to staff vehicles (typically cars) in relation to pipelines.

The proponent contends that given the negligible increase in overall traffic, increased noise associated with traffic would be insignificant. Impacts from construction traffic would be minimised by nominating routes along main roads and through industrial/commercial areas rather than residential where possible.

Vibration

Vibration was assessed against *Assessing Vibration: a technical guide* (DEC 2006d), British Standard BS 6472-1992 *Evaluation of human and exposure to vibration in buildings* (1-80Hz) (BSI 1992) and German Standard DIN 4150 - *Part 3 Structural vibration in buildings – Effects on structures* (DIN 1990).

Construction vibration impacts from rock breakers, compactors and vibratory rollers may be noticeable in receivers located within 30m of the infrastructure sites and occasionally levels may exceed noise management levels. Vibration levels are not likely to be detected at distances greater than 30 m from the construction and structural damage is unlikely. Mitigation measures to minimise vibration impacts include establishing buffer distances if necessary and the implementation of a management measures such as a procedure to address vibration complaints, modifications of construction equipment, application of more stringent buffer zones and possibly time restrictions.

Operation

The EA includes a quantitative operational noise assessment, which was undertaken in accordance with the *Industrial Noise Policy* (EPA 2000b) using the most stringent night time amenity criterion and based on future background noise levels as well as *Environmental Criteria for Road Traffic Noise* (EPA 1999).

Modelling indicates that operation of the project would comply at distances greater than 40m for wastewater pumping stations and 25m for water pumping stations without mitigation. However, the pumping stations are likely to be enclosed (brick buildings with acoustic louvres and sound proof doors for larger stations with dimensions of approximately 3m x 5m) or located underground for the smaller stations in relation to the noise producing elements. Where solid fences exist (colourbond) for residences (boundary fencing), this results in a noise level reduction of 5dB(A). It is therefore expected that where distances are greater than 15m the sleep disturbance criteria would be met. Furthermore, the proponent commits to installing mitigation measures for sensitive receivers where distances are less than 15m from the infrastructure site.

Operational vibration levels are considered negligible and will not impact on either existing or future residences (based on likely distances).

5.4.2 Department's Consideration

The Department acknowledges that noise impacts causing disturbance at nearby sensitive receivers from the construction of the proposal are likely and expected due to the nature of the works, albeit noise impacts will be temporary.

The Department notes EPA comments regarding the significant exceedances of noise management levels and acknowledges that residual noise levels beyond the relevant noise goals are likely.

The Department is cognisant that all the new reservoirs and water and wastewater pumping stations are located within sparsely populated rural subdivisions with few residences. Residential subdivisions are located at distances between 100m and 500m from the 3 existing wastewater pumping stations proposed for augmentation with 2 of the 3 located within industrial areas (Oak Flats and Coniston) and the Horsley wastewater pumping station being over 250 m from residential subdivision.

The EPA notes that despite implementation of mitigation measures, the assessment predicts significant air borne construction noise exceedances of the noise management levels and recommends that the proponent develop a Construction Noise and Vibration Management Plan. The Department considers that such a plan is unlikely to result in a reduction in construction noise impacts but should outline measures to ensure effective communication with, and appropriate management responses to any concerns of the affected community.

The Department recommends the imposition of a condition as part of the Project Application approval requiring implementation of a Community Communication Strategy including a complaint and enquiry procedure together with the establishment and maintenance of a website/page(s) dedicated to proposal information.

The Interim Construction Noise Guidelines require clear justification and prior approval for any works outside the standard hours together with early erection of temporary noise barriers and minimising truck movements. The Department recognises the technical and construction timeframe benefits for construction works out of hours such as micro tunnelling and /or directional drilling as well as the delivery of oversized items during the shoulder of the standard Interim Construction Noise Guidelines hours to avoid peak traffic periods.

However, specific details of the request for out of hours work have not been provided including nomination of specific timeframes and durations of out of hours work for each activity. Accordingly, standard construction noise conditions have been imposed which allow flexibility to work outside of standard *Interim Construction Noise Guidelines* hours in certain circumstances and the development of an out of hour protocol including referral of works to the Director-General for high risk works.

Due to the timeframe for the completion of the proposal, the Department considers that a revision of the construction noise and vibration assessment for the Concept Plan area is warranted to minimise impacts to receivers and has recommended a condition to this effect.

The Department is aware that noise impacts associated with construction are unavoidable and therefore the emphasis is on the management of noise to the greatest extent possible. Overall the Department considers that the impacts would not be unreasonable given:

- that construction noise is temporary;
- that levels would fluctuate depending on equipment;
- that the noisiest activities will not occur at a single location for the entire construction period;
- that the project will largely precede residential development; and
- that a conservative assessment was completed as shielding was not considered in noise level calculations.

5.5. Other Issues

5.5.1 Contamination

The risk of encountering contamination has been assessed as high for two sites within the Project Application area including the former piggery and a landfill/steel pipe manufacturing facility at Kembla Grange. One site in the Concept Plan area is identified at Albion Park (petrol station).

Five sites within the area were assessed as having a moderate/high risk of encountering contamination with three of these sites located in the Project Application area. These sites include the Wongawilli Colliery; the former mining operations at Huntley and Avondale; emplacement areas from steel manufacturing at West Dapto Road/Wylie Road, Kembla Grange; and mining operations at West Dapto Road, north of Horsley and Avon. Two sites are situated in the Concept Plan area and include the Calderwood Golf Course and the electrical substation in Yallah.

Consideration of the potential for the proposal to disturb known contaminated land will be undertaken during detailed design and these areas would generally be avoided if practicable. Alternatively, should these areas be affected the soil would be subject to the following management and mitigation measures:

- appropriate studies/assessment and soil analysis for the purposes of determination of specific mitigation measures; and
- consideration of State Environmental Planning Policy No. 55 - Remediation of Land and relevant guidelines under the Contaminated Land Management Act 1997 and waste classification against Waste Classification Guidelines – Part 1 (DECCW 2009a).

Also, specific management measures would be implemented to ensure that preferential pathways for contaminated groundwater movement are not created. The Department is satisfied with this approach and recommends a condition to this effect.

5.5.2 Soils, Geology and Groundwater

The proposal contains areas of risk in relation to landslide, erodible soils, groundwater interception and creek crossings (also refer to relevant sections: creek crossings, flood and contamination). Trenching could potentially result in erosion and sedimentation and adverse impacts on natural watercourse features and groundwater. Similarly, the disturbance of Acid Sulfate Soils, saline and contaminated soils, all of which are potentially present in the proposal area, could also result in adverse impacts.

Soils and Geology

High landslide risk was identified from construction of pipelines in the north west of the project area (Wongawilli) located at the base of the escarpment within an area of talus (rock debris at the base of a cliff). Further geotechnical investigations are proposed as part of the detailed design and alignment of pipelines would be reviewed accordingly. Components where risk is highest include wastewater pipelines, pumping stations and the Avondale Reservoir due to close proximity to flood prone creeks; the level of excavation proposed or the proximity to steep slopes. The proponent intends to mitigate the risk by:

- developing and implementing appropriate and standard erosion and sedimentation mitigation measures in accordance with Managing Urban Stormwater: Soils and Construction (Volume 1, Landcom and Vol 2A, DECC 2008);
- restricting vehicle and machinery movements to existing access tracks and construction corridors; and
- stabilising entry/egress points.

The Department has also recommended a condition for the preparation of a Rehabilitation and Landscape Plan to manage rehabilitation of areas exhibiting erosion or waterways classified as sensitive or prone to erode due to construction.

Although highly saline soils have been mapped near Horsley and in the Avondale Road area there were no visual indicators observed during the assessment, which concluded that salinity is unlikely to be an issue. Should any salinity be encountered appropriate mitigation measures including the use of salt resistant construction methods and materials (imported fill) are proposed including not reusing excavated saline soils for backfilling.

Acid Sulfate Soils

There is a low risk of encountering Acid Sulfate Soils during construction of the wastewater pipeline in Kembla Grange, Yallah, Koonawarra and Mullet Creek (William Beach Park) and high risk in a small area in Albion Park adjacent to the pumping station. Locations will be further investigated during detailed design and if practical relocated to avoid ASS. Where this cannot be achieved, particularly around Mullet Creek and Albion Park, mitigation measures are to be implemented to minimise impacts in accordance with Acid Sulfate Soils Management Advisory Committee: Acid Sulfate Soils Assessment Guidelines (ASSMAC, 1998).

Ground Water

Concerns regarding impacts on groundwater was raised by the EPA, Wollongong City Council and NOW. In response, the Department notes:

- that changes to recharge and evapotranspiration (the process of transferring moisture from the earth to the atmosphere by evaporation of water and transpiration from plants) rates are expected to be low due to the small construction footprint (inclusive of reservoirs and pumping stations); and
- that the proponent intends to consult with NOW regarding licence requirements following detailed design.

There is a high risk of intercepting groundwater from the more shallow of the two aquifers during construction near watercourses, registered bores or other landforms throughout the proposal area. This could potentially result in groundwater entering excavations or the excavations creating preferential groundwater flow paths.

Impacts were considered temporary and not significant given the progressive construction of the pipelines, small trench footprint pipeline (50m x 2m) and short timeframe (trenches backfilled generally daily or within two weeks). To minimise groundwater inflows construction mitigation measures would be implemented including shoring and piling. The proponent commits to pumping out, containing, testing and, if appropriate, treating prior to reuse, or appropriate discharge or disposal of any groundwater encountered during construction.

To ensure that soils, geology and groundwater are appropriately managed the Department recommends conditions specifying construction techniques for high risk watercourse crossings with erodible soils as well as actions to manage soil and water which require compliance with NOW and NSW Fisheries guidelines together with a rehabilitation management plan. Adherence to approval conditions for underboring will avoid water quality and geomorphological impacts, while other management plan conditions will ensure an acceptable level of management, monitoring, rehabilitation and stabilisation of areas prone to erosion.

5.5.3 Creek Crossings/Riparian Zones/Wetlands

With potentially over 284 watercourse crossings by pipelines (particularly wastewater) within the area (and approximately 550 within the concept plan area), the proposal has the potential to impact on riparian zones, wetlands, aquatic ecology, groundwater, bank and channel stability and cause erosion and associated downstream deposition of sediment.

The majority of the proposal is located in the Coastal plains and would typically cross watercourses in the lower reaches that are usually stable with low channel migration potential although prone to frequent overbank flooding. Four high geomorphological risk watercourses have been identified in the proposal area with two of these located in the Project Application area (in Sheaffes/Wongawill) and two in the Concept Plan area (crossings of Mullet Creek between Avondale and Brownsville). These are also mapped as Category 1 watercourses which are defined as important environmental corridors providing biodiversity linkages between key destinations in accordance with the Riparian Corridor Management Strategy (DPINR, 2004).

The proposed pipeline alignment has been designed to avoid sensitive riparian and aquatic environments with assessment of riparian zones revealing that they generally occur as eroded and cleared creeks within farmland. Impacts from construction in watercourses would be avoided in some instances by co-locating water pipelines with roads and bridges. Wastewater pipelines, however, have design, engineering and/or hydraulic design constraints which prevent them from being always co-located with roads.

Most Category 1 and high risk watercourses would be underbored with trenching only proposed in Category 2 and 3 watercourses. These watercourses are considered to be minor streams that are generally in poor condition with no riparian habitat.

Typically creek crossings of wastewater pipelines would involve disturbing a construction area of 30m long x 10m wide with a depth of between 3 - 5m. Potential for bed and bank scour would be considered in terms of burial depth should crossings of high risk watercourse be unavoidable.

Environmental, engineering and operational constraints would be considered at detailed design stage and would determine the construction method selected at each creek crossing with site specific consideration of sensitive locations (dynamic watercourses, highly erodible soils and sensitive riparian corridors). Additional watercourses with comparable characteristics to the four high risk sites identified would be managed similarly.

A construction corridor width for wastewater pipelines is proposed between 6m-10m. Access is the key determinant of the width of the construction corridor and when vehicle access is unavailable this necessitates the widening of the construction corridor.

Mitigation measures include avoidance of high risk sites, underboring of Category 1 watercourses together with an appropriate pipeline burial depth which considers potential bank and bed scour, locating entry and exit points for underboring outside the 'top of bank' where possible, timing of works (trenching when creek bed is dry and avoiding works during or immediately after heavy rain) and implementation of erosion, sediment controls in

accordance with Managing Urban Stormwater: Soils and Construction (Volume 1, Landcom 2004 and Volume 2A, DECC 2008) and rapid restoration and stabilisation of stream banks and riparian areas.

Creek crossings were raised by Wollongong City Council, the Southern Rivers Catchment Management Authority, EPA, NOW and NSW Fisheries). Consent conditions were recommended in relation to specific pipeline construction techniques, placement of launch and exit points, restricting the construction corridor, fish passage, consultation, management, monitoring and rehabilitation.

The Department supports limiting the construction corridor width through riparian zones to the smallest with possible but is cognisant that 6m may not be feasible. The Department is comfortable with the proponent's commitment for between 6m-10m particularly given the degraded nature of the riparian zones and practical consideration of vehicular access. The Department also accepts that large trees in close proximity to the pipelines may compromise their function and that feasibility studies would remain outstanding until detailed design has been completed.

While the Department supports the proponent's general approach of avoidance as well as mitigation and progressive stabilisation measures to reduce impacts, given the sheer volume and sensitivity of the watercourses in the project area, there is potential for ongoing impacts to waterways. Therefore, to ensure impacts are appropriately managed the Department recommends the imposition of conditions requiring the proponent to prepare a Construction and Environmental Management Plan that outlines specific management actions to minimise impacts to waterways accordance with relevant NOW and NSW Fisheries guidelines together with a rehabilitation plan inclusive of monitoring. In addition, the Project Approval is to include a requirement to underbore all high risk watercourses (Category 1, dynamic, highly erodible, key fish habitats) unless sufficient justification is provided.

With regard to the Concept Plan, the Department recommends a future assessment requirement for a detailed assessment of watercourse crossings including justification of proposed methods, associated impacts and mitigation.

5.5.4 Flooding

The proposal has been designed with leak tight pipes and to:

- avoid the 1 in 100 year flood liable land and where this is impractical the infrastructure will be located below ground, elevated or bunded; and
- accord with minimum depths of cover for pipelines specified in the Water Supply Code of Australia (WSAA, 2002) and Sewerage Code of Australia (WSAA, 2002).

Ongoing monitoring would ensure the detection of leaks and inspection of pumping stations. Following floods all above ground infrastructure would be inspected for impact and measures to restore services implemented.

Consideration of floodplain risk management (on assets and the surrounding environment) and recent flood studies and failure to address the probable maximum flood were raised by OEH. The Department notes that Wollongong City Council is satisfied with the proponent's assessment and commitment measures as they relate to flooding.

The Department accepts that the detailed assessment of flood events greater than 1% Annual Exceedance Probability is unnecessary due to the proposed design and compliance with industry standards together with maintenance procedures. Further, it is noted that existing Sydney Water assets (not part of the proposal) that are located within the 1 in 100 year flood zone have not been affected by previous flood events.

Due to the extensive development horizon for the Concept Plan, the Department is recommending a condition on the Concept Plan approval requiring the review of local flooding inclusive of subsequent development and relevant flood studies subsequent to approval.

5.5.5 Aboriginal Heritage

An Aboriginal heritage assessment was undertaken in accordance with draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, 2005) and included desktop and field assessments with the pipeline alignment further refined post field assessment. The area was assessed as significantly disturbed and eroded by agricultural activities. However, 189 known sites and 18 potential archaeological sites were identified in the study area.

During detailed design, areas identified as having moderate to high archaeological sensitivity in the Concept Plan area would be subject to further site-specific assessment. In this regard, the Department recommends the imposition of a condition on the Concept Plan approval requiring the review of the Aboriginal heritage assessment to account for changes in the environment in the intervening time inclusive of mitigation and management measures as well as their efficacy and demonstrated consultation with Aboriginal communities.

The Department notes that flexibility in detailed design was factored into the assessment with construction zones narrower than assessment corridors in the field studies although, due to design requirements, wastewater pipelines may not be readily relocated.

The proposal has been designed to avoid disturbing identified sites, where avoidance cannot be achieved specific mitigation measures for each site would be developed with a heritage professional and Registered Aboriginal Parties. Broad mitigation measures proposed include:

- spatial recording for surface sites or sites with a subsurface expression;
- testing and/or salvage excavations for subsurface sites or sites with a subsurface expression;
- recording of cultural materials and impacts;
- level of post-excavation analysis;
- storage of any recovered objects or materials; and,
- consultation with state government agencies and Registered Aboriginal Parties.

OEH raised concerns that specific mitigation measures proposed for each site were not specifically identified. While the Department recognises that impact extent will not be known until detailed design, given the generally close proximity of the sites to construction activities, further detail in the form of actions to manage Aboriginal heritage is recommended to be conditioned.

The Department has recommended a specific condition to ensure that sites are appropriately managed where Aboriginal Cultural Heritage impacts cannot be avoided

5.5.6 Odour

Operation of wastewater infrastructure generates potential odour impacts from odour control units, vent shafts, wastewater pumping stations (WWPSs), wastewater pipelines and at the Wollongong and Shellharbour Wastewater Treatment Plants.

Upgrades to the Wastewater Treatment Plants form part of the Concept Plan and wastewater flows would be accommodated within the existing approved capacity until 2031. Odour impacts at Wastewater Treatment Plants were addressed via recent upgrade works with assessments predicting that there would be no significant impacts from the upgrades. There has been no history of complaints under normal operating conditions.

There is potential for offensive odours to arise from the wastewater pipeline from poor ventilation or stagnant conditions. Odour risk is significantly reduced with appropriate slope and ventilation. The proponent commits to odour management in accordance with the *Protection of the Environment Operations Act* and existing procedures namely, the registration and investigation of complaints and the implementation of odour reduction measures (such as engineering, operational) in the event of verifiable complaints.

The Department has therefore recommended a condition to be imposed on the Concept Plan approval that requires an assessment of potential air quality and odour impacts for subsequent stages in accordance with the requirements of the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (DECC, 2005 – The Approved Methods), Assessment and Management of Odour from Stationary Sources in NSW (DECC, 2001) and Technical Notes: Draft Policy: Assessment and Management of Odour from Stationary Sources in NSW (DECC, 2001).

5.5.7 Visual Amenity

Water and wastewater pumping stations will be mostly located below ground, with small above ground kiosks housing electrical equipment. Visual impacts of the pumping stations were assessed as minor and localised with vegetation (existing and additional) screening of the structures from sensitive receivers.

Five reservoirs are proposed at three locations. These structures range in size from 8m to 10m in height with diameter dependent on capacity (20ML and 17ML have diameters of 50m and 45m respectively). Views of the reservoir are distant, however due to their elevated location they are highly visible. Visual prominence is reduced via vegetation (existing and additional) screening and painting the structures to improve integration with the landscape.

The Department is not satisfied that the likely residual impacts will be appropriately mitigated. Accordingly, the Department recommends conditions requiring the proponent to prepare and implement a rehabilitation/revegetation plan to the Director-General's satisfaction which considers visual screening and mitigation measures to minimise the residual impact.

The Department notes that the location of ancillary components (such as vent shafts 19m x 0.3m) were raised by Shellharbour Council and accepts that they are common visual elements in the urban landscape that do not result in an unreasonable visual impact.

5.5.8 Traffic

There are nine main roads providing access across the proposal area. The major north-south linkages are the F6 Freeway and Princes Highway. Anticipated construction traffic is approximately 140 vehicle movements per day with half attributed to staff vehicles. The remaining truck movements would be dispersed across the construction day (7am-6pm).

The Department considered that construction traffic impact is likely to be minor, since construction will be in stages and generally within the road corridors. RMS and Wollongong City Council commented on roads, traffic and out of hours work. RMS requested the imposition of approval conditions in relation to the appropriate construction methodologies for road crossings, restorative works and gaining appropriate approval for works.

The Department accepts that Sydney Water is not required to obtain consent under the Roads Act, 1993 from Wollongong City Council but they must commit to continued consultation and restoration of Council and RMS managed land in accordance with their standard work practices. The Department has recommended conditions requiring detailed actions to manage traffic and access.

Subject to the recommended conditions and the proponent's commitments the Department considers that the potential traffic impacts can be appropriately managed.

5.5.9 Waste

The largest waste volume to be generated is from spoil excavated for the pipelines, pumping stations and reservoirs and is in the order of 105,600m^3 (or 15,740 truckloads). Other likely wastes include green waste, packaging, offcuts and disused construction material.

Suitable spoil would be reused on site for backfilling (trenches particularly) and landscaping with the majority classified as virgin excavated material. The proponent commits to this method of reuse together with classification of spoil in accordance with both the *Waste Classification Guideline: Part 1 – Classifying waste* and the *Protection of the Environment Operations Act* with excess spoil disposed of at a licensed facility.

Reuse, recycling and disposal are the methods selected for the treatment of other wastes with organic wastes minimised through mulching and composting. The Department approves of the proponent's approach for the reuse of the drilling slurry and recommends the imposition of a condition on the project approval requiring that waste management be addressed as part of the Construction Environment Management Plan.

The Wastewater Treatment Plant generates the highest volume of operational waste. Existing procedures would be used for waste management and disposal. Treated effluent from the Wastewater Treatment Plants is undertaken in accordance with the Environment Protection Licences and 100% of biosolids are reused for soil conditioning and fertilising as part of the Bio-Soil Program.

The Department is satisfied that waste is appropriately managed in relation to the Project Application and it is recommended that the Concept Plan approval is conditioned to require assessment of the quality and impact of treated effluent resulting from the upgrades.

5.5.10 Property and Servicing

Five submissions were received from residents relating to property, pipelines traversing their properties, servicing of Yallah/Marshall Mount precinct and North of Marshall Mount Road, insurance/public liability, consultation and limitations on land. Three submissions requested the extension of services within the Yallah/Marshall Mount precinct.

The Department accepts that every property that has been zoned for development can be serviced by trunk infrastructure via reticulation pipelines (diameter less than 300mm), which are constructed by other parties. Although recent plans produced by Wollongong City Council indicate proposed development in Duck Creek, the proposal was not designed to service development in this location. The proponent commits to reviewing and updating the servicing strategy for subsequent stages as part of the detailed planning.

The inclusion of the wider Calderwood Valley was also considered premature by Shellharbour City Council since only part of the area has currently been assessed for suitability for urban development. The Department accepts that the proposal includes sufficient capacity to cater for expected population growth in this area.

While the proponent considers its Customer Contract and Community Stakeholder Engagement and Customer Complaints policies and procedures together with its obligations under their Operating Licence (2010-2015) to be sufficient, the Department would consider the use of existing corporate procedures where it can be demonstrated that matters of concern would be addressed. The Department has recommended a condition to this effect.

The Department considers the imposition of standard conditions, requiring the proponent to consult with and consider concerns raised by affected landowner together with rectification or compensation for any damage caused, are sufficient to ensure that protection is afforded to private properties.

6. CONCLUSION

The construction and operation of the project facilitates the development of the majority of precincts within WDURA (including Kembla Grange, Sheaffes/Wongawilli, West Horsley, Cleveland and parts of Avondale).

The Department has reviewed the EA, Statement of Commitments, submissions received and the Submissions Report, and is satisfied that the impacts of the proposal can be mitigated and/or managed to ensure an acceptable level of environmental performance with regard to the objects of the EP&A Act and the principles of ESD.

The proponent has demonstrated that impacts on water quality, ecology, heritage, human amenity and property can be mitigated and/or managed. Further assessment requirements are recommended by the Department to ensure that appropriate reviews and consultation with relevant stakeholders are undertaken for subsequent projects subject to the Concept Plan. In particular, the recommended future assessment requirements include:

- reviews to reflect changes in flora and fauna, flooding, heritage, construction noise and vibration together with detailed assessment of creek crossings;
- the development of a measures to offset biodiversity impacts;
- details of proposed upgrade(s) to the treatment plant(s) including proposed technology, construction requirements, interruptions to existing operation and services, confirmation and review of modelled effluent against guideline criteria and demonstration that air quality and odour levels satisfy relevant goals; and,
- the development of community engagement, complaints and reporting procedures as well as a compliance tracking program.

Recommended conditions for the Project Application require:

- the underboring of high risk (Category 1, dynamic, highly erodible, key fish habitats) watercourse crossing unless agreed to by the Department, NOW and NSW Fisheries;
- the minimisation of riparian corridor impacts and rehabilitation to pre-construction conditions where impacts are unavoidable;
- no clearing of Illawarra Lowland Grassy Woodland at the Avondale Reservoir site and a requirement to include measures to offset the impacts of any ILGW at other sites in the Rehabilitation and Landscape Plan;
- the preparation and implementation of a Construction Environmental Management Plan, including actions to manage soil and water, heritage (both Aboriginal and Non-Aboriginal); construction noise, vibration, traffic and access. Construction is to be undertaken during standard *Interim Construction Noise Guidelines* construction hours with the establishment of an out of hours work protocol for assessment, management and approval for construction outside standard hours, identifying measures and practices to minimise noise impacts forming part of the actions to manage construction noise and vibration;
- the preparation and implementation of a rehabilitation and landscape plan inclusive of monitoring and maintenance procedures; and
- the preparation and implementation of an Operation Environmental Management Plan (or an Environmental Management System in lieu where one exists) which requires details on the management approach for visual impacts resulting from the operation of the project.

The Department therefore is satisfied that the Concept Plan and Project Application are consistent with government policy and impacts can be managed to an acceptable level with the implementation of the Proponents statement of commitments and the Department's recommended conditions. Therefore the Department recommends approval for both the Concept Plan and Project Application.

7. RECOMMENDATION

It is RECOMMENDED that the Executive Director Development Assessment and Systems Approval:

- Consider the findings and recommendations of this report;
- Approve the project application, subject to the conditions; and
- Sign the attached instrument of approval (see Appendix E)

14/6/13

A/Director
Infrastructure Assessments

14.6.13

Executive Director
Development Assessment and Systems Approval

APPENDIX A ENVIRONMENTAL ASSESSMENT

See the Department's website at
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3541

APPENDIX B SUBMISSIONS

See the Department's website at http://majorprojects.planning.nsw.gov.au/index.pl?action=list_submissions&job_id=3541

APPENDIX C PROPONENT'S RESPONSE TO SUBMISSIONS

See the Department's website at https://majorprojects.affinitylive.com/public/a855821640b4d4c9159482f27e6d1647/Submissions%20Response%20Report.pdf

APPENDIX D UPDATED INFORMATION ON HISTORIC HERITAGE

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3541

APPENDIX E RECOMMENDED CONDITIONS OF APPROVAL