Sydney WATER

Modification to the Picton Regional Sewerage Scheme

Assessment Report

November 2011

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Report Endorsement

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Executive summary

Introduction

On 15 January 1997, the Minister for Urban Affairs and Planning gave conditional approval to Stage 1 of the Picton Regional Sewerage Scheme (the Scheme). Certain changes to the Scheme were proposed in 1998 and a modification of the Minister's approval was granted in 1999.

The Scheme collects wastewater from the villages of Picton, Tahmoor and Thirlmere via a gravity reticulation network and transfers it through sewage pumping stations to the Picton Water Recycling Plant (the plant) and the Picton Reuse Farm Scheme (the farm). The plant was designed to treat an average dry weather flow of 2.7ML/day and was commissioned in early 2000 to service the area within the boundary shown in Figure 10.1 of the Environmental Impact Statement (EIS) (ERM Mitchell Mccotter 1996).

Sydney Water has received requests for connection to the Scheme from outside the approved Scheme boundary. Future growth in the Picton, Tahmoor and Thirlmere areas has been forecast by the Department of Planning and Infrastructure (DP&I) and Wollondilly Shire Council. The combined forecasts predict that 1,477 lots would be developed by 2031.

Sydney Water has reviewed these future growth forecasts and the capacity of the Scheme and identified uncommitted, spare capacity within the Scheme.

A modification to the Minister's Approval for the Scheme is needed to extend the Scheme boundary so these lots can be serviced.

Description of the modification

Sydney Water is seeking a modification of the Minister's approval for the Scheme. This modification would, if approved, allow properties from outside the approved Scheme boundary to connect to the Scheme using the uncommitted spare capacity at the plant and farm.

These additional connections would be from:

- the seven growth areas on the outskirts of Picton, Tahmoor and Thirlmere identified by DP&I and Wollondilly Shire Council.

  Sydney Water would need to amplify two existing SPSs and build three new SPSs and wastewater pipelines to facilitate these connections to the Scheme.

- other areas.

Property owners/developers seeking to connect to the Scheme must exhibit:

- a willingness to comply with Sydney Water's connection requirements
- an existing relevant planning approval obtained under the *Environmental Planning and Assessment (EP&A) Act 1979*.

Future growth and development

The seven growth areas identified in the 2008/09 MDP were not identified when the Scheme was approved in 1997. Sydney Water is therefore seeking approval to service these growth areas outside the Scheme boundary.

To allow flexibility and efficiencies in the way future development is serviced and connected, Sydney Water is also seeking approval to service other areas outside the approved Scheme boundary. Sydney Water would continue to consult with Wollondilly Shire Council and the DP&I in planning connections to these areas.

New assets and asset amplifications

Sydney Water has identified new assets and amplifications required to service the additional growth areas. No amplifications to the plant or farm are required to service these new growth

areas. Minor upgrades to certain plant components are likely to be required to maintain plant reliability.

The collection system would need to be expanded and amplified to collect and transfer wastewater from the future growth areas. Sydney Water has identified preliminary locations for the proposed changes based on growth projections in the MDP and from information provided by Wollondilly Shire Council. The proposed changes include:

- amplifications of two sewage pumping stations (SPSs), SPS 920 and SPS 1045
- construction of three new SPSs and rising mains (referred to as SPS A, B and C and Rising Mains A, B and C)
- construction of a wastewater pipeline at West Picton.

The reticulation system within the growth areas will be the responsibility of the developer and will be assessed separately by the developer under Part 4 of the *Environmental Planning and Assessment Act 1979.*

Purpose of this report

This report describes the proposed changes to the original approved Scheme and identifies and assesses any additional impacts, particularly those relating to the proposed amplification of the existing SPSs and construction of new SPSs and wastewater pipelines.

This report also identifies new mitigation measures for the proposed changes.

Environmental impacts and mitigation

Impacts associated with the increased flows, including additional irrigation and discharges to Stonequarry Creek, are consistent with the impacts assessed in the EIS and those currently occurring.

The construction of the proposed changes would involve clearing, disturbance and excavation at the new SPS sites and within the pipeline corridors. Excavation works are not required at the SPS amplification sites.

Specialist consultants were engaged to assess the potential flora and fauna, Aboriginal heritage and noise and vibration impacts. Their findings were:

- The flora and fauna study identified that Shale Sandstone Transition Forest (SSTF) is present at the SPS A and B sites. SSTF is listed as an Endangered Ecological Community under the *Threatened Species Conservation Act 1995*. The Assessment of Significance concluded that the new assets would not have a significant impact on the habitat or habitat connectivity of SSTF occurring at the SPS A and B sites.
- The Aboriginal Heritage Due Diligence Assessment did not identify any Aboriginal heritage sites in the vicinity of the new assets and concluded that no further investigations and/or impact assessment would be required.
- The noise and vibration assessment identified that construction noise management levels would be exceeded at nearby residential receivers during worst case noise generating activities. Operational noise is unlikely to impact residences.

Construction could potentially affect:

- surface water quality
- soils
- vegetation
- traffic
- existing noise levels
- the visual environment.

Any impacts would be minor and short-term only.

Adverse operational impacts would include

- increased overflows in wet weather
- the visual impacts of above ground sewerage system assets
- odours
- increased chemical transport/storage.

These impacts would also be minor, although longer term.

By adopting the mitigation measures outlined in this document Sydney Water expects that there would be minimal environmental impacts.

Justification for the project

This report found that the proposed changes would not compromise the ability of the Scheme to meet its objectives and would have community and environmental benefits. Timely servicing of the new growth areas would contribute to economic growth and meeting future housing demand in the area. The proposed changes would also ensure that water quality and public health risks associated with wastewater collection and disposal are minimised.

The proposed changes have been assessed against the principles of ecologically sustainable development, including the precautionary principle, intergenerational equity, conservation of biological diversity and ecological integrity and improved valuation, pricing and incentive mechanisms. The evaluation found that the potential impacts from the proposed changes would be minimised through the implementation of appropriate mitigation measures. The mitigation measures would ensure that the health, diversity and productivity of the local and regional environment is maintained.

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1 Introduction

1.1 Background

On 15 January 1997, the Minister for Urban Affairs and Planning gave conditional approval to Stage 1 of the Picton Regional Sewerage Scheme (the Scheme). Certain changes to the Scheme were proposed in 1998 (moving the water recycling plant (WRP, the plant) to a different site on Carlton Stud, nominating an extra 55 ha of Carlton Stud to be irrigated, including a treated effluent main to Picton and relocating SPS 914). A modification of the Minister's approval was granted in 1999.

The approved Stage 1 Scheme was:

- a new WRP at Picton and a collection system (including eight sewage pumping stations (SPSs)) in Picton, Thirlmere and Tahmoor to service existing urban, business, industrial special use and open space areas. The plant would be designed to treat an average dry weather flow (ADWF) of 2.7 ML/day
- a treated effluent reuse area of 175 ha on Carlton Stud (now referred to as the Picton Reuse Farm Scheme (the farm))
- the precautionary discharge of excess treated effluent to Stonequarry Creek
- a treated effluent reuse main from the plant to Picton (this main was not constructed).

The Scheme was described in the Environmental Impact Statement (EIS) (ERM Mitchell Mccotter, 1996) and Review of Environmental Factors (REF) (Sydney Water Transutilities Consortium, 1998). It was commissioned in early 2000 to service the area identified within the boundary shown on Figure 10.1 of the EIS.

Sydney Water has subsequently received requests from the owners of established properties outside the Scheme boundary for a connection to the Scheme. Wollondilly Shire Council has also approached Sydney Water about providing wastewater services to proposed, new urban growth areas in Picton, Thirlmere and Tahmoor. More recently, requests for connection to the Scheme have been received from areas outside the identified new growth areas.

Sydney Water has identified that there is uncommitted spare capacity within the Scheme. In 2007, Sydney Water proposed a two-phased process to the then Department of Planning (now the Department of Planning and Infrastructure (DP&I)) to address these requests and extend the Scheme service area:

Phase 1: A defined number of established properties located outside the Scheme area could immediately connect to the Scheme, making use of the spare capacity identified within the Scheme. These customers would fund the cost of their connections and priority would be given to long-standing requests from the owners of community service facilities such as retirement villages and sports clubs.

Phase 2: Wastewater services would be provided to Wollondilly Shire Council's proposed urban growth areas immediately adjacent to, or within, Picton, Thirlmere and Tahmoor, as proposed under Draft LEP Amendment No. 73 and consistent with the Council's 25 Year Vision.

DP&I endorsed this approach in November 2007.

Sydney Water obtained a modification to the Minister's approval from the DP&I in April 2009. This allowed the approved Scheme boundary to be extended to allow established community service facilities to connect to the Scheme. Three facilities, Macquarie Retirement Village, Tahmoor Oval and Estonian Retirement Village, met the criteria for connection under Phase 1 of the process and the owners of these facilities were invited to connect to the Scheme. The locations of these properties are shown in Figure 2. These properties are yet to connect to the Scheme.

Sydney Water has reviewed the proposed future development forecasts in Picton, Tahmoor and Thirlmere identified in the Wollondilly LEP 2011 and DP&I's Metropolitan Development Plan (MDP). The combined forecasts predict that 1,477 lots would be developed by 2031.

These lots would all be located outside the Scheme boundary.

Further investigations by Sydney Water have confirmed that there is uncommitted spare capacity at the plant and farm to take additional flows from the future growth areas. However, the collection system would need to be expanded and amplified to collect and pump wastewater from the future growth areas to the Scheme.

Sydney Water is now seeking another modification to the Minister's approval to implement Phase 2 of the boundary extension process. This modification would, if approved, allow properties from outside the approved Scheme boundary to connect to the Scheme using the uncommitted spare capacity at the plant and farm.

These additional connections would be from:

- the seven growth areas on the outskirts of Picton, Tahmoor and Thirlmere identified in the DP&I's 2008/09 MDP and by Wollondilly Shire Council.

  Sydney Water would need to amplify two existing SPSs and build three new SPSs and wastewater pipelines to facilitate these connections to the Scheme.

- other areas.

Property owners/developers seeking to connect to the Scheme must exhibit:

- a willingness to comply with Sydney Water's connection requirements
- an existing, relevant planning approval obtained under the *Environmental Planning and Assessment (EP&A) Act 1979*.

1.2 Purpose of this document

This report describes the proposed changes to the approved Scheme and assesses their potential impacts. In particular, the impacts of the proposed SPS amplifications and new SPSs and wastewater pipelines are assessed.

This report also identifies appropriate mitigation measures for the proposed changes.

2 The Picton Regional Sewerage Scheme

2.1 Description of the Scheme

The Scheme was commissioned in February 2000 to serve the people in Picton, Thirlmere and Tahmoor in Wollondilly Shire, in south west Sydney. Prior to the Scheme, individual properties were serviced by on-site wastewater treatment systems.

The Scheme collects wastewater from the villages of Picton, Tahmoor and Thirlmere via a gravity reticulation network, and transfers it through eight SPSs to the Picton WRP for treatment. The plant produces two types of treated effluent.

Secondary treated effluent is stored in the Eastern Dam and used to irrigate fodder grown on a 90 ha area of the Picton Reuse Farm Scheme (see Figure 1). Most of the treated effluent produced by the plant is used for irrigation.

Tertiary treated effluent stored in the Western Dam is used around the plant and discharged to Stonequarry Creek in precautionary discharges[1].

These effluent re-use and discharge practices are in accordance with two key objectives of the Scheme: to reduce local pollution and optimise resource use.

2.2 Picton Sewage Treatment System Licence

Sydney Water holds a licence under the *Protection of the Environment Operations Act 1997* for the operation of the Scheme.

The Picton Sewage Treatment System (STS) licence sets limits on the quality and quantity of effluent used on the farm as well as on the effluent discharged to Stonequarry Creek in precautionary discharges.

The licence regulates precautionary discharges in the following ways:

- Discharges are only permitted when flows in Stonequarry Creek are more than 8 ML/day.
- A discharge of up to 25% of the creek flow is permitted when flows in Stonequarry Creek are greater than 8 ML/day.
- The total discharge to the farm and Stonequarry Creek is limited to 14 ML/day.

The licence does not specify a limit for wet weather overflows from the Scheme.

The licence requires Sydney Water to monitor and report on the following:

- number of pollution complaints
- quality and quantity of water discharging to Stonequarry Creek
- quality of water used for irrigation
- flows in Stonequarry Creek
- non-compliances with the licence conditions.

Overall, the Scheme has performed well. Licence requirements have generally been met and non-compliances with licence conditions have been reported and managed to prevent their re-occurrence.

Sydney Water has been able to demonstrate that the water quality in Stonequarry Creek has improved since the Scheme was commissioned (refer to Section 5.2 for more details).

[1] Precautionary discharge is the term used in this scheme for all the discharges to the creek.

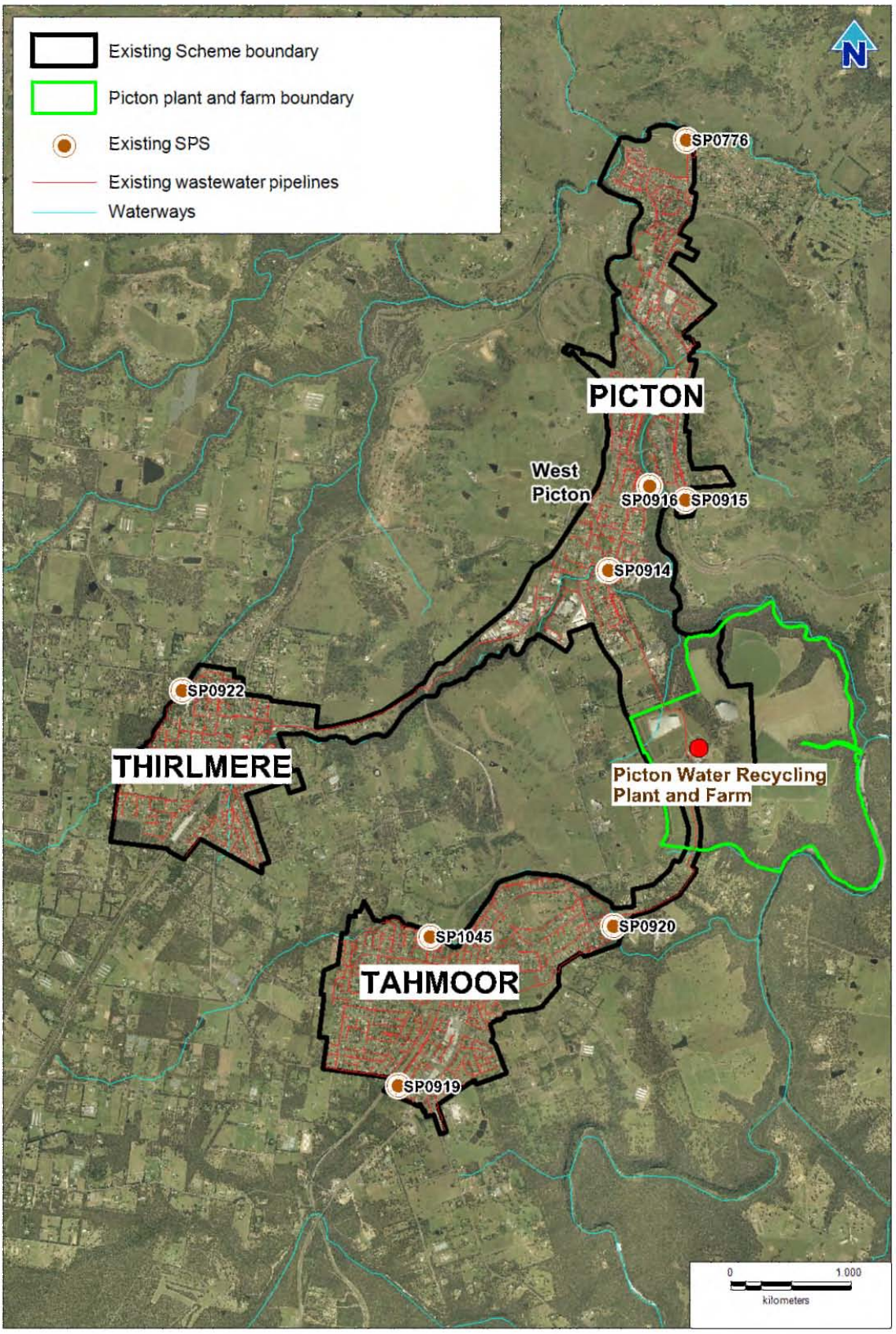

Figure 1 Picton Regional Sewerage Scheme

3 Description of the modification

3.1 Need for proposed changes

Sydney Water proposes to make changes to the Picton Regional Sewerage Scheme to meet its wastewater servicing responsibilities. Future growth areas that require servicing have been identified on the outskirts of Picton, Tahmoor and Thirlmere. Sydney Water has also received requests for connection to the Scheme from outside these identified growth areas.

Sydney Water has identified uncommitted spare capacity at the plant and farm but is not currently able to use this capacity to service future growth areas or other areas outside the approved Scheme boundary without a modification of the Minister for Planning's approval.

This modification does not cover any amplification of the Scheme beyond the Scheme's approved capacity (an ADWF of 2.7 ML/day). Such a proposal would be the subject of a separate environmental impact assessment and approval.

3.1.1 Future growth and development

DP&I and Wollondilly Shire Council forecasts for development outside the Picton, Tahmoor and Thirlmere Scheme boundary predict that 1,477 lots would be developed by 2031. Lot forecasts for the new growth areas are summarised in Table 1.

The new growth areas are all outside the approved Scheme boundary (refer to Figure 2). Sydney Water is therefore unable to service them under its current approval.

Table 1 Wollondilly Council lot forecasts for Picton, Tahmoor and Thirlmere (PTT) Growth Areas

New Growth Areas	Number of Lots
PTT 1_West Picton	40
PTT 2_ East Thirlmere	200
PTT 3_ South Thirlmere	123
PTT 4_ West Tahmoor	120
PTT 5_ Bronzewing Estate	123
PTT 6_ East Tahmoor	750
WOLL 16_Seniors Living Thirlmere	121
TOTAL	1477

Source: Wollondilly Shire Council and DP&I's Metropolitan Development Program (MDP)

The growth areas and lot numbers in Table 1 are forecasts only. Actual development may proceed at a slower rate, be limited by environmental or other constraints or may occur outside these planned areas depending on demand and developer plans.

Wollondilly Shire Council is currently preparing environmental studies to assist in planning for future development and this could alter the current growth areas proposed.

3.1.2 Requests from other areas for connection

Requests for connection to the Scheme have been received from areas outside the identified, new growth areas in Picton, Tahmoor and Thirlmere.

To allow for flexibility in servicing, Sydney Water is also requesting approval to service other areas outside the Scheme boundary (provided they meet the criteria listed in Section 1.1 and flows from all sources are less than the approved Scheme capacity (an ADWF of 2.7 ML/day)). These areas would be in addition to the areas identified in Table 1.

Ingham's Turkey Operations at Tahmoor has inquired about a possible future connection to the Scheme. Sydney Water is currently investigating the potential impact of such a connection on the Scheme's capacity.

Sydney Water may be able to partially or fully service flows from Inghams Turkey Operations depending on the rate of connections from the new growth areas and the remaining unallocated spare capacity at the plant and farm.

This report does not cover any amplifications to the Scheme's collection, treatment and effluent management facilities that may be required to service Inghams Turkey Operations. Should Sydney Water agree that they can use some of the Scheme's unallocated, spare capacity and connect to the Scheme, any connection costs, including any trunk main amplifications, would have to be fully funded by Inghams. Inghams would need to obtain their own consent for these works (from Wollondilly Shire Council) and would need to meet Sydney Water's connection requirements under section 73 of the *Sydney Water Act 1994*.

3.1.3 Uncommitted spare capacity within the Scheme for future growth areas

Sydney Water has identified uncommitted spare capacity within the Scheme. This capacity could be taken up by flows from the future growth areas.

The approved Stage 1 Scheme, as described in the EIS and REF, involves a collection system, a WRP with the capacity to serve 3,000 lots (an ADWF of 2.7ML/day) and treated effluent reuse on land adjacent to the WRP.

The EIS predicted that the Stage 1 capacity would be reached by 2004. A Stage 2 was envisaged that would involve amplifying the Scheme to the ultimate capacity of 4,500 lots (and an ADWF of 4.05 ML/day). Stage 2 was predicted to be adequate to cope with residential and industrial development in the three townships up to about 2016.

Development within the Scheme area has been slower than anticipated. In addition, lower residential water use and lower wet weather infiltration rates than anticipated mean that the predicted flows of 220L per Equivalent Person (EP) per day have not been reached. Current flows only average 150L per EP per day.

Thus the Picton WRP is currently operating at less than its Stage 1 capacity. The plant currently receives an ADWF of 1.65 ML/day from about 2,500 existing lots within the villages of Picton, Tahmoor and Thirlmere.

Sydney Water has predicted that the ultimate ADWF would increase to 2.4 ML/day by 2031 when all the new growth areas are developed and infill development within the existing Scheme boundary is complete. This is less than the approved Scheme capacity (an ADWF of 2.7 ML/day).

There is adequate spare capacity at the plant and farm to treat and dispose of the additional flow from the new growth areas. No amplifications to the plant or farm are required to service these areas.

Minor upgrades to certain plant components, including the filters and disinfection system, are likely to be required to maintain plant reliability. The scope of these upgrades would be identified during the detailed design phase.

The collection system would need to be expanded and amplified to collect and transfer wastewater from the new growth areas. These changes are described in Section 3.3.

Sydney Water has approval to irrigate 175 ha at the farm. Currently, only 90 ha is irrigated. Sydney Water (2008) has identified that up to 2.5 ML/day of treated effluent could be applied to the current irrigated area without any uncontrolled discharge. Thus, the predicted flows from the growth areas would be managed within the existing irrigation areas.

As flows increase, Sydney Water would continue to monitor the capacity of the existing irrigation area to take effluent. Any indication of uncontrolled discharges from the current irrigation area, significantly increased soil nutrient levels or significantly changed groundwater levels or quality would trigger investigations to expand the irrigation area.

These investigations would consider the suitability of other areas of the farm for irrigation. Existing topography, vegetation (especially the endangered ecological plant community Shale Sandstone Transition Forest), soils and the need for buffer zones would be considered. Water balance modelling would also be undertaken to determine the new area of irrigation required.

3.2 Benefits of the proposed changes

Allowing Sydney Water to provide connections to properties outside the Scheme boundary (provided they meet the criteria listed in Section 1.1 and flows from all sources are less than the approved Scheme capacity (an ADWF of 2.7 ML/day)) would be more efficient and cost effective than Sydney Water seeking case-by-case extensions to the Scheme boundary. It would also allow flexibility in servicing new development.

This approach would also be consistent with Sydney Water's preferred approach of servicing all growth areas listed on the MDP. Furthermore, Sydney Water would be able to respond in a more timely way to requests for connection to the system.

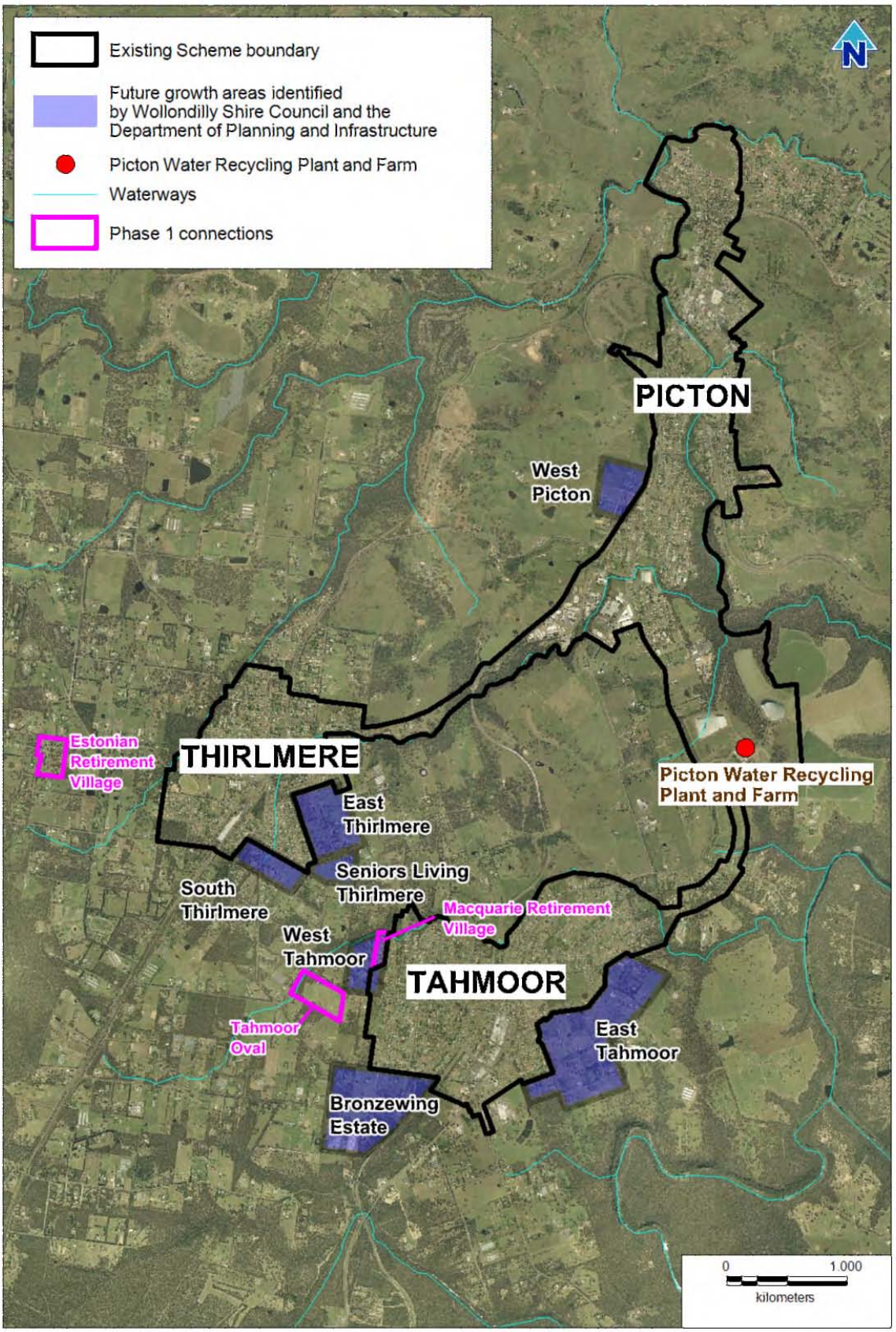

Figure 2 New growth areas

3.3 The proposed changes

3.3.1 New assets and asset amplifications

As outlined in Section 3.1.3, Sydney Water has confirmed that there is uncommitted spare capacity at the plant and farm. No amplifications to the plant or farm are required. Only minor changes to certain plant components would be required to maintain reliability. These changes have not been assessed in this report, and would be subject to a consistency assessment once the scope has been determined.

The collection system would need to be expanded and amplified to collect and transfer wastewater from the new growth areas. Sydney Water has identified preliminary locations for the proposed new assets based on growth projections in the MDP and from information provided by Wollondilly Shire Council. These locations would be confirmed during the detailed design process. The proposed changes include:

- amplification of SPS 920 and SPS 1045
- construction of three new SPSs and rising mains (referred to as SPS A, B and C and Rising Mains A, B and C)
- construction of a wastewater pipeline at West Picton.

Some of these assets may be built by developers on behalf of Sydney Water and then handed over to Sydney Water to own and operate. Developers would also be responsible for building the reticulation system to service individual lots.

The locations of the proposed assets are summarised in Table 2 and shown in Figure 3. With the exception of the two SPS amplifications, the new assets would generally be located within or adjacent to the future growth areas.

SPS sites were located at the lowest point in the catchment areas to allow wastewater from the new growth areas to drain to the SPS. Environmental constraints, such as land use, vegetation and waterways, were also considered. Pipeline routes have been selected to connect to nearby points in the existing system and are generally located in road reserves.

Two alternative locations are presented for SPS A, referred to as A1 and A2. The preferred location for SPS A will be determined during detailed design and will take into account the results of this environmental assessment as well as engineering constraints.

Table 2 Description of proposed changes

Infrastructure	Description	Location
SPS Amplifications		
SPS 920	Increase SPS capacity from 134 L/sec (existing) to 200 L/sec	River Road, Tahmoor
SPS 1045	Increase SPS capacity from 20 L/sec (existing) to 35 L/sec	Hilton Park Road, Tahmoor
New SPS		
SPS A (two alternative locations have been proposed: A1 and A2)	A new SPS with 24 L/sec capacity	Cross Street, Tahmoor
SPS B	A new SPS with 60 L/sec capacity	Progress Street, Tahmoor
SPS C	A new SPS with 25 L/sec capacity	Marion Street, Thirlmere
Wastewater pipelines		
Rising Main A (same location for SPS A	A 590m long, 150 mm diameter pipe	Cross Street & Myrtle Creek Avenue, Tahmoor

Infrastructure	Description	Location
alternatives A1 and A2)		
Rising Main B	A 440m long, 225mm diameter pipe	Progress Street, Tahmoor
Rising Main C	A 260m long, 150 mm diameter pipe	Marion Street and Rita Street, Thirlmere
West Picton wastewater pipeline	A 210m long, 150 mm diameter pipe	Between Connellan Crescent and Remembrance Driveway Picton

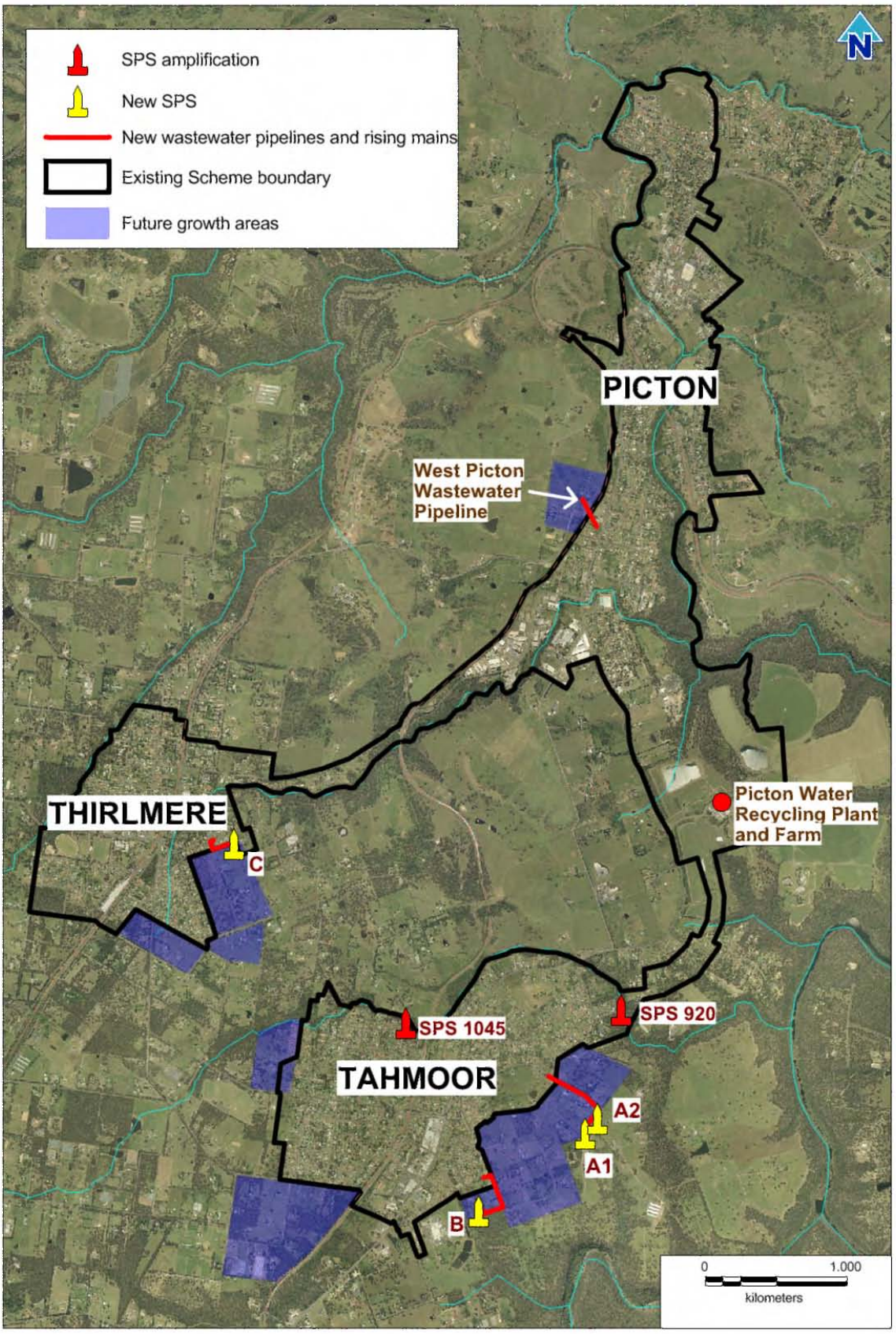

Figure 3 Location of proposed changes

3.3.2 SPS amplifications

SPS 920 would be amplified to receive additional flows from the West Tahmoor, Bronzewing Estate and East Tahmoor development areas. New pumps would be installed to increase the capacity of the SPS to approximately 200L/sec.

SPS 1045 would be amplified to receive additional flows from the West Tahmoor development area. New pumps would be installed to increase the capacity of the SPS to approximately 35L/sec.

3.3.3 New SPSs

Three new SPSs would be built, two in Tahmoor and one at Thirlmere.

SPSs A and B would receive flows from the East Tahmoor development area. Two alternative locations have been proposed for SPS A, referred to as A1 and A2. Both are located on Cross Street, between Tahmoor Road and Myrtle Creek Avenue.

SPS C would receive flows from the East Thirlmere development area. All SPSs would then pump wastewater to the existing Picton wastewater reticulation system. The SPSs would be designed in accordance with the Sewage Pumping Station Code of Australia.

The SPSs would be designed so no dry weather overflows occur. Wet weather overflows from the SPSs would, however, occasionally occur. Overflow structures at the new SPSs would be constructed as required by the Sewerage Pumping Code of Australia.

3.3.4 Wastewater pipelines

Approximately 1.5 km of new wastewater pipelines would be laid. These would range in diameter from 150 to 225 mm.

The proposed West Picton wastewater pipeline would connect the West Picton development area to the existing wastewater network. This pipeline would be bored underneath the Main Southern Railway Line.

The proposed rising mains would generally be laid within road reserves and would transfer wastewater flows from the SPSs to the existing wastewater network. Indicative locations for the proposed wastewater pipelines are shown in Figure 3.

Sydney Water would use a low infiltration wastewater system to minimise the levels of inflow and infiltration during wet weather. Reduced inflow and infiltration into the wastewater system would reduce the potential for wet weather overflows, reduce treatment costs and improve treatment plant performance. The pipelines would be designed to achieve no dry weather overflows.

3.3.5 Other components

Other components of the wastewater pipelines would include maintenance structures, emergency relief structures and air release facilities.

Maintenance structures provide access to the wastewater system. There are two main types of structures: maintenance holes and maintenance shafts. Both types would be installed.

An emergency relief structure is an overflow structure designed to permit a controlled discharge of stormflows that exceeds the downstream capacity of the wastewater system.

Air release facilities would be placed at significant high points in the system to release air conveyed by the wastewater. Without air release facilities, air would become trapped in the pipeline and could restrict flow.

The final locations of these components would be determined during detailed design.

3.4 Construction method

3.4.1 Wastewater pipelines

Open trench excavation

Open trenching would be used to construct rising mains A, B and C.

The total construction footprint for the pipeline corridors is expected to be up to 10 m wide. Laydown and staging areas may also be required.

Construction activities associated with open trench excavations would typically include:

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

Trenching would generally be carried out using excavators and a small compactor. Rockbreakers may also be required where bedrock is encountered during excavation.

Boring

Sydney Water proposes to bore the wastewater pipeline under the railway line at West Picton.

Potential boring techniques include micro-tunnelling and horizontal directional drilling (HDD).

Micro-tunnelling requires excavation of a launch shaft (approximately 6 m long, 3 m wide and down to the pipeline depth) and an exit shaft of similar or smaller size. Additional space would be required at the launch site to accommodate plant and equipment.

Micro-tunnelling generally involves a hole being bored by the cutting heads with the boring equipment being thrust along a straight alignment from the launching shaft to the receiving shaft by means of rods or jacks. Guidance is by laser and survey equipment, which allows for the boring of very flat grades with great accuracy. A single borehole would be restricted to a maximum length of approximately 1 km.

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

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

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

Activities associated with boring techniques include:

- establishing sites for the launch and exit shafts, including:
    - installing erosion and sediment controls
    - implementing management measures for drilling fluids and cuttings
    - implementing management measures for groundwater
    - removing road/footpath surfaces and clearing vegetation, as required

  - installing fencing and security measures.
- excavating the launch and exit shafts
- drilling the borehole and removing spoil and cuttings
- inserting the pipe into the borehole
- commissioning the pipeline
- restoring affected areas, including backfilling the bore shafts.

3.4.2 Sewage pumping stations

New SPSs

Constructing the new SPSs would involve the following activities:

- levelling the site and disposing excess spoil where required
- carrying out earthworks including excavating the SPS wet well
- constructing the SPS wet well, emergency storage well and control building
- installing chemical dosing equipment (if needed)
- installing a vent shaft
- constructing other works including the SPS access road, fencing etc
- commissioning
- landscaping and restoration.

Typical construction equipment would include excavators, compactors, rockbreakers, saw cutters, welding equipment, delivery and concrete trucks, powered hand tools, generators and cranes.

Amplification of existing SPSs

During the amplification of SPS 920 and SPS 1045, the SPSs would be shut down during a period of low flow. If required, Sydney Water would transfer the wastewater to another part of the system during the installation. The amplifications would involve the following activities:

- removing existing pumps
- using a crane to move old and new pumps
- installing new pumps
- modifying the wet well if necessary
- welding and electrical wiring
- concreting
- commissioning
- landscaping and restoration.

3.4.3 Timing and duration

Construction of the new SPSs and rising mains would take approximately six to twelve months. The amplification of the existing SPSs would take approximately three to six months. The construction of the West Picton wastewater pipeline would take up to four weeks to complete.

Works would be staged to coincide with the planned development. Sydney Water would consult with Wollondilly Shire Council and the DP&I to confirm that its delivery program is consistent with the development plans.

3.5 Delivery method

Sydney Water is responsible for delivering the proposed changes. However, some of the work may be delivered by a developer on behalf of Sydney Water. In general, this occurs when a developer wishes to advance the timing of the delivery of assets for their development. A commercial agreement is established between Sydney Water and the developer for this purpose.

3.6 Changes to the proposal

The proposed assets and asset amplifications would be confirmed as development plans progress. If the locations or design of the new or amplified assets are changed during the detailed design process, further environmental impact assessment may be required.

Any changes to the proposal described in this report that are inconsistent with the Minister's modified approval would require a further modification of approval.

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4 Legislative framework

4.1 Planning approval

The Picton Regional Sewerage Scheme was determined to be likely to have a significant impact on the environment. Therefore, an EIS was prepared under Division 4 of Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). An EIS was completed for Stage 1 in January 1996 and the Minister for Urban Affairs and Planning gave conditional approval on 15 January 1997.

As a result of the Minister for Planning's Order of 29 July 2005, any projects likely to have a significant effect on the environment and that would have previously required the preparation of an EIS under Part 5 of the EP&A Act fell under Part 3A of the EP&A Act. This included the Picton Regional Sewerage Scheme.

In May 2011, the NSW Government announced that Part 3A would be repealed and that transitional arrangements would apply for existing approved projects. The transitional arrangements commenced on 1 October 2011. Under Schedule 6a sub-clause 1(a) of the EP&A Act, Part 3A continues to apply to approved projects and the Minister for Planning and Infrastructure remains the approval authority.

Section 75W of the now repealed Part 3A of the EP&A Act relates to the modification of projects approved under Part 3A. Section 75W(2) allows a proponent to request the Minister to modify a project's approval.

4.2 Planning setting

Under section 75R(3) of the EP&A Act, environmental planning instruments (other than State environmental planning policies) do not apply to the Scheme once it is approved. However, under sections 75J(3) and 75O(3), the Minister may take into account the provisions of environmental planning instruments that would otherwise apply. In addition, the Minister may not approve a project or part of a project that would be otherwise prohibited by an environmental planning instrument (section 8O of the EP&A Regulation).

Accordingly, Table 3 considers relevant State environmental planning policies (SEPPs), deemed SEPPs and local environmental plans (LEPs) that are relevant to this Proposal.

Table 3 Environmental planning instruments relevant to the Scheme changes

Planning instrument	Application to the Scheme
Wollondilly Local Environmental Plan 2011	Under the *Wollondilly Local Environmental Plan 2011*, the proposed changes would be undertaken in land that is zoned: • R2 Low density residential • SP2 Infrastructure • RU4 Rural Small Holdings Clause 5.12(1) of the *Wollondilly Local Environmental Plan 2011* states that "This Plan does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted to be carried out without consent, or that is exempt development, under the *State Environmental Planning Policy (Infrastructure) 2007*".
State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP)	The Infrastructure SEPP provides for defined utility installations to be undertaken without the need for development consent. The proposed changes (amplified SPSs and new SPSs and pipelines) fall under the definition of a 'sewage reticulation system'. Part 3, Division 18 of the Infrastructure SEPP defines a 'sewage reticulation system' as: A facility for the collection and transfer of sewage to a sewage treatment plant or water recycling facility for treatment, or transfer of the treated water for use or disposal, including associated: (a) pipelines and tunnels, and

Planning instrument	Application to the Scheme
	(b) pumping stations, and (c) dosing facilities, and (d) odour control works, and (e) sewage overflow structures, and (f) vent stacks. Under clause 106(3)(a) development for the purposes of a sewage reticulation system by or on behalf of a public authority is permitted without consent on any land.
SEPP 44 – Koala Habitat	SEPP 44 applies to land within local government areas listed in Schedule 1. This includes the Wollondilly Local Government Area (LGA). SEPP 44 only applies to developments requiring development consent under Part 4 of the EP&A Act. As the proposed changes to the Scheme fall under Part 3A of the EP&A Act, the requirements of this SEPP would not apply. Nonetheless, SEPP 44 has been considered in the Flora and Fauna Assessment completed by Biosis Research (Appendix 2). The assessment concluded that the study areas were not potential koala habitat and as such the changes are unlikely to impact this species.
SEPP 33 – Hazardous and offensive development	SEPP 33 defines hazardous and offensive development and sets out requirements for considering an application for hazardous or offensive development. The additional wastewater volumes from the new development areas being transferred to Picton STP could increase the storage and use of hazardous chemicals at Scheme sites. SEPP 33 applies to developments requiring development consent under Part 4 of the EP&A Act. As the proposed changes to the Scheme fall under Part 3A of the EP&A Act, the requirements of this SEPP would not apply.

Table 4 discusses relevant Commonwealth and NSW legislation.

Table 4 Relevant Commonwealth and NSW State acts and regulations

Legislation	Relevant requirements	Application to the Scheme changes
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Approval from the Commonwealth Minister for Environment and Heritage is required for any action that may have a significant impact on matters of national significance and/or the environment of Commonwealth land. Matters of national significance are: • World Heritage properties • National Heritage Places • Ramsar wetlands • migratory species, threatened species, or ecological communities listed under the EPBC Act 1999 • Commonwealth marine areas • nuclear actions.	The proposed changes would not impact any World Heritage properties, National Heritage Places, Ramsar wetlands or Commonwealth marine species and would not involve any nuclear actions. No work would be undertaken in Commonwealth land. The potential effect of the Scheme on migratory species, threatened species, and ecological communities listed under the EPBC Act was assessed in the report *Terrestrial Flora and Fauna Assessment – Picton Sewerage Scheme* (Biosis Research 2011, Appendix 2). The study concluded that the proposed changes are unlikely to impact on any migratory or threatened species or ecological communities listed under the EPBC Act (refer to Section 5.4).
National Parks and Wildlife Act 1974	This Act provides for the protection, preservation and management of: • habitat, ecosystems and ecosystem processes • biological diversity • landforms of significance, including geological features and processes • landscapes and natural features of significance including wilderness and wild rivers, • places, objects and features of significance to Aboriginal people, and • places of historic, architectural or scientific significance.	A Due Diligence Aboriginal Heritage Assessment was prepared by Archaeological and Heritage Management Solutions (Appendix 4). No places, objects or features of significance to the Aboriginal people were identified. The assessment concluded that an Aboriginal Heritage Impact Permit would not be required for the proposed changes (refer to Section 5.9).
Heritage Act 1977	This Act provides for the conservation of the State's natural and built heritage.	There are no State-listed heritage items, including relics, within the vicinity of the proposed changes. Non-Aboriginal relics of significance protected under Part 6, Division 9, are unlikely. The impacts of the Scheme on items of environmental and cultural heritage have been assessed and the results are discussed in Sections 5.9 and 5.10.
Protection of the Environment Operations Act 1997 (POEO Act)	This Act is administered by the Office of Environment and Heritage (OEH). The main aim of this act is to protect, restore and enhance the quality of the environment in NSW. Under this Act it is an offence to pollute without an Environment Protection Licence (EPL).	Sydney Water holds a licence under the POEO Act for the operations of the Scheme. Details have been provided in Section 2.2.
Roads Act 1993	This Act outlines the processes involved with opening roads, road levels, closing of public roads, roadwork, regulation of traffic ('temporary' and 'permanent') by Roads Authorities, entry onto land and financial assistance	It may be necessary for the changes to be undertaken in an RTA road and/or road reserve. Sydney Water would consult and seek concurrence/approval from the RTA, in accordance with the *Roads Act 1993*.

Legislation	Relevant requirements	Application to the Scheme changes
	to Roads Authorities.	
Threatened Species Conservation Act 1995 (TSC)	The Act protects threatened plants and animals native to NSW (excluding fish and marine vegetation, which are protected under the *Fisheries Management Act 1994* (FM Act)), endangered ecological communities and critical habitat. It integrates the conservation of threatened species into development control processes under the EP&A Act.	Flora and fauna surveys have been conducted to determine the presence of threatened species and endangered ecological communities in the study area. No threatened species were identified during the field investigations. Shale Sandstone Transition Forest (SSTF), an endangered ecological community, was identified at the SPSs A and B sites. An assessment of significance was undertaken and concluded that the proposal would not have a significant impact on the habitat or habitat connectivity of the SSTF at the SPS A and B sites and would not significantly affect the current disturbance regime.
Waste Avoidance and Resource Recovery Act 2001	The purpose of this Act is to develop and support the implementation of regional and local programs to meet the outcomes of a state-wide strategy for waste avoidance and resource recovery. Waste reporting conditions apply.	The proposed changes are consistent with the objectives of the *Waste Avoidance and Resource Recovery Act 2001*. Waste mitigation measures for the changes are outlined in Section 5.11. If required, waste generation and disposal would be reported as per the Act.
Noxious Weeds Act 1993	The purpose of this Act is to reduce the negative impact of weeds and to provide for the monitoring and reporting on the effectiveness of weed management. The Act establishes control mechanisms to: (i) prevent the establishment of significant new weeds (ii) restrict the spread of existing significant weeds (iii) reduce the area of existing significant weeds.	Biosis Research identified noxious weeds within the study area (refer to Section 5.4.1). Sydney Water should require the removal of these weeds prior to accepting an affected site, as Sydney Water is obliged to control noxious weed on land it occupies. Sydney Water must also notify the local control authority of the presence of a notifiable weed on land it owns within three days of becoming aware of the weed.
Mine Subsidence Compensation Act 1961 and Regulation 2007	The purpose of this Act is to ensure that areas at risk from subsidence from mining activities are identified as Mine Subsidence Areas (MSAs). Certain colliery owners contribute to a compensation fund, used to compensate parties if mine subsidence can be shown to have damaged property etc.	The proposed changes would be located within a mine subsidence area. Sydney Water should seek Mine Subsidence Board approval under section15 (2A) of the Act.

5 Environmental assessment of proposed changes

This section describes the existing environment and assesses the construction and operational impacts of the proposed SPS amplifications, new SPSs and wastewater pipelines. Appropriate mitigation measures are also identified.

The physical works associated with the growth areas and other areas (and any environmental impacts associated with these additional connections) would be assessed by developers when obtaining consent for their developments from Wollondilly Shire Council.

5.1 Landform, geology and soils

5.1.1 Existing environment

Picton, Thirlmere and Tahmoor are characterised by gently undulating to rolling hills on Wianamatta Group Shales or Mittagong formation over Hawkesbury Sandstone. Bannerman and Hazelton (1990) describe two distinct soil landscapes within the Scheme area. These are the Blacktown and Lucas Heights soil landscapes. Their distribution in the Scheme area is shown in Figure 4.

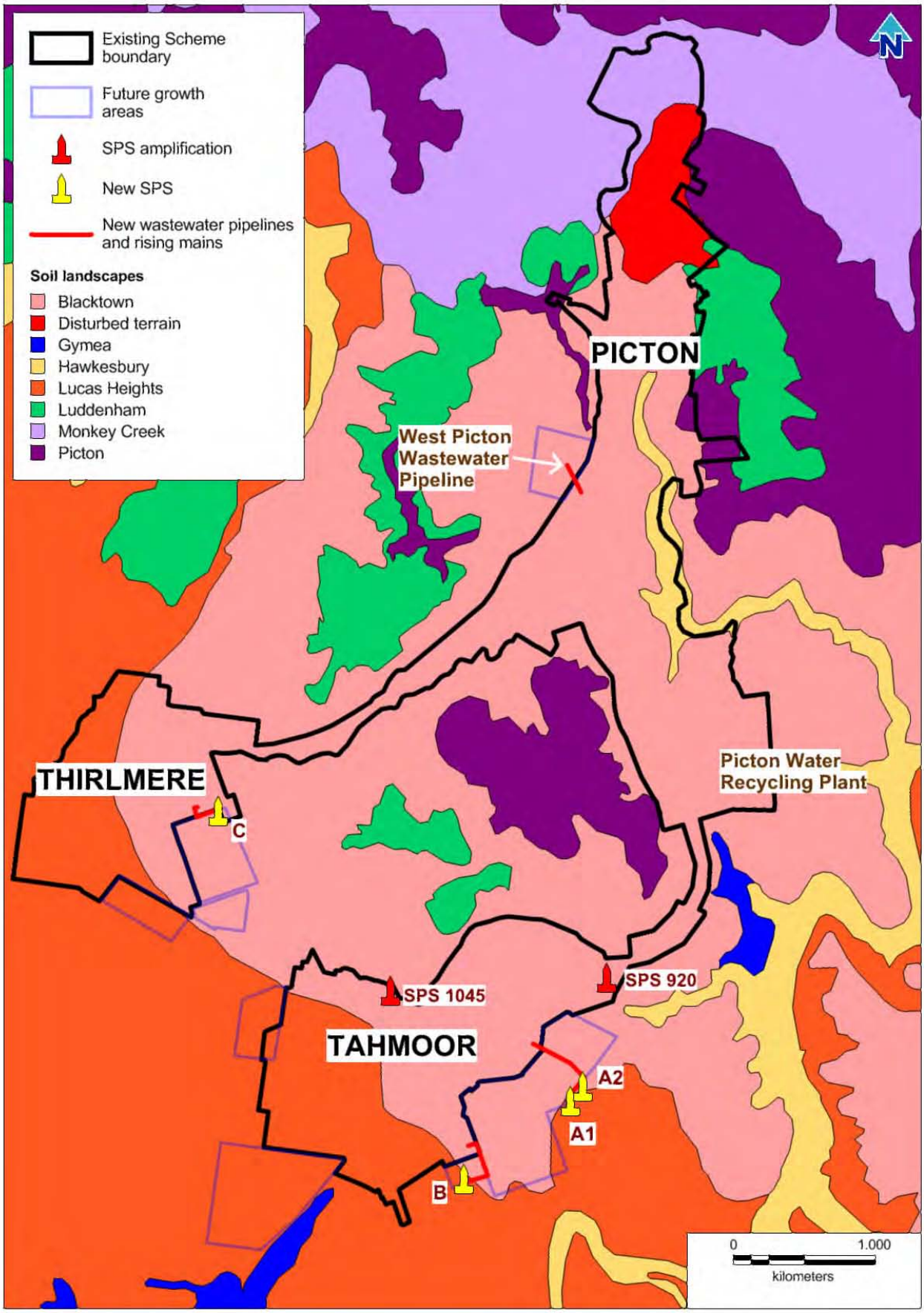

Figure 4 **Soil landscapes of Picton, Thirlmere and Tahmoor**

The characteristics of these landscapes and soil types are summarised in Table 5. Blacktown soils are clayey, acidic and moderately erodible. Lucas Heights soils are sandy, stony, low in fertility and moderately to highly erodible.

Table 5 Soil landscapes of the project area

	Blacktown	Lucas Heights
Top cover (from top to bottom)	bt1: Friable browning black loam (patchy) bt2: Hard setting brown clay loam bt3: Strongly pedal, mottled brown light clay bt4: Light grey plastic mottled clay	lh1: Loose, dark brown to yellowish brown sandy loam, lh2: Beached, stony, hard setting sandy clay loam. lh3: Earthly, yellowish brown sandy clay loam lh4: Pedal yellowish brown clay
Soil limitations	bt1: Strongly acidic bt2: Hard setting, low fertility, strongly acidic high aluminium toxicity bt3: High shrink-swell (localised), low wet strength, low permeability, low available water capacity, salinity (localised), sodicity (localised), very low fertility, very strongly acidic, very high aluminium toxicity bt4: High shrink-swell (localised), low wet strength, stoniness, low water capacity, low permeability, salinity (localised), sodicity (localised), low fertility, strongly acidic, very high aluminium toxicity, high erodibility (localised)	lh1:Stoniness, high permeability, low available water capacity, low fertility lh2: Erodibility (localised), stoniness, low available water capacity, hardsetting surface, very low fertility lh3: Stoniness, low available water capacity, very low fertility, sodicity (localised), high erodibility lh4: Stoniness, low available water capacity (localised), very low fertility, strong acid (localised), high aluminium toxicity (localised)
Erodibility	Topsoil is moderately erodible. Sub soils are highly erodible.	Topsoil is moderately erodible. Sub soils are moderately to very highly erodible
Erosion hazard	Low to moderate (non concentrated flows) Moderate to high (concentrated flows)	Moderate,(non concentrated flows) High (concentrated flows)
Surface movement potential	Deep clay soils: moderately reactive Shallower soils on crests: slightly reactive	Deep clay soils: moderately reactive Shallower soils on crests: slightly reactive
Landscape limitations	Surface movement potential Seasonal water logging	Localised surface movement potential
Geology	Wianamatta formation over Hawkesbury Sandstone	Mittagong formation above Wianamatta Group shale and Hawkesbury Sandstone.

Source: Bannerman & Hazelton (1990)

The farm is located on the Blacktown Soil Landscape. Appendix 1 shows the distribution of soil types at the farm.

The two main soil types at the farm are Red Podzolic soils and Soloths. The soil profiles consist of clay loam to sandy clay loam grading down to clay as in Table 5. The erodibility of Red Podzolic soil is moderate and that of Soloths is high. The soil sodicity[2] of Red Podzolic soil is also high. All soils require the application of gypsum to counter the effects of high sodicity. Red Podzolics also have a higher phosphorus sorption capacity[3] than the Soloths.

[2] Percentage of sodium ions on clay particles

[3] Amount of phosphorus that will be fixed in the soil before leaching takes place

Soil acidity at the farm has been greatly reduced by the application of lime and gypsum during the last ten years of operation. Soil conductivity is low, but soil nutrient levels have slightly increased.

All biosolids produced by the plant are reused on the irrigation area. The biosolids are injected into the soil to supplement the nutrients in the effluent. The biosolids are tested and managed in accordance with the *Environmental Guidelines: Use and disposal of biosolids products* (EPA 1997) as required by the Picton STS licence.

Sydney Water searched the OEH Register for any registered contaminated land sites in the Wollondilly LGA on 12 May 2011. No contaminated sites near the proposed changes were identified. However, low levels of soil contamination from pesticides, herbicides and fertilisers are likely in catchments where grazing, farming and agriculture are common.

No acid sulphate soils or salinity hazard areas were identified from the NSW Acid Sulfate Soils Risk Maps (Department of Natural Resources 2003) and the Salinity Hazard Map for Western Sydney (Department of Land and Water Conservation 2001).

5.1.2 Assessment of impacts – construction

As soils in the project area are moderately to highly erodible, excavation and vegetation removal for the proposed changes could facilitate soil erosion by wind and rain. Silt in runoff from exposed soil could degrade water quality and aquatic habitat.

Construction vehicles moving from the work site could track mud onto roads.

Open trenching for the rising mains would also temporarily disturb the soil.

The West Picton wastewater pipeline would be bored below the Main Southern Railway line. Frac-outs (when water and/or other lubricants used in the boring process escape from the borehole) could occur during drilling/boring and allow dirty water, mud and oil to reach the ground surface or waterways.

5.1.3 Assessment of impacts – operation

The connection of the proposed new growth areas to the Scheme would result in increased flows to the plant and farm. These flows would, however, be within the approved capacity of the Scheme (an ADWF of 2.7ML/day, as described in the EIS).

As outlined in Section 3.1.3, the predicted flows from the growth areas would be used within the existing irrigation area. As flows increase, Sydney Water would continue to monitor the capacity of the existing irrigation area to take effluent. Any indication of uncontrolled discharges from the current irrigation area, significantly increased soil nutrient levels or significantly changed groundwater levels or quality would trigger investigations to expand the irrigation area.

These investigations would consider the suitability of other areas of the farm for irrigation. Existing topography, vegetation (especially the endangered ecological plant community Shale Sandstone Transition Forest), soils and the need for buffer zones would be considered. Water balance modelling would also be undertaken to determine the new area of irrigation required.

The addition of more effluent to the irrigation farm has the potential to increase the nitrogen and phosphorus levels in the soil. If not properly managed, runoff from the farm could add nutrients to Stonequarry Creek. However, the runoff control banks and structures located on drainage lines would contain the runoff from additional effluent.

Slightly increased volumes of biosolids would also be generated by the plant. No adverse impacts are expected from their application to the irrigation area.

The operation of the new and amplified SPSs and wastewater pipelines has the potential to impact on soils through:

- system leaks
- overflows from SPSs during wet weather.

System leaks

Leaks from the new pipelines would be minimal. This is because they would be designed to ensure no dry weather overflows and minimal inflow and infiltration during wet weather. Impacts on soils from system leaks would therefore be insignificant.

Overflows from SPSs during wet weather

The new SPSs would be designed with sufficient dry weather emergency storage capacity to minimise the risk of overflows from them during a power failure. Each SPS would be able to store peak dry weather flows for a four hour period during a power failure. Equipment would also be provided to allow the SPS emergency storage to be pumped out.

Wet weather releases from overflow structures would increase as a result of the additional flows and would increase erosion potential. However, the increase would only be minor and potential erosion can be minimised by installing appropriate energy dissipating structures at overflow points. The infrequent releases of diluted wastewater from the SPS overflow structures during wet weather would have a minimal impact on soils.

5.1.4 Mitigation measures

The following mitigation measures would be implemented during construction and operation to minimise any impacts on soils, as required:

- Minimise vegetation and soil disturbance by restricting and demarcating the areas required for construction and access with exclusion fencing or tape.
- Install erosion and sediment controls downhill of disturbed areas, particularly near waterways and around stockpiles.
- Divert ‘dirty’ runoff from work areas into sediment control devices and ‘clean’ runoff away from working areas.
- Wash/clean wheels prior to vehicles exiting construction sites, to prevent mud being tracked off-site. Where this is not practical, sweep streets at the end of each work day, and when necessary.
- Appropriately contain water pumped from excavation or boring activities to allow sediment to settle out prior to discharging it to the environment through sediment screens.
- Compact the spoil used to fill trenches with a mechanical compactor.
- If any contamination is discovered during excavation (e.g. discoloured soil, strong chemical or petrol odours, refuse or leachate), stop work immediately and notify appropriate personnel to determine response measures.
- Incorporate appropriate energy dissipation structures at new overflow points.

5.2 Water quality, drainage and flooding

5.2.1 Existing environment

All creeks in the Scheme area drain to the Nepean River. SPS 920 and SPS 1045 are located adjacent to Myrtle Creek. SPSs A and B would be located north of the Bargo River. SPS C would be located about 200 m south of Redbank Creek. The plant and farm are located adjacent to Stonequarry Creek and precautionary discharges from the plant flow to this creek. Figure 5 shows the locations of the creeks and the water quality monitoring sites used to assess the impacts of precautionary discharges into Stonequarry Creek.

Stonequarry Creek drains most of the Scheme area and flows into the Nepean River. Before the Scheme was commissioned, AWT (1993) concluded that the on-site wastewater disposal systems used within Picton had a detrimental effect on Stonequarry Creek and the Nepean River. Pollutant concentrations in Stonequarry Creek were generally higher than those in the Nepean River and in wet weather, the levels of pollutants in Stonequarry Creek increased greatly, indicating a major contribution from the up-stream catchment.

As shown in Table 6, water quality in Stonequarry Creek (site N911) has improved since the Scheme came into operation. In particular, water quality has improved during dry weather. There has also been a reduction of pollutant levels in Stonequarry Creek in wet weather. However, pollutants from the catchment continue to flow into Stonequarry Creek and the Nepean River during wet weather.

Table 6 Comparison of pre-commission (1995-2000) water quality data with post-commission (2005-2009) data

Sampling Site	Stonequarry Creek (N911)	
Commissioning	**BEFORE**	**AFTER**
TOTAL NITROGEN (mg/L)		
Mean	0.89	0.40
Median	0.66	0.35
Maximum	3.82	2.05
Minimum	0.16	0.15
TOTAL PHOSPHORUS (mg/L)		
Mean	0.08	0.03
Median	0.04	0.02
Maximum	1.14	0.31
Minimum	0	0.01

The control structures and banks installed around the irrigation areas prevent any runoff from the farm entering Stonequarry Creek (Figure 6).

Part of Picton's commercial zone lies within a flood prone area. Wollondilly Shire Council is currently mapping other flood prone areas of the LGA. Council records indicate that the area between Rumker Street and Argyle Street in Picton, and at Turner and Baroo Streets in Thirlmere are below the 1 in 100 year flood level.

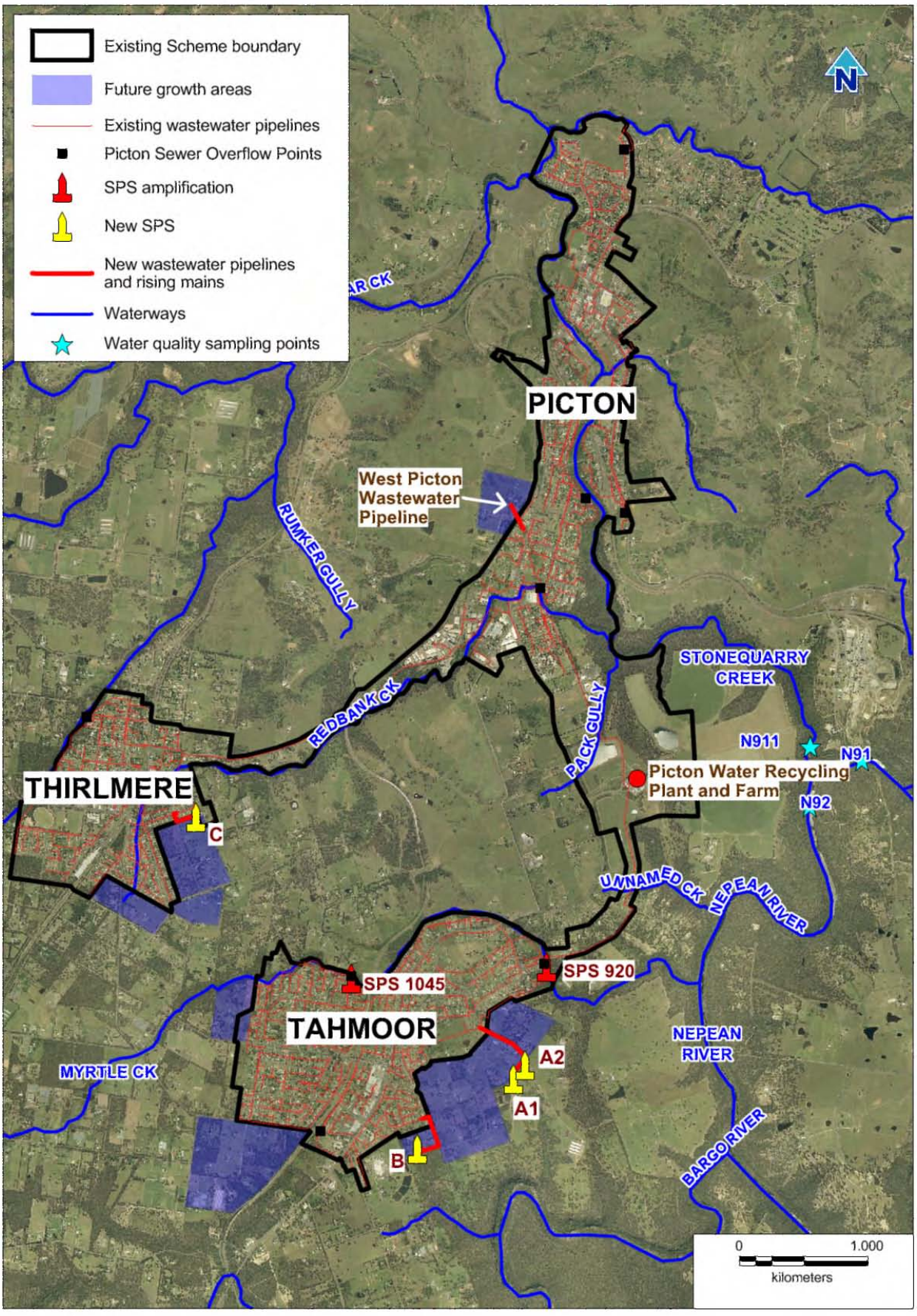

Figure 5 Waterways in the Picton Scheme area

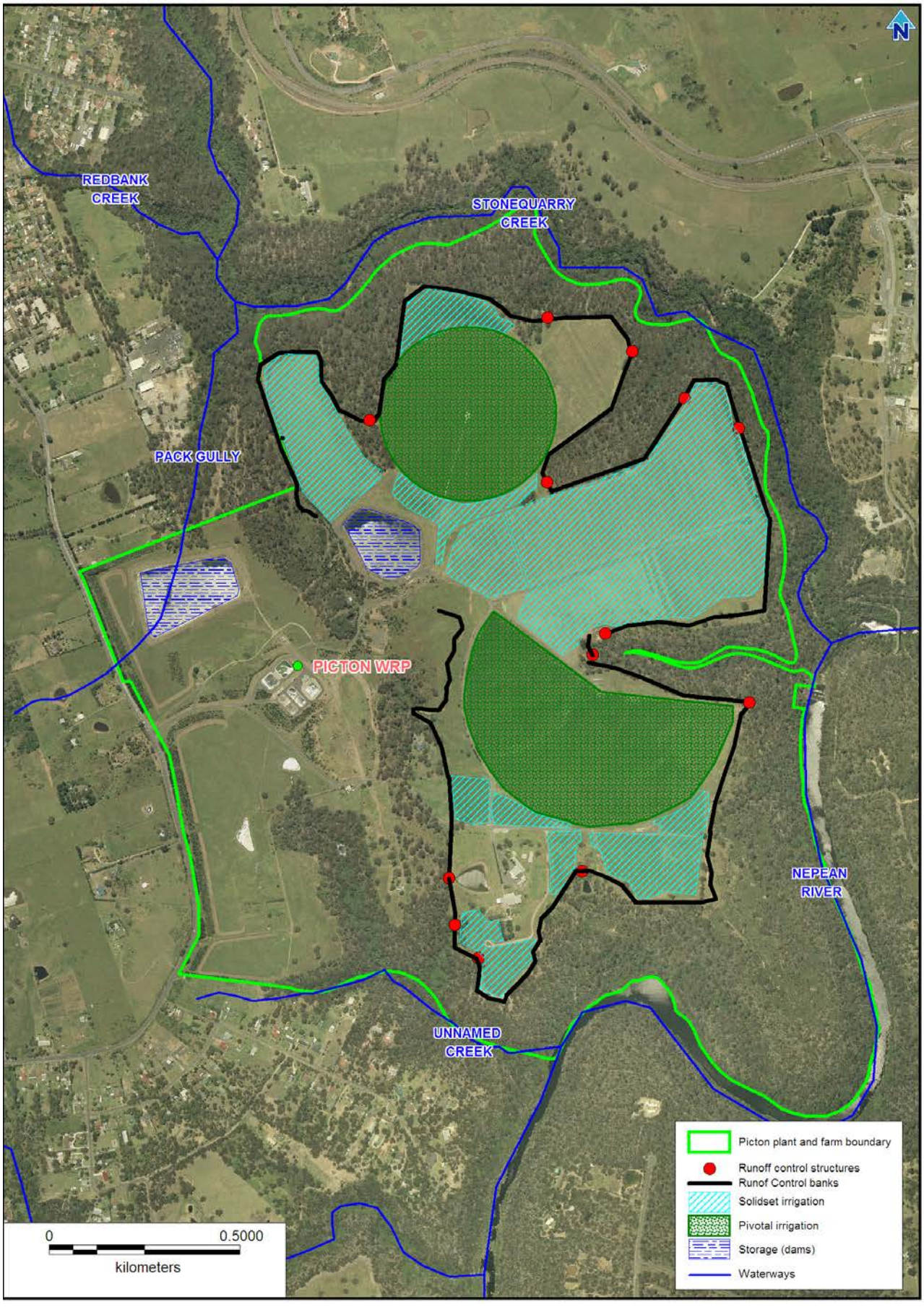

Figure 6 Picton Reuse Farm Scheme and nearby waterways

5.2.2 Assessment of impacts - construction

The proposed amplifications at SPS 920 and SPS1045 are unlikely to involve any excavation or ground disturbance. Whereas, construction activities for the new SPSs and wastewater pipelines have the potential to impact on surface water quality and hydrology through:

- sediment transfer to drainage lines
- frac-outs to the ground surface or waterways from boring works
- pollution of waterways by fuel or chemicals.

In sediment transfer, the pollutants attached to sediment particles are of concern. Nutrients such as phosphorus can be adsorbed to clay particles and transported downstream and can contribute nutrient enrichment at locations far away from where they originated.

No works are proposed in flood prone areas between Rumker Street and Argyle Street in Picton, and at Turner and Baroo Streets in Thirlmere.

5.2.3 Assessment of impacts - operation

The operation of the proposed changes has the potential to impact on surface water quality through:

- additional flow to the plant and farm
- system leaks
- increase in wet weather overflows
- increase in the frequency of precautionary discharges to Stonequarry Creek.

Additional flow to the plant and farm

During the last five years Sydney Water has generally complied with the water quality requirements specified in the Picton STS licence for the irrigation effluent and precautionary discharges.

The additional flows from the growth areas would not exceed the system capacity that was previously assessed in the EIS and approved by the Minister.

There is sufficient capacity within the plant to ensure that water quality requirements continue to be met. As mentioned previously, some minor upgrades to the plant may be needed to ensure the continued reliable operation of the plant.

The additional flow will also increase irrigation rates at the farm. Sydney Water (2008) has identified that up to 2.5 ML/day can be applied to the current irrigation area without any uncontrolled discharge.

The runoff control structures and banks installed around the irrigation areas (see Figure 6) are expected to continue to operate effectively. Although Sydney Water has approval to irrigate 175 ha at the farm, only 90 ha is currently used for irrigation. As mentioned in Section 3.1.3, Sydney Water would monitor the capacity of the irrigation area to take effluent and if necessary, expand to the irrigation area. New control structures and banks would be installed around any new irrigation areas.

Impacts associated with the increased flows at the plant and farm, as described above are consistent with those assessed in the EIS and approved by the Minister. Sydney Water will continue to monitor compliance with the licence requirements.

System leaks

As indicated previously, leaks from the new pipelines would be minimal. Impacts on waterways from system leaks would therefore be insignificant.

Overflows from SPSs during wet weather

More frequent wet weather overflows from the system would result from the additional flows. Sydney Water would design the new components of the Scheme to reduce the likelihood of overflows. The amplification of SPS 920 and SPS 1045 would also reduce the potential for overflows from these SPSs.

Diluted wastewater released from the SPS overflow structures during wet weather would only have a minimal impact on surface water quality in waterways. This is because the bulk of pollutants in the waterways originate from the catchment (AWT 1993).

Treated effluent discharges to Stonequarry Creek

The extra treated effluent produced by the plant would be used for irrigation or discharged to Stonequarry Creek in precautionary discharges. The additional flows are likely to increase the frequency of precautionary discharges but would be consistent with those described and assessed in the EIS.

5.2.4 Mitigation measures

The following mitigation measures would be implemented during construction to minimise any impacts on surface water quality and drainage, as required:

- Overflow structures on new SPSs would retain gross solids/trash and scum within the system.
- Where feasible, extra wet weather storage would be provided at the new SPSs.
- Place all stockpiles away from drainage lines and contain them with sediment control. Cover or water them down regularly to prevent sediment from being blown away.
- Where possible, vehicles should remain on the road or in designated lay down areas.
- Install appropriate containment procedures to collect used drilling fluids at the drill entry and exit points. These procedures would include the collection of the drilling fluids in tanks/ drums at the entry and exit points and at frac outs to the surface between the entry and exit points, and their appropriate disposal.
- Do not store chemicals, oils, fuels and wastes adjacent to any stormwater or natural drainage line. Contain them in sealed vessels in bunded areas within the work compound.
- Collect any fuel, oil spills and contaminated material and dispose of it at an approved waste disposal facility.
- All work crews are to carry emergency spill kits. Site offices must also keep a kit.

5.3 Groundwater

5.3.1 Existing environment

Groundwater in the Picton region contributes to the base flow of creeks and rivers. Its depth is influenced by topography, rainfall, aquifers and geological formations (Russel *et al*., 2010). Drainage systems relieve groundwater pressure and limit the height of the water table to stream levels within the valleys and gorges. Rainfall away from the valleys recharges the groundwater system, creating an elevated water table and sustaining groundwater flows toward the waterways.

The water table is often complicated at a local scale by perching (caused by less permeable strata) or by accelerated flow along structural defects such as joints or bedding shears within the rock mass.

Fodder crops are irrigated with treated effluent. Five millimetres of treated effluent is applied once the soil deficit reaches 15 mm. There is a very low risk of treated effluent percolating down to the water table even if heavy rain immediately follows irrigation.

Boreholes were installed at the farm prior to Scheme commissioning and groundwater levels have been monitored for the past 10 years. Groundwater levels have remained between 10-20 m below the ground surface.

The groundwater pH has varied between 6.3 and 6.8. Conductivity levels have varied between 172 and 690 mS/m indicating no major intrusion of ions into groundwater. Total Nitrogen levels have varied between 0.4 and 1 mg/L and Total Phosphorus levels have varied between 0.004 and 0.09 mg/L. These values are less than the values recorded for groundwater occurring in the Appin area (BHP 2008).

Sydney Water (2011) has not found any evidence of effluent used for irrigation seeping into the groundwater.

5.3.2 Assessment of impacts – construction

The proposed changes would involve excavation for the new SPSs, open trenching for the rising mains and boring under the Main Southern Railway Line.

These construction activities are not expected to impact on the water table. However, it is possible that shallow, perched groundwater may be encountered after rainfall or drilling may intercept fractures or aquifers causing groundwater to come to the surface.

5.3.3 Assessment of impacts – operation

The extra treated effluent produced by the plant would be used for irrigation or discharged to Stonequarry Creek in precautionary discharges. Sydney Water (2008) has confirmed that 2.5 ML/day of treated effluent can be applied to the current irrigation area at the farm without uncontrolled runoff. .

The proposed changes are not expected to impact on groundwater. However, Nutrients, pH and salinity levels in groundwater will continue to be monitored.

5.3.4 Mitigation measures

The following mitigation measure would be implemented during construction to minimise any impacts on groundwater, as required:

- Groundwater pumped out from excavations would be discharged to land/stormwater through appropriate sediment controls in a manner that avoids water pollution, flooding and erosion.

5.4 Terrestrial flora and fauna

5.4.1 Existing environment

Picton plant and farm

The REF predicted that the use of buffer zones and installation of diversion drains and barriers to control and direct runoff would minimise adverse impacts on the vegetation surrounding the farm (identified as the endangered ecological community Shale Sandstone Transition Forest (SSTF), as listed under the *Threatened Species Conservation Act 1995* (TSC Act)). Buffer zones were established between the irrigation area and vegetation and runoff banks and runoff control structures were installed to prevent runoff affecting the surrounding vegetation.

Actinotus Environmental Consultants undertook a flora and fauna survey of the Picton plant and farm in November 2009 as part of Sydney Water's Property Environment Management Program.

They confirmed that most of the vegetation bordering the irrigation area and along the farm's boundaries is SSTF. SSTF is listed as an endangered ecological community under the TSC Act and the *Environment Protection and Biodiversity Conservation Act* (EPBC Act).

Study area A (SPS A and Rising Main A)

Biosis Research carried out a flora and fauna assessment for the proposed changes. Their report is included in Appendix 2 (Biosis Research, 2011). Biosis Research surveyed the sites for the new rising mains and SPSs. The proposed wastewater pipeline site at West Picton and the SPS 920 and SPS 1045 sites were not surveyed because they are disturbed and it is unlikely that any vegetation would need to be removed during construction.

Previous clearing and regular grazing have encouraged a simplified vegetation community with a relatively low diversity of native species at study area A. *Eucalyptus tereticornis* forms the canopy. The mid-storey is largely absent and the ground layer is dominated by exotic grasses, with sparse occurrences of native grasses and groundcovers.

Thirty plant species were recorded during the survey, including 15 locally occurring native species and 15 exotic species. No threatened flora or fauna or noxious weeds were found.

This assessment determined that the vegetation at the A1 and A2 sites matches the NSW Scientific Determination description of SSTF, although it is in a degraded form. This is shown in Figure 7 below.

SSTF is also listed as an endangered ecological community under the EPBC Act. However, the assessment concluded that the vegetation in this area did not meet the threshold criteria for SSTF under the EPBC Act.

The rising main route along the road verge was classified as Exotic Closed Grassland.

The vegetation communities at SPS A and Rising Main A are mapped in Figure 7.

The fauna habitat at study area A was classified as moderate conservation value in the open woodland areas and poor conservation value in the open exotic grassland habitat.

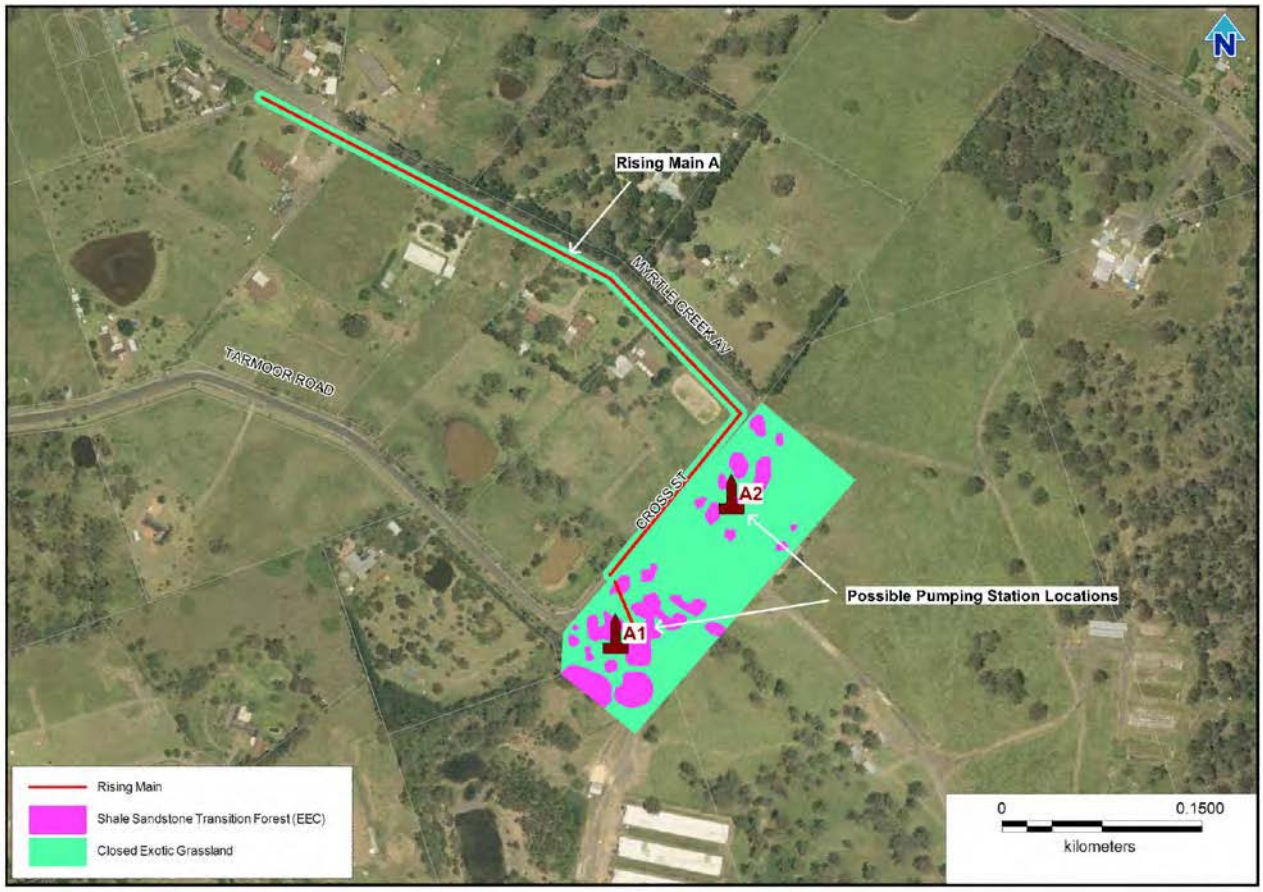

Figure 7 Vegetation communities at SPS A and Rising Main A

Study area B (SPS B and Rising Main B)

Previous clearing and grazing has significantly reduced the diversity of native species at study area B. The canopy is dominated by *E. tereticornis* and *E. fibrosa* although *E. moluccana*, *E. globoidea* and *E. punctata* are also present. There is also a 200 m^2 dense stand of *Acacia decurrens.* Native grasses and groundcovers include *Microlaena stipoides*, *Entolasia marginate*, *Glycine clandestina* and *Hardenbergia violaceae*.

The rising main route along Progress Street is dominated by mown, exotic grasses and mature, individual *E. tereticornis* trees. The northern section of the rising main route is planted with exotic and non-local native species such as *Casuarina* spp. The ground layer consists of exotic grasses.

A four-hectare area of bushland in good condition is located directly south of the study area.

Forty nine plant species were recorded during the survey, including 33 locally occurring native species and 16 exotic species. No threatened species or noxious weeds were recorded.

The vegetated parts of study area B are representative of SSTF, as listed under the TSC Act. Cleared areas, including the road verge, are Exotic Closed Grassland.

The vegetation within study area B did not meet the threshold criteria for SSTF under the EPBC Act because of its significantly modified understorey.

The vegetation communities at SPS B and Rising Main B are mapped in Figure 8.

Study area B provides limited sheltering, breeding and foraging habitat for native fauna species in the form of tree and ground hollows and large remnant trees. The fauna habitat is therefore of moderate conservation value.

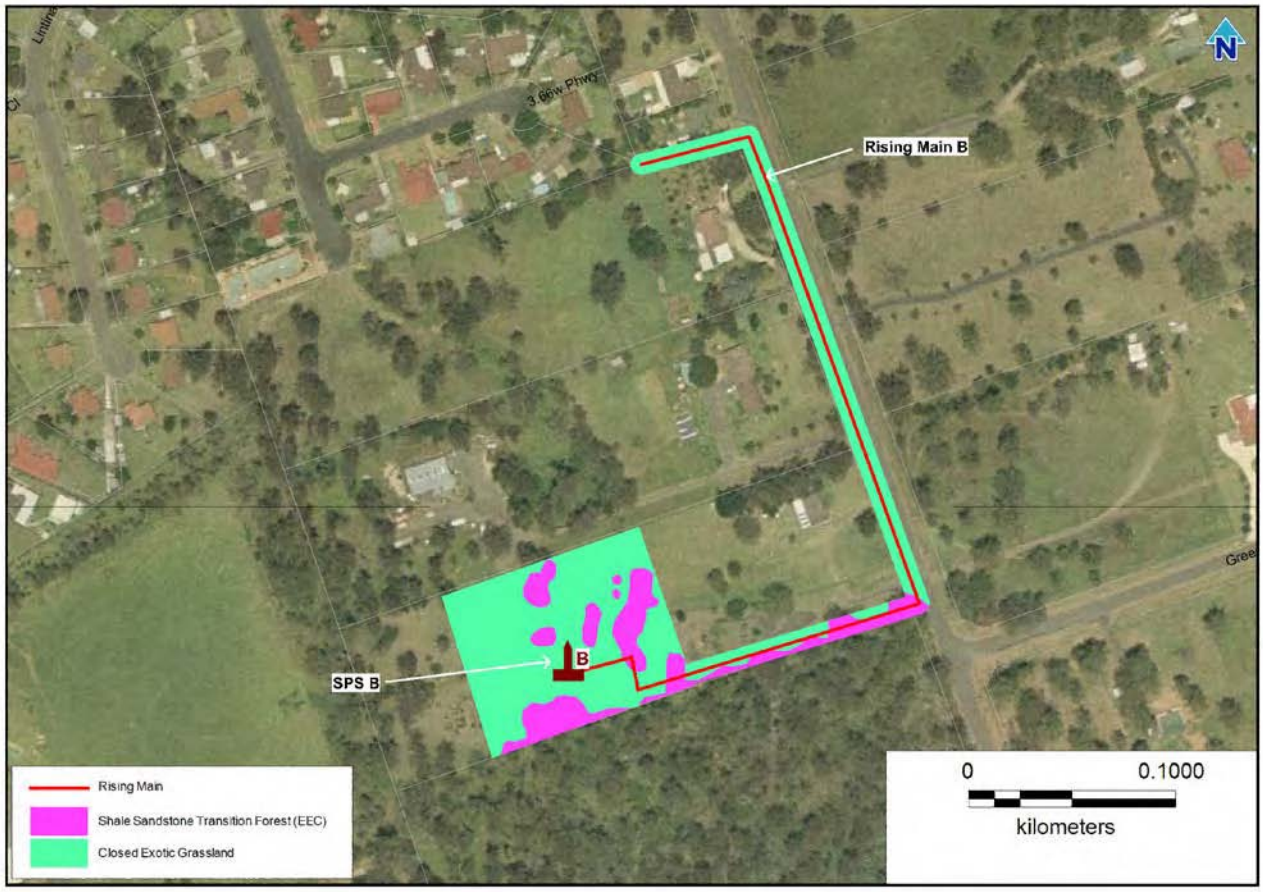

Figure 8 Vegetation communities at SPS B and Rising Main B

Study area C (SPS C and Rising Main C)

Study area C is located within cleared land and was grazed until recently. It is currently dominated by exotic grasses and annual weeds. One *E. tereticornis* tree occurs on the northern boundary fence adjacent to the area. A small clump of *E. tereticornis* saplings occur within the area. Mature *A. decurrens* shrubs are sparsely scattered over the area and are the only native mid-storey species present.

The rising main route along Marion and Rita Streets is mown exotic grass planted with exotic and non-local native tree species.

The field survey recorded 30 plant species within study area C, including 11 locally occurring native species and 19 exotic and non-local native species. No threatened species were recorded. One noxious weed was recorded: *Rubus fruiticosus* (blackberry). This species is listed under the *Noxious Weeds Act 1993* as a Class 4 weed. The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.

The low diversity of native species present means that this vegetation community is classified as Exotic Closed Grassland with some exotic plantings (see Figure 9 below).

Very little breeding, foraging or sheltering habitat is present within the area for amphibians, mammals or birds. There is limited sheltering habitat for reptiles. Given that most native vegetation has been removed, the fauna habitat is of poor conservation value.

Figure 9 Vegetation communities at SPS C and Rising Main C

Koala habitat

SEPP 44 applies to the Wollondilly Shire LGA. There are no known records of koalas from any of the three study areas or adjoining bushland areas. No koalas were seen or heard during field surveys and no scats or tree scratchings were found on or near trees within the study areas. Thus none of the study areas constitute Core Koala Habitat.

Forest Red Gum (*E. tereticornis,* a koala food tree listed in SEPP 44) was found at all SPS sites. However, given that this species forms less than 15% of the canopy trees, the study areas are not potential koala habitat. Any change of this vegetation is unlikely to affect koalas.

Migratory species

The 11 species listed under the migratory provisions of the EPBC Act appear on database searches within 10 km of the three study areas. The likelihood of these species occurring within the study areas was therefore assessed.

The study areas were not classed as an 'important habitat' for migratory species as defined under the *Matters of National Environmental Significance – Significant Impact Guidelines 1.1* (DEWHA 2009). This is because the areas do not contain:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species
- habitat that is of critical importance to the species at particular life stages
- habitat utilised by a migratory species which is at the limit of its range
- habitat within an area where the species is declining.

5.4.2 Assessment of impacts – construction

The potential impacts of the proposed changes are included in the report in Appendix 2. The assessment found that native canopy trees would be removed/disturbed at SPS A and tree roots

would be disturbed by trenching for the installation of Rising Mains A and B. Further detail is provided below.

Sewage pumping stations

Two possible locations, A1 and A2, have been identified for SPS A. Up to 15 *E. tereticornis* trees may need to be removed to allow for construction at A1. No trees would need to be removed at A2.

The removal/disturbance of these trees at A1 would reduce the extent and condition of the SSTF at this location. Biodiversity would decrease and the habitat value of the site would also decrease.

Generally, the removal of canopy trees increases the risk of weed invasion and erosion by surface water runoff. However, weed invasion is not likely to be worse at A1 because the understorey is already dominated by exotic grasses and annual weeds.

One mature native tree may need to be removed at the SPS B site. The understorey is dominated by exotic grasses with few mid-storey species, so impacts would be minor.

SPS C is dominated by exotic grasses and annual weeds and disturbance may result in the spread of these weeds. It is unlikely that any native trees would require removal at SPS C.

An Assessment of Significance (under the TSC Act) was required to assess the impact of the proposal on the EEC SSTF at SPSs A & B. The assessment (see Appendix 2) concluded that the proposal would not have a significant impact on the habitat or habitat connectivity of the SSTF occurring at SPS A and B and would not have a significant effect on the current disturbance regime.

Rising mains

No trees would need to be removed for the installation of Rising Mains A, B and C.

Open trenching is required for the installation of Rising Mains A, B and C. Trenching within the root zone of native trees may damage and sever tree roots and could present a safety hazard. This could reduce the health and longevity of the trees.

Trenching for the installation of Rising Mains A and B could damage tree roots. Rising Main B would be laid parallel to the edge of an area of bushland, potentially within the root zone of trees within this bushland. Native trees along Progress Street could also be affected by trenching.

Trenching for the installation of Rising Main C would not disturb native tree roots.

5.4.3 Assessment of impacts - operation

Higher irrigation rates have the potential to adversely affect the SSTF at the farm if there is uncontrolled runoff from the irrigation areas. Increased soil moisture and nutrient levels could facilitate the growth of species, especially weeds, requiring these particular growing conditions.

Sydney Water (2008) has identified that the higher irrigation rates are unlikely to cause uncontrolled runoff from the irrigation area. In addition, the established buffer zones, runoff banks and runoff control structures will continue to prevent runoff affecting the surrounding vegetation.

SPS wet weather overflows would contain nutrients and these may facilitate weed invasion.

5.4.4 Mitigation measures

The following mitigation measures would be implemented during construction to minimise any impacts on biodiversity, as required:

- Position the new SPSs to minimise tree removal and locate SPS A at location A2 if possible. Position rising mains to minimise the trenching required within the tree protection zone of native trees.
- Pruning tree roots encountered during trenching works should be carried out in accordance with AS 4373 - 2007 Pruning of amenity trees (Standards Australia, 2007).
- Tree protection measures should be implemented according to AS 4970 – 2009 Protection of trees on development sites (Standards Australia, 2009).
- Native vegetation removed or disturbed by the proposal should be replaced, where possible.

- Areas disturbed during construction/installation should be managed to prevent weed colonisation.
- Excavated trenches are to be covered when construction sites are inactive (i.e. overnight or on weekends) to prevent native fauna being trapped in them.
- Machinery parking, equipment or materials storage compounds, temporary stockpiles of excavated material and work areas are to be in located in cleared areas away from creeks and drainage lines.
- During construction, control the growth and spread of noxious weeds (including the blackberry identified at SPS C) in accordance with the measures specified in a management plan published by the local control authority.

5.5 Aquatic flora and fauna

5.5.1 Existing environment

The main aquatic environments in the Scheme area occur in the Nepean River, Stonequarry Creek and its tributaries. The riparian zone along the Nepean River is often very limited but the riparian zones along the creeks are wider and characterised by ground cover and shoreline trees.

The EIS predicted that faunal diversity in Stonequarry Creek would increase, as a result of improvements to water quality that would result from the implementation of the Scheme. As outlined in Section 5.2.1, water quality has improved since the Scheme was commissioned. However, no significant change in freshwater ecosystem health has been found in Stonequarry Creek since Scheme commissioning.

SPS 920 and SPS1045 are located adjacent to Myrtle Creek. SPSs and Rising Mains A, B and C and the West Picton wastewater pipeline would be located some distance away from creeks.

5.5.2 Assessment of impacts – construction

The construction of the new SPS sites and wastewater pipelines may indirectly impact on aquatic flora and fauna through increased sedimentation and erosion. This is identified as a threatening process under the *Fisheries Management Act 1994*. High levels of suspended solids can clog gill structures and smother benthic communities, thereby affecting fish and macroinvertebrate abundance. Increased turbidity can reduce light penetration, limit plant growth and increase predator foraging behaviour. The mitigation measures listed in Section 5.1.4 are appropriate for minimising this risk.

No excavation works are required at SPS 920 or SPS 1045 and impacts on the aquatic habitat of Myrtle Creek would be avoided.

Accidental spills of fuels, oils and/or construction materials such as concrete can also affect aquatic flora and fauna if the spills reach waterways.

5.5.3 Assessment of impacts – operation

The extra treated effluent produced by the plant would be used for irrigation or discharged to Stonequarry Creek in precautionary discharges. The additional flows are likely to increase the frequency of precautionary discharges but would be consistent with those described in the EIS.

The system will be designed to have no dry weather overflows.

The increased flows through the system may also lead to more frequent wet weather overflows. There is no limit in the licence for wet weather overflows, however Sydney Water would design the new components of the Scheme to reduce the likelihood of overflows.

An overflow from the SPS would occur when the capacity of the system is exceeded in wet weather or during a system failure. During a system failure, overflows from SPSs could be a major source of pollution, releasing large quantities of nutrients and chemicals into the nearby receiving waterway. Wastewater discharges may also contain pollutants that adversely affect the health of aquatic ecosystems.

Wet weather overflows would only occur during high flows in nearby creeks associated with localised flooding. Pollutants would be very diluted.

The creeks and their flora and fauna have withstood high-intensity rainfalls for many years and the comparatively small increases in wet weather overflow frequencies are not expected to have any major impacts on macroinvertebrate communities. Macroinvertebrate communities are fairly resilient and would either return to their previous structure after an overflow event or become more populated by species adapted to high-flow conditions. The overall community structure and ecosystem health would not change for the worse.

Macroinvertebrate communities could be adversely affected if chemical pollutants such as hydrocarbons, trace metals etc. are contained in overflows to waterways. This is unlikely to occur with this proposal because the future growth areas would not include heavy industries.

5.5.4 Mitigation measures

The following mitigation measure would be implemented during construction to minimise any impacts on aquatic flora and fauna, as required:

- Minimise disturbance during amplification works at SPS 920 and SPS 1045, by limiting site access to paved and hardstand areas where possible. The riparian zone adjacent to these SPSs is to be designated an exclusion zone and workers instructed to keep out of the area.

5.6 Air quality

5.6.1 Existing environment

The Picton area is characterised by low-density urban development and agricultural holdings. Vehicle emissions, agricultural odours, on-site wastewater systems and wood fires impact air quality in the Scheme area.

Sensitive receivers that may be affected by air quality impacts and odour include rural and residential properties near the proposed changes.

Odour complaints can be high in the early years of operation of a new wastewater system when flows are low and wastewater travel times are higher.

The Scheme is performing well, with respect to odour emissions. During the first five years of the Scheme's operation (2000-2004) there were 20 odour complaints related to pumping stations and four odour complaints related to the Picton WRP. SPS 914 was the object of many complaints.

During the 2005-2009 period there were no odour complaints from the reticulation system or plant (Sydney Water 2011).

5.6.2 Assessment of impacts – construction

Local air quality could potentially be impacted by dust generated during earthworks, machinery and truck movements and vehicle emissions. There is also the potential for odour generation when the new pipelines are connected to the existing wastewater system.

5.6.3 Assessment of impacts – operation

Although the proposed changes have the potential to adversely affect air quality through odour emissions it is anticipated that the increased flows in the existing network would actually reduce odour potential.

The system assets would be designed to limit the production and emission of odours from the SPSs and vent shafts. Further odour assessments would be carried out at the detailed design stage to allow the final locations and numbers of air vents and other odour control devices to be determined. The need to upgrade existing odour controls would also be assessed at this time.

5.6.4 Mitigation measures

The following mitigation measures would be implemented during construction and operation to minimise any impacts on air quality, as required:

- Prepare odour assessments during the detailed design stage to assess the need for odour control.
- Minimise the area of exposed surfaces during construction.
- Dampen, cover or mulch exposed surfaces in windy or dry conditions.

- Manage materials stockpiles to minimise dust generation.
- Rehabilitate exposed areas as soon as possible following excavation.
- Cover loads on vehicles hauling materials to and from work sites.
- Access work sites by sealed roads when these are available.
- Sweep roads as required to control dust.
- Machinery and vehicles would be switched off when not in use.
- Properly maintain all vehicles and machinery.
- Investigate and respond to any odour and dust complaints associated with construction and operation as soon as possible.

5.7 Energy and greenhouse gases

Sydney Water aims to be carbon neutral by 2020. This would eliminate or offset more than 400,000 tonnes of carbon dioxide each year, which is the same as taking 100,000 cars off the road for a year.

Carbon neutrality will be achieved by:

- producing up to 20% of Sydney Water's power needs through renewable cogeneration
- installing hydro-electrical and biogas generation facilities at wastewater treatment plants
- using energy more efficiently
- using carbon credits earned by Sydney Water for water saving programs such as WaterFix and rebate programs.

Sydney Water's initial target is to achieve a 60% reduction in energy related emissions by 2012. The strategies to achieve the carbon neutral goal are outlined in Sydney Water's Energy Management Plan. These include the development of viable renewable energy sources and implementing an integrated energy management program.

5.7.1 Assessment of impacts – construction

Low levels of greenhouse gases would be emitted by construction equipment and vehicles.

5.7.2 Assessment of impacts – operation

Energy use would increase at the plant, amplified SPSs and new SPSs to enable the extra flows from the new growth areas to be treated. The increase in energy use would be small relative to the overall energy requirements of the Scheme.

Sydney Water would implement measures to reduce energy use and maximise energy efficiency.

5.7.3 Mitigation measures

The following mitigation measures would be implemented during construction and operation to minimise the impacts of energy use and greenhouse gas emissions, as required:

- Where possible select materials that require less energy to manufacture.
- Minimise wastage of materials through accurate estimations of materials required and construction scheduling/planning.
- Ensure all vehicles and equipment are regularly serviced and meet appropriate emission standards.
- Where possible, source construction materials from local suppliers.
- Schedule works to minimise the number of journeys required. Switch plant and equipment off when unattended for extended periods and do not leave it idling.
- Fit out all sheds and offices with energy efficient lighting, equipment and appliances.
- Select energy efficient equipment for the works including motors (pumps).

5.8 Noise and vibration

5.8.1 Existing environment

Picton has low ambient noise levels, which can be attributed to the surrounding rural land and low density residential development. Existing daytime noise levels are influenced by local road traffic, local fauna (birds), residential activity such as gardening and aircraft passing over.

The Scheme is performing well, with respect to noise emissions. Noise monitoring was undertaken in 2000 at certain property boundaries to verify the predicted noise levels from the Scheme. Noise levels from most pumping stations and at the plant boundary were found to be less than the ambient noise level, with the exception of SPS 922.

Only one noise complaint was reported from SPS 914 during the first five years of the Scheme's operation. There were no noise complaints from 2005 to 2009 (Sydney Water 2011).

A noise and vibration assessment of the proposed changes was carried out and the report is included in Appendix 3.

Attended and unattended background noise monitoring was carried out at residential receivers near the proposed SPS locations to characterise the existing noise environment and determine baseline noise levels. The survey locations (A, B and C) are shown in Figure 10 and the results are described in detail in Appendix 3. The measured noise management levels were adopted for use in assessing potential impacts (Parsons Brinckerhoff 2011).

Figure 10 Noise monitoring locations

5.8.2 Assessment of impacts – construction

The assessment predicted that the adopted noise management levels would generally be exceeded at residential receivers within 300 to 400 m of construction works during worst case noise generating activities such as rock breaking, saw cutting, concreting and excavation. Also noise from the amplification of SPS 920 and SPS 1045 would generally exceed the adopted noise management levels at residential receivers within 200 m of construction works during worst case noise generating activities.

The assessment concluded that there is a low probability of human disturbance from ground vibration during construction. Worst case vibration levels may be perceptible at the nearest residences to the West Picton wastewater pipeline exit site. Structural damage to off-site property and buildings is unlikely.

Construction road traffic noise impacts would be compliant with an adopted 55 dB(A) $L_{Aeq,\ 1hr}$ road traffic noise management level.

5.8.3 Assessment of impacts – operation

The proposed changes and additional flows are not expected to increase noise levels within the existing system.

The assessment of the proposed changes used the measured background noise levels to establish a conservative operational noise goal of 35 dB(A) $L_{Aeq,\ 15min}$ at all residential receivers (in accordance with the NSW Industrial Noise Policy (INP)).

Site specific noise assessment models were prepared utilising the SoundPLAN noise propagation software and measured 1/3 octave band source noise levels.

The models predicted that the proposed new and amplified SPSs and wastewater pump operations would achieve NSW INP compliance and maintain acoustic amenity at all future receivers within the growth areas.

The assessment also determined that location A1 is the acoustically preferred location for SPS A. The potential noise impacts at this location would be about 8 dB(A) less than those predicted for the A2 location.

5.8.4 Mitigation measures

The following mitigation measures would be implemented for the planning, construction and operational phases. These measures are outlined below and discussed in greater detail in Appendix 3.

- Adopt Best Management Practice and Best Available Technology Economically Achievable practices as addressed in the *Interim Construction Noise Guideline* (DECC 2009).
- Schedule construction works between 7 am and 6 pm Monday to Friday and Saturdays 8 am and 1 pm, with no works on Sundays or public holidays, unless site-specific engineering, health and safety or operation conditions require works outside these times.
- Consult with noise affected residents prior to the commencement of works.
- Notify local residents and the Wollondilly Shire Council prior to out of hours works commencing.
- If possible, use temporary noise barriers at locations close to residences and where construction involves major plant.
- Schedule noisy activities (for example rock breaking or saw cutting works) to minimise impacts on sensitive receivers and provide respite periods where necessary.
- Locate fixed and mobile construction plant and equipment away from sensitive receivers.
- Where practical manage the simultaneous operation of dominant noise generating plant to reduce noise impacts.
- Consider alternative construction techniques for noisy activities, such as pressurised rock splitting techniques.

- Limit the requirement for tonal reversing beepers on construction vehicles and mobile plant where possible.
- Switch off construction plant and machinery when unattended for extended periods and do not leave idling.
- Monitoring of construction noise should be considered where work is being undertaken near sensitive receivers. Monitoring is recommended at the following times:
    - At the commencement of construction. Monitoring would occur during standard construction hours to verify predicted construction noise levels and confirm the requirements for noise management and mitigation measures.
    - At the commencement of any construction works required outside of standard day time construction hours to verify construction noise levels and confirm the requirements for noise management and mitigation measures.
- Confirm SPS operational noise level compliance during the detailed design stage.

5.9 Aboriginal heritage

5.9.1 Existing environment

An Aboriginal Heritage Due Diligence Assessment was done for the proposed changes. The report is included in Appendix 4 and the sites surveyed were the new rising mains and SPSs. The West Picton wastewater pipeline route was not assessed because it is within a previously disturbed area. SPS 920 and SPS 1045 were also not assessed because the proposed change would be contained within the existing SPS footprints.

The Tharawal Local Aboriginal Land Council and Cubbitch Barta Native Title Claimants were consulted as part of the assessment and they were present at the visual inspection.

The existing environment includes:

- Study area A (SPS A and Rising Main A) contains a swamp flat on a lower to mid-slope. It slopes upwards from a swampy area in the southwest to the northeast at a gradient of approximately 15 degrees. Study area A currently supports a chicken farm and what appears to be a dwelling. In the past the area has been used for grazing and residential purposes. Historical aerial photos show that the area has a history of disturbance and was largely cleared by 1955. Several roads, a dam and structures existed in the area in the past.
- Study area B (SPS B and Rising Main B) consists of a gentle lower slope bisected by a small ephemeral creek-line. The site slopes away from the creek-line in both directions at a gradient of no more than 5 degrees. Almost all of the original vegetation has been cleared. The area is currently used for grazing cattle. Historical aerial photographs reveal that the area was largely cleared by 1990 and the waterway appears to have been artificially rerouted. Several structures have been built near the site, with one located in the southeast. The proposed rising main route along the road verge and the northernmost part of the site were cleared by 1990. Road construction and the installation of several power poles has disturbed the rising main route.
- Study area C (SPS C and Rising Main C) is located on a flat broad terrace. The area is about 400 m south of Redbank Creek and 50 to 100 m northwest of an ephemeral creek that has been dammed. It is likely that this creek was a permanent water source before the dam was built. Although the site is currently almost completely flat, topographical maps show it as being located on an upper slope. It is possible that its flat appearance is due to cutting and filling to flatten the site for the buildings that are apparent in the historical aerial photographs. The photos reveal that the site was largely cleared by 1966. The area has been used for grazing and residential purposes, but is currently unused as is evidenced from the extreme weed growth.

5.9.2 Assessment of impacts – construction and operation

The Due Diligence Assessment of the proposed changes was done to determine whether or not further investigation and/or an Aboriginal Heritage Impact Assessment is warranted. The assessment was undertaken in accordance with the due diligence process described in the *Due*

Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW 2010). The code requires the study areas and proposed development to be assessed against a series of archaeological and disturbance questions. The full assessment is included in Appendix 4.

The assessment concluded that further investigations and/or impact assessment (including an Aboriginal Heritage Impact Permit (AHIP)) would not be required at any of the study areas because:

- a search of the OEH Aboriginal Heritage Information System (AHIMS) database identified no registered Aboriginal heritage sites within any of the study areas
- no Aboriginal heritage sites were identified during visual inspections of each study area
- no archaeological landforms of interest were identified in any of the study areas
- discussions with two Aboriginal communities with knowledge of the area did not identify any cultural or archaeological areas of concern
- each of the study areas has been subject to land uses that have disturbed the ground surface.

5.9.3 Mitigation measures

The following mitigation measure would be implemented during construction and operation to minimise any impacts on Aboriginal heritage, as required:

- If any Aboriginal object is found during construction or operation, all excavation or disturbance would cease in the area and the Sydney Water Project Environmental Representative (PER) must be notified immediately. The PER must inform Sydney Water's heritage staff and the Office of Environment and Heritage in accordance with section 89A of the *National Parks and Wildlife Act, 1974.*

5.10 Non-Aboriginal heritage

5.10.1 Existing environment

There are heritage listings for the Picton area on local, state and national registers. The following databases were searched for listings near the proposed changes:

- World Heritage list
- National Heritage list
- Commonwealth Heritage list
- State Heritage Register
- Wollondilly Local Environmental Plan 2011.

The two items listed in Table 7 are located more than 75 m away from the proposed changes. Both items are located near the West Picton wastewater pipeline route.

Table 7 Heritage Items in the vicinity of the proposed changes

Item	Register	Address
Redbank Uniting Church	Wollondilly LEP 2011	385 Argyle Street, Picton
Industry Housing Group – Cowper Street	Wollondilly LEP 2011	14, 16, 18, 20 Cowper Street Picton

5.10.2 Assessment of impacts – construction

The proposal would not directly affect the heritage items in Table 7.

Vibration from the use of heavy machinery has the potential to indirectly affect heritage items. Given that the identified heritage items are located at least 75 m from the construction sites it is unlikely that there would be any adverse impacts.

5.10.3 Assessment of impacts – operation

No operational impacts are expected because the proposed assets are not located near any identified heritage items.

5.10.4 Mitigation measures

The following mitigation measure would be implemented during construction to minimise any impacts on non-Aboriginal heritage, as required:

- If any substantial intact non-Aboriginal relics are unexpectedly found / discovered / uncovered during the excavation works, works must cease within that area and Sydney Water's Project Environmental Representative (PER) is to be contacted. The PER must inform Sydney Water's heritage staff. Works within the affected area may only begin again after written approval is provided by Sydney Water's heritage staff. Depending on the nature of the discovery, notification of the discovery of relics may be required under section 146 of the *Heritage Act 1977*.

5.11 Waste

5.11.1 Existing environment

The NSW waste regulatory framework was established under the principal legislation of the *Protection of the Environment Operations Act 1997*. The key objective of the legislation is to ensure a healthy and clean environment by regulating pollution and other adverse environmental impacts that may result from waste activities.

The waste legislation uses innovative tools and programs to mitigate pollution from waste disposal, minimise resource use, improve resource recovery and ensure the appropriate disposal of harmful waste in NSW.

The Picton WRP produces grit, screenings and biosolids that are managed according to set protocols. All biosolids produced by the plant are reused on the irrigation area (via injection into the soil) to supplement nutrients in the effluent.

The Biosolids are tested and managed in accordance with *Environmental Guidelines: Use and disposal of biosolids products* (EPA 1997) as required by the Picton STS Licence.

5.11.2 Assessment of impacts – construction

Construction activities would generate the following wastes:

- excess spoil from excavations including earth and rock
- general construction waste such as excess concrete, redundant lengths of pipe or fittings, timber, plastic and metal
- miscellaneous waste such as food waste and wrappers, paper, plastic and glass
- contaminated material from spills or leaks from vehicles.

The largest volume of waste would likely be the excess spoil generated by the pipelines and pumping station excavations.

Wherever possible, suitable excavated spoil would be reused on site for backfilling, landscaping and other uses. If suitable spoil is unable to be reused on-site, opportunities for off-site reuse would be investigated. If reuse opportunities are unable to be identified or the spoil is unsuitable for reuse due to its geotechnical or contamination characteristics, spoil would be classified according to the *Waste Classification Guidelines* (DECC, 2008). It would then be disposed of at an appropriately licensed facility.

Organic wastes produced through vegetation clearing would be minimised where possible and opportunities for mulching and composting would be investigated.

Volumes of other construction wastes would be low. Wherever possible these wastes would be recycled or reused, however, it is likely that they could require disposal after being classified according to *Waste Classification Guidelines* (DECC, 2008).

No significant volumes of liquid wastes, including oils or fuels would be generated on site during construction. Cutting heads and drilling equipment used for boring may be lubricated using bentonite slurry. The slurry would be reused in the drilling process, although small quantities of this liquid waste may require disposal. Liquid and non-liquid waste would be classified and managed in accordance with the *Waste Classification Guidelines* (DECC 2008). Wastewater from the dewatering of excavated areas would be discharged and disposed of in accordance with the *Protection of the Environment Operations Act 1997*.

5.11.3 Assessment of impacts – operation

The volumes of waste products (grit, screenings and biosolids) produced by the plant would slightly increase once the new growth areas are connected to the Scheme. This increase would only be minor.

The application of slightly greater volumes of biosolids to the irrigation area is not expected to adversely affect soils.

5.11.4 Mitigation measures

The following mitigation measures would be implemented during construction and operation to minimise waste generation, as required:

- Take opportunities to minimise the production of waste and maximise the use of recycled or recyclable products and materials.
- If re-use opportunities cannot be found, dispose of materials at the nearest approved waste disposal/recycling facility.
- Store waste materials awaiting recycling, re-use or disposal to ensure they do not escape into the environment.

5.12 Hazards and risks

5.12.1 Existing environment

State Environmental Planning Policy 33 - Hazardous and Offensive Development (SEPP 33) defines potential hazardous and offensive developments. It specifies requirements for assessing hazards and granting development consents. SEPP 33 normally only applies to developments requiring development consent under Part 4 of the EP&A Act 1979. As the modification is to be approved under Part 3A of the EP&A Act, the requirements of SEPP 33 do not apply.

5.12.2 Assessment of impacts – construction

Small volumes of fuels and chemicals may be stored on work sites for use by machinery and equipment during construction. These substances could potentially spill into the surrounding environment during refuelling activities, transport and delivery.

5.12.3 Assessment of impacts – operation

The additional flows may require extra volumes of chemicals to be stored at the plant than is currently stored. As the flows would be within the approved capacity of the plant, the chemical use is unlikely to be above quantities previously approved.

The need for storage of chemicals at the SPSs would be determined during the detailed design and would depend on the need for odour control. The risks associated with chemical storage would be assessed in detail during the detailed design phase.

5.12.4 Mitigation measures

- Conduct all work in accordance with the *Occupational Health and Safety Act 2000* and an appropriately approved Project Safety Plan.
- Undertake risk assessments to identify and manage environmental and safety risks for all works.
- Store and transport chemicals and fuels in accordance with the requirements of *the Occupational Health and Safety Act 2000* and Regulations, and the *Road and Rail Transport (Dangerous Goods) Act 2008*.

- Store chemicals in bunded areas with 110% capacity of the total volume of chemicals stored.
- Minimise chemical use at the Picton WRP and SPSs by optimising processes and operations where possible.

5.13 Traffic and access

5.13.1 Existing environment

Most of the proposed changes are located along local roads that only carry light traffic.

Access to the western end of the West Picton wastewater pipeline would be via Argyle Street/Remembrance Drive. Remembrance Drive runs from Narellan through Camden, Picton and Tahmoor to Bargo, where it has an interchange with the Hume Highway. This road carries significant regional traffic.

The West Picton wastewater pipeline would be laid beneath the Main Southern Railway Line.

5.13.2 Assessment of impacts – construction

The installation of the SPSs and wastewater pipelines would cause a minor, short-term increase in heavy traffic. Construction traffic would have temporary noise impacts and may cause minor traffic disruptions in the surrounding areas.

Remembrance Drive is the most critical road that would be affected during construction. Minor roads would also be affected by construction traffic and construction within road reserves.

Access to residential driveways may be temporarily impacted during excavation for the wastewater pipelines. Sydney Water would keep access to private properties open wherever possible.

Total vehicle numbers and movements are expected to be low. It is unlikely that construction traffic would significantly contribute to road use.

Impacts on the rail service would be avoided by boring underneath the railway line at West Picton. Sydney Water would negotiate the exact location and design of the railway crossing with RailCorp.

5.13.3 Assessment of impacts – operation

Sydney Water would need to access assets during operation for maintenance purposes. The impact on traffic would be very minor and infrequent. No additional operational mitigation measures are required.

5.13.4 Mitigation measures

The following mitigation measure would be implemented during construction to minimise any impacts on traffic and access, as required:

- Provide notice of traffic disruptions to residents.
- Notify residents of any access obstructions in advance and provide alternative access where possible.
- Consult with Wollondilly Shire Council, the RTA, emergency services and bus companies (as required) about the need for any partial road closures.
- Obtain approval from the RTA for any Traffic Management Plan prepared for works that require the partial or full closure of an RTA managed road.
- Consult with RailCorp during the detailed design phase of the West Picton wastewater pipeline.

5.14 Visual impacts

5.14.1 Existing environment

Picton is located within the elevated Razorback Range hill country. This includes the sparsely vegetated ridgelines which define the Racecourse Creek/Crawford Creek catchment.

Tahmoor and Thirlmere are categorised as rural areas with some features of scenic value. The visual environment is dominated by a series of creeks bound by rocky outcrops.

Picton, Tahmoor and Thirlmere contain a number of heritage items imparting an historical character. The towns contain compact, linear commercial districts surrounded by detached dwellings interspersed with frequent open space areas. The towns have developed along creeklines that have remained vegetated, contributing to their rural and visually pleasing character.

5.14.2 Assessment of impacts – construction

Construction of the proposed changes is expected to impact temporarily on the visual amenity of the local environment as construction sites are generally highly visible. Activities that may cause adverse visual impacts include:

- use and storage of machinery, equipment and work vehicles
- vegetation clearing
- stockpiling soil and vegetation
- excavating trenches.

Work sheds, worker amenities and equipment would remain on-site after hours and this would impact on the visual amenity of the area. These impacts would be temporary and only occur during the construction period.

Existing vegetation at the new SPS sites would be retained where possible. The sites would be appropriately landscaped to minimise visual impacts from the SPSs at the completion of construction.

The rising mains would be laid along local roads. Construction equipment would be visible to adjacent properties and road users. The relatively rapid rate of pipeline laying would ensure that visual impacts move quickly along the pipeline route. Areas disturbed by pipeline construction would be progressively rehabilitated, further reducing visual impacts. Machinery would be used and stored so as to minimise disturbances to residents.

Construction at the SPS and rising main sites would only have a temporary visual impact. If necessary, screening could be used to obscure construction works from view and minimise the visual impact of construction.

Compounds may need to be established along pipeline routes and at SPS sites during construction. Hoardings or temporary screening may be erected to decrease visual impacts where appropriate. Good housekeeping practices would also be employed on-site. Compound areas would be restored to their original condition when construction has finished.

5.14.3 Assessment of impacts – operation

Most of the above-ground structures at the new SPSs would be contained within a building or small kiosk housing electrical equipment. There would be no additional operational visual impacts at SPS920 and SPS1045. Photos of recently installed Sydney Water SPSs are shown in Figure 11.

Figure 11 Examples of recently constructed sewage pumping stations

Views to the site would be restricted to some extent by existing vegetation, but the structures would still be visible from the surrounding landscape. The viewpoints that would be most significantly impacted are the existing homes on surrounding rural residential lots. Properties potentially impacted are listed in Table 8. The SPSs may also be visible from the future growth areas.

Table 8 Properties potentially affected by visual impacts from SPSs

Proposed new asset*	Properties potentially impacted
SPS A (location A1 or A2)	Lot 1 and 90 Tahmoor Road 105 and 110 Myrtle Creek Avenue
SPS B	55, 65 and 70 Progress Street
SPS C	26-38, 50 Rita Street 50 Marion Street

* There would be no additional visual impacts at existing sewage pumping stations

The SPS structures would be designed, located and finished to minimise their visual impact. Shrubs would be planted around the SPSs to minimise the visual impacts.

The wastewater pipelines would be laid underground and would have no visual impact during operation. There would be some surface infrastructure associated with the pipelines such as vent shafts, manholes, screw valves and overflows. These would be designed to minimise their visual impact.

5.14.4 Mitigation measures

- Position SPSs, air release valves and vent shafts to minimise visual impact as far as practical.
- Take photos of construction areas prior to commencing work for reference during rehabilitation.
- Restore private properties as promptly as possible after the work is completed to their pre-existing condition (as close as possible).
- Keep construction sites and site compounds to the smallest size practicable and screen if necessary.
- Store equipment within established site compounds or designated lay-down areas to confine the visual impact of machinery and other such equipment to specific locations.
- Display accurate public information/signs during construction.
- Progressively rehabilitate rising mains and wastewater pipelines as work is completed.
- Undertake landscaping and restoration works at the SPS sites at the completion of construction.

5.15 Socio-economic considerations

5.15.1 Existing environment

The Scheme services the towns of Picton, Tahmoor and Thirlmere. As discussed in Section 3.1.1, the DP&I and Wollondilly Shire Council have forecast that 1,477 residential lots would be developed on the outskirts of Picton, Tahmoor and Thirlmere by 2031 and would connect to the Scheme.

5.15.2 Assessment of impacts – construction

Community impacts may occur as a consequence of the proposed Scheme changes.

Change can be viewed by a community as either positive or negative, depending on the reason for the change, the associated direct impacts on individuals, the duration of exposure to the impacts and the ability to influence or modify the outcomes. Whole communities may accept the change as worthwhile. However, some individuals may not consider the impacts as acceptable if they are direct or sustained, even if the change has regional community benefits.

There would not be any significant adverse impacts on the local community during construction. Local residents may experience some minor and temporary disruptions to local roads and access to their properties. Visual impacts, noise and dust may also be generated by construction activities. These impacts would be short term and minimised through the implementation of appropriate site specific safeguards.

5.15.3 Assessment of impacts – operation

The operation of the proposal would have a beneficial impact because it would allow new growth areas to connect to the existing wastewater network. There would be economic benefits from the facilitation of growth in the region.

5.15.4 Mitigation measures

No additional mitigation measures are required.

5.16 Cumulative effects

The main cumulative impact of the Scheme relates to the stimulation of population growth in the vicinity of the villages of Picton, Tahmoor and Thirlmere. The overall aim of the proposed changes is to extend the wastewater service to new growth areas. Additional development and growth in the villages is not solely determined by the provision of wastewater services. The planning decisions for the future of the Picton area would be made by Wollondilly Shire Council and the DP&I following consideration of a wide range of factors.

It is not anticipated that the proposed changes would add significantly to the overall cumulative impact of the Scheme. The contribution of the new growth areas is within the uncommitted spare capacity of the plant and farm.

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6 Consultation

6.1 Community

In December 2010, Sydney Water advised property owners in Picton, Tahmoor and Thirlmere about environmental investigation work associated with the Scheme. In total, 22 property owners received letters advising that Sydney Water is proposing to modify the Scheme boundary and that investigations are being carried out as part of the proposed changes.

6.2 Feedback

In response to the December 2010 notification, seven property owners (two in Picton, one in Tahmoor and four in Thirlmere) called the 1800 number to enquire about the work. Most of these property owners called to discuss access requirements to their property. Other callers were concerned about the location of Scheme assets such as sewer mains.

The DP&I will place this Assessment Report and any other material relevant to this modification request on their website. The DP&I may seek submissions.

6.3 Stakeholders

Regular meetings have been held with Wollondilly Shire Council during the development of the proposal. Wollondilly Shire Council and the DP&I would continue to be consulted to ensure that Sydney Water meets development timeframes.

6.4 Further consultation

The public would have an opportunity to comment on the proposal if the DP&I seeks submissions.

Sydney Water would consult with potentially affected property owners as the design progresses.

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7 Environmental management

7.1 Construction

A Construction Environmental Management Plan was prepared for the original works undertaken for the Scheme. A new CEMP would be developed for the proposed changes once the design is complete and any further assessments are completed. The CEMP would address any construction requirements specified in the modified Approval as well as the specific mitigation measures identified in this Assessment Report.

7.2 Operation

Sydney Water would review and amend, as required, its existing Waste and Wastewater Integrated Management Systems to incorporate the proposed changes to the Picton wastewater system. The following procedures, guidelines and requirements may change:

- site incident procedures
- chemical storage and handling procedures
- maintenance requirements
- standard safety procedures.

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8 Project justification

8.1 Ecological sustainability

Clause 6 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) outlines the requirements of an environmental assessment, including:

> *'The reasons justifying the carrying out of the development or activity in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development'*

The Regulation lists the principles of ecologically sustainable development as:

a) **The precautionary principle,** namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation

b) **Intergenerational equity**, namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations

c) **Conservation of biological diversity and ecological integrity**, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration

d) **Improved valuation, pricing and incentive mechanisms**, namely that environmental factors should be included in the valuation of assets and services.

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) also identifies the following principle for consideration, namely:

> *Decision making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.*

Table 9 provides an assessment of the proposed changes against the above principles.

Table 9 Consistency of proposed changes with principles of ecologically sustainable development

Principle of ESD	Evaluation of the proposed changes against the principle
The precautionary principle	This principle aims to reduce the chance of serious or irreversible environmental problems (even if we are not sure that these problems might occur) by assessing the risks of various options. Identifying environmental risks and proposing mitigation measures, as outlined in Section 5 of this report, addresses the precautionary principle. This principle is further demonstrated by Sydney Water's commitment to preparing a CEMP for construction. The CEMP would detail a range of mitigation measures and processes for minimising adverse impacts on the environment. The implementation and success of these measures would be monitored during construction. Sydney Water would review and amend its existing Waste and Wastewater Integrated Management Systems to incorporate the proposed changes, including any new environmental management requirements that result from the proposed changes.
Intergenerational equity	The principle of 'intergenerational equity' requires that decisions made by the present generation do not degrade the environment for future generations. The proposed changes involve activities that have the potential for environmental and social disturbance. However, this potential should be balanced against the long-term social, environmental and economic benefits of the changes. The proposed changes would be designed, as far as practicable, to ensure that the community will not be significantly disadvantaged over the long term, and that overall environmental and urban quality will be maintained. The mitigation measures listed in this report would ensure that the health, diversity and productivity of the local and regional environment is maintained for future generations.

Principle of ESD	Evaluation of the proposed changes against the principle
Conservation of biological diversity and ecological integrity	This principle aims to ensure that conservation of biological diversity and ecological integrity is a fundamental consideration. This report has found that the proposed changes would have minimal impacts on significant ecological communities and threatened flora and fauna. Where minor impacts would occur, restoration works would be undertaken. Sydney Water would ensure that impacts on biological diversity are minimised during the detailed design, construction and operational phases, in order to maintain ecological integrity.
Improved valuation, pricing and incentive mechanisms	This report identifies the environmental and other consequences of the proposed changes and includes appropriate mitigation measures to manage adverse impacts. Implementing these mitigation measures increases Sydney Water's capital and operating costs. This means the assets are valued to incorporate environmental factors. In addition, Sydney Water uses tools that integrate environmental resource use into planning and decision-making processes to ensure preferred project options are environmentally sustainable.
Decision making process	The proposed changes have been developed in consultation with Wollondilly Shire Council and the Department of Planning and Infrastructure. An assessment of the short and long-term, construction and operation impacts of the proposed changes is included in this report, including a consideration of the principles of ESD. The modification requires approval under Part 3A of the EP&A Act, meaning that the decision making process is administered by the DP&I.

8.2 Consistency with Scheme objectives

The proposed changes would result in community and environmental benefits. This report has found that the proposed changes would not compromise the ability of the Scheme to meet its objectives. Timely servicing of the growth areas outside of the Scheme boundary would contribute positively to economic growth and meeting future housing demand in the area. It would also ensure that water quality and public health risks associated with wastewater collection and disposal are minimised.

8.3 Consistency with conditions of approval

Sydney Water considers the proposed changes are consistent with the Conditions of Approval for the Scheme with the exception that:

- the growth areas are outside the original Scheme boundary
- the proposed assets and SPS amplifications were not described in the original EIA documents

For this project to go ahead, Sydney Water requires approval from the DP&I to extend the Scheme boundary to allow connections from the new growth areas and other areas, build the identified new SPSs and wastewater pipelines and amplify the identified SPSs.

8.4 Consistency with future growth requirements

The proposed changes are consistent with MDP forecasts and Wollondilly Shire Council's growth strategy. The expansion of the collection system would allow future growth areas to connect to the Scheme using the uncommitted spare capacity of the plant and farm.

Works would be staged to coincide with the planned development. Sydney Water would consult with Wollondilly Shire Council and the DP&I to confirm that its delivery program matches development plans.

9 Conclusion

The proposed changes to the Scheme would allow Sydney Water to service the future growth areas identified by the DP&I and Wollondilly Shire Council and other areas outside the Scheme boundary in a flexible, cost effective and timely way.

Sydney Water has confirmed that there is sufficient uncommitted spare capacity at the plant and farm to receive flows from the future growth areas. However, upgrades to certain plant components including the filters and disinfection system would be required to maintain plant reliability.

Impacts associated with the increased flows, including extra irrigation and discharges to Stonequarry Creek, are consistent with the impacts assessed in the EIS.

The construction of the proposed changes would involve clearing, disturbance and excavation at SPS sites and within the pipeline corridors. No excavation works are required at the SPSs to be amplified.

Specialist consultants were engaged to assess the potential flora and fauna, Aboriginal heritage and noise and vibration impacts.

The flora and fauna study identified that Shale Sandstone Transition Forest (SSTF) is present at the SPS A and B sites. SSTF is listed as an Endangered Ecological Community under the TSC Act. The Assessment of Significance concluded that the new assets would not have a significant impact on the habitat or habitat connectivity of SSTF occurring at the SPS A and B sites.

The Aboriginal Heritage Due Diligence Assessment for the proposed changes did not identify Aboriginal heritage sites in the vicinity of the new assets and concluded that no further investigations and/or impact assessment would be required.

The noise and vibration assessment for the proposed changes identified that noise management levels would be exceeded during construction at nearby residential receivers during worst case noise generating activities.

Operational noise impacts are unlikely to impact residences as the noise assessment predicted that pump operations would comply with the NSW Industrial Noise Policy.

Construction could potentially affect:

- surface water quality
- soils
- vegetation
- traffic
- existing noise levels
- the visual environment.

Any impacts would be minor and short-term, only.

Adverse operational impacts would include

- increased overflows in wet weather
- the visual impacts of above ground sewerage system assets
- odours
- increased chemical transport/storage.

These impacts would also be minor, although longer term.

With the adoption of the mitigation measures outlined in Section 5, these impacts are expected to have a minor effect on the local community and the environment.

The SPSs would be designed with sufficient emergency storage capacity to minimise the risk of dry weather overflows from the SPSs during a power failure. Visual impacts would be reduced through

the strategic positioning of assets and their screening with native vegetation. Chemical dosing of wastewater, vent shafts and other odour control devices would control odour from the Scheme.

The proposed changes can be implemented without any significant environmental impacts. Practical measures would be implemented to mitigate identified impacts and these would not result in serious or irreversible harm to the environment.

10 References

Actinotus Environmental Consultants, *Flora and Fauna Survey of Property Environment Management Program Sites in the Picton/Illawarra Localities, NSW, Volume 2A – Picton STP,* Report for Sydney Water, 2009.

Archaeological & Heritage Management Solutions (AHMS), *Sydney Water Modifications to the Picton Sewerage Scheme – Aboriginal Heritage Due Diligence,* Report for Sydney Water, 2011.

AWT, *Picton stream monitoring. July 1992 – June 1993. Australian Water Technologies, Science and Environment*, Report Number 93/63, 1993.

Bannerman SM and Hazelton PA, *Soil landscapes of the Penrith 1:1000 000 sheet,* Soil conservation service of NSW, Sydney, 1990.

BHP, *Appin Area 7 Longwalls 705 to 710 Groundwater Assessment, Douglas Park, NSW* BHP Billiton Illawarra Coal Pty Ltd, 2008.

Biosis Research, *Terrestrial Flora & Fauna Assessment: Picton Sewerage Scheme Boundary Modifications,* Report for Sydney Water, 2011.

Department of Environment and Climate Change NSW (DECC), *Interim Construction Noise Guideline,* Sydney, 2009.

Department of Environment and Climate Change NSW (DECC), *Waste Classification Guidelines,* Sydney, 2008.

Department of Land and Water Conservation (DLWC), *Salinity Hazard Map for Western Sydney,* 2001.

Department of Natural Resources (DNR), *NSW Acid Sulfate Soils Risk Maps* 2003.

Department of Planning, *MDP 2008/09 Report: Metropolitan Development Program – Residential Forecasts 2008/09 – 2017/18,* Sydney, 2010.

Department of the Environment, Water, Heritage and the Arts (DEWHA), *Matters of National Environmental Significance – Significant impact guidelines 1.1,* Barton ACT, 2009.

Douglas and Partners, *Report on Geotechnical Investigation, Picton STP Effluent Detention Dams, Remembrance Drive, Picton,* September 1999.

ERM Mitchell Mccotter, *Picton Regional Sewerage Scheme: Environmental Impact Statement*, January 1996.

GHD Hassall, *Report for Picton wastewater reuse facility. Annual Report and Nutrient Balance,* 1 July 2008 to 30 June 2009.

GHD, *Groundwater assessment: Longwalls 705 to 710, Appin Area 7,* BHP Billiton Illawarra Coal Pty Ltd and Geo Terra, NSW, 2008.

Mount King Ecological Surveys, *Habitat assessment of Stonequarry Creek and Nepean River for the proposed sewerage Scheme for Picton region. Detailed assessment and Fauna Impact Statement,* Mount King Ecological Surveys, Oberon, 1995.

Parsons Brinckerhoff, *The Picton Sewerage Scheme Boundary Modifications – Noise and Vibration Assessment,* Report for Sydney Water, 2011.

Russel GN, Green RT and Spencer J, *Thirlmere Lakes groundwater assessment*, NSW Office of Water, Sydney, 2010.

Sydney Water, *Picton Sewerage System Plan* Asset Planning Treatment, Sydney Water, 2008

Sydney Water, *Picton Regional Sewerage Scheme: Environmental impact prediction verification Report No. 3. Ten Yearly Assessment (2005-1009).Draft Report.* Sydney Water, 2011.

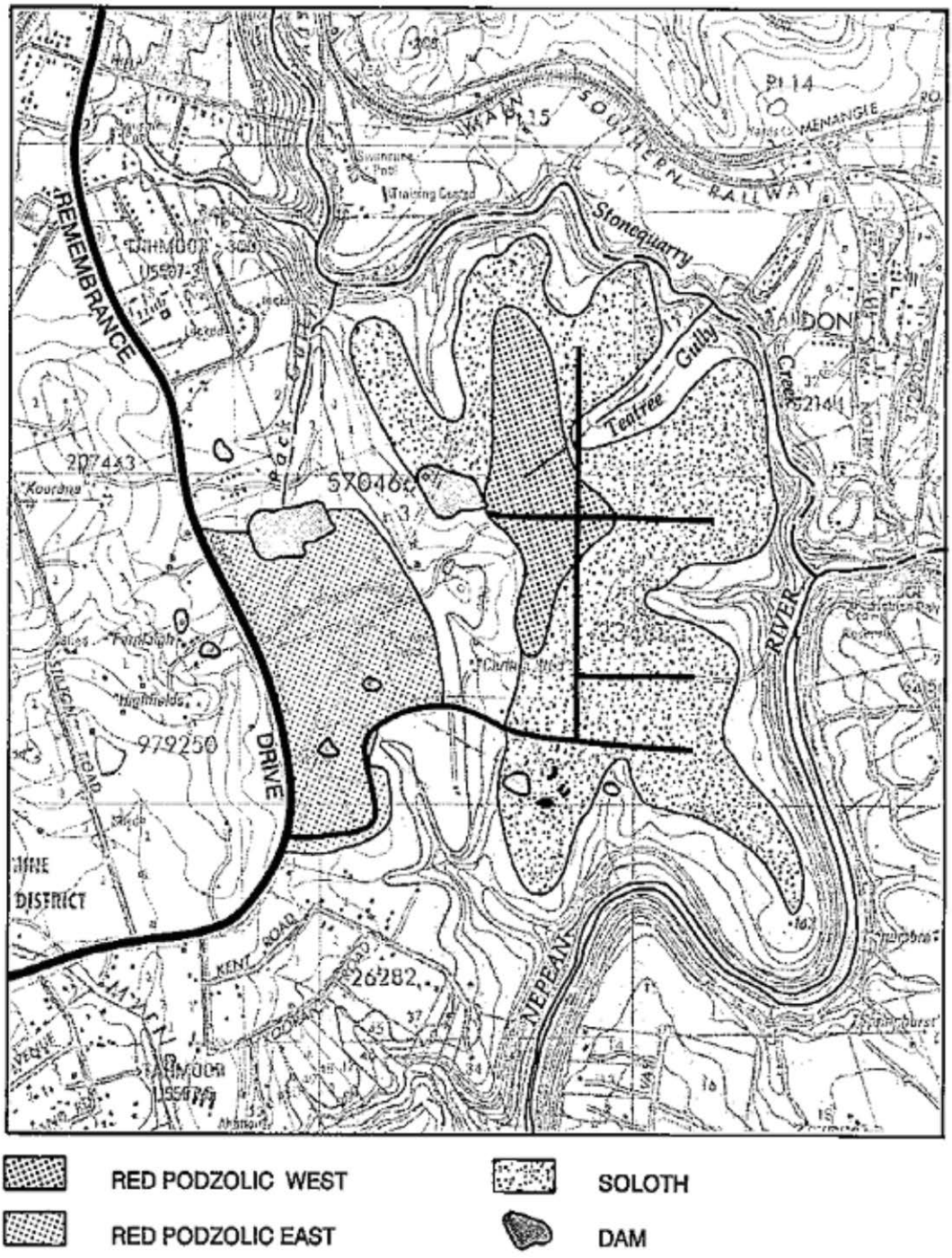
Sydney Water Transutilities Corporation (SWTC), *Picton Regional Sewerage Scheme: Environmental impact verification Report No. 1. Reporting period: 11 Feb to11 August 2000.* Sydney Transutilities Consortium, 2000.

SWTC, *Picton Regional Sewerage Scheme: Environmental impact verification Report No. 2. Reporting period: 11 Aug 2000 to11 March 2001.* Sydney Transutilities Consortium, 2001.

SWTC, *Proposed modifications to the Picton Regional Sewerage Scheme Review of Environmental Factors* Sydney Water Transutilities Consortium, 1998.

Appendix 1 Soil Landscapes

The distribution of soil types at the Picton Water Recycling Farm (Source: ERM Mitchell Mccotter Picton Regional Sewerage Scheme-EIS, 1996)



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Appendix 2 Terrestrial Flora & Fauna Assessment

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Appendix 3 Noise and Vibration Assessment

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Appendix 4 Aboriginal Heritage Due Diligence Assessment