Review of Environmental Factors

Liverpool to Cecil Park Water Project

(December 2019)

Sydney WATER




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Determination

This Review of Environmental Factors (REF) assesses potential environmental impacts of Liverpool to Cecil Park Water Project and was prepared under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with Sydney Water as both the proponent and determining authority. The State Environmental Planning Policy (Infrastructure) 2007 allows the project to be carried out without development consent. The project has also been considered against the matters listed in clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) (Appendix A).

During construction, the main potential environmental impacts of the project are typical construction impacts such as erosion and sedimentation, vegetation clearing, noise and vibration and traffic impacts. During operation, the main potential impact is associated with noise from the operation of the water pump station at Liverpool Reservoir. The assessment shows that if the environmental safeguards identified in this REF are adopted, the project will not have a significant environmental impact. Accordingly, an Environmental Impact Statement is not required.

The Sydney Water Project Manager will make sure the project is carried out as described in this REF. If the scope of work or work methods described in this REF change significantly following determination, additional environmental impact assessment may be required.

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Executive summary

Sydney Water proposes to construct and operate the Liverpool to Cecil Park Water Project, which involves construction and operation of a DN900 water main that connects Liverpool Reservoir and Cecil Park Reservoir, a new water pump station at Liverpool Reservoir and several smaller DN200/DN300 distribution mains in Austral. The project is required to cater for the predicted growth in demand for water servicing in parts of the South West Growth Area.

The project is situated within the suburbs of Cecil Hills, Cecil Park and Austral in the local government area of Liverpool City Council. The surrounding land use is predominantly residential and also includes Western Sydney Parklands, which is characterised by recreational open space and bushland. The Westlink M7 motorway runs north-south through the parklands.

Environmentally sensitive areas in the surrounding area include a number of waterways, water bodies and bushland areas. The main waterways include Hinchinbrook Creek and Kemps Creek. The project will cross a few smaller waterways including Bonds Creek and two unnamed tributaries of Kemps Creek. Waterbodies in the surrounding area are limited to Doujon Lake in Cecil Hills and small farm dams in Austral.

Native vegetation is mainly confined to Western Sydney Parklands and in the vicinity of waterways. Impacts not avoided on flora and fauna include clearing of an estimated 1.58 hectares of native vegetation, including areas comprising Cumberland Plain Woodland threatened ecological community as well as potential habitat for threatened species including Cumberland Plain land snail and various species of hollow-roosting microbats.

Heritage items in the surrounding area include the Sydney Water Supply Upper Canal / Upper Canal System, Cecil Hills Farm Group and Austral Town Centre Conservation Area. An s57(2) exemption will be obtained for crossing the Upper Canal System.

The project is also expected to require disturbance of a known artefact scatter and potential archaeological deposit near Cecil Park Reservoir. Works will be carried out in accordance with an Aboriginal heritage impact permit under the *National Parks and Wildlife Act 1974*.

Potential environmental impacts of the project have been initially avoided, mitigated and managed through options assessment and design. This includes using trenchless methods for construction, such a microtunelling, to avoid impacts to surface features. A number of environmental safeguards have been proposed to avoid, mitigate and manage the residual impacts of the project on the environment. A Construction Environmental Management Plan, including a Soil and Water Management Plan and Traffic Control Plan will be prepared by the delivery contractor to mitigate potential environmental impacts.

The project will service future growth and increase water resilience in the system, resulting in positive long-term environmental improvements, aligned with the principles of ecologically sustainable development.

1 Introduction

1.1 Project background and need

Sydney Water proposes to construct and operate the Liverpool to Cecil Park Water Project, which involves construction and operation of a DN900 water main that connects Liverpool Reservoir and Cecil Park Reservoir, a new water pump station at Liverpool Reservoir and a number of smaller DN200/DN300 distribution mains in Austral. The project is described in more detail in section 2.

1.1.1 Project need

The project is required to cater for the predicted growth in demand for water servicing in parts of the South West Growth Area, one of several areas identified by the NSW Government to provide land for housing development and be close to jobs, parks, schools and amenities.

The project has been designed to cater for predicted growth in demand in parts of Austral, Leppington and Rossmore precincts collectively referred to as the Eastern Front.

The extents of the project and the South West Growth Area are shown in Figure 1-1.

1.1.2 Project objectives

The proposal objectives are to:

- meets the demands for growth in Sydney's south west – Eastern front
- increase resilience in Sydney's drinking water system
- make the most of water we have.

1.1.3 Options assessment

An options assessment process informed the design of the project. This process identified several options for the DN900 watermain alignment between Liverpool Reservoir and Cecil Park Reservoir and considered a number of factors including environmental constraints identified through a preliminary environmental assessment (ENSure 2018). The key environmental constraints identified included:

- land subject to a biodiversity stewardship agreement
- location of State and local heritage items and a number of Aboriginal heritage items
- geotechnical constructability constraints
- planned RMS road upgrades

The preferred option for the DN900 water main alignment was ultimately selected as it avoids impact to the land subject to a biodiversity stewardship agreement, avoids conflicts with planned RMS road upgrades and has less constructability constraints.

The options for the water pump station at Liverpool Reservoir and the smaller DN200/DN300 distribution mains in Austral were subject to fewer constraints but were nonetheless refined, including constructing several sections utilising trenchless methods, to limit potential impacts.

Overall, the preferred options and design of the project were selected as those that best met the need and objectives at the least cost and acceptable level of risk — including environmental risk.

1.2 Consideration of Ecologically Sustainable Development

The project has been considered against the principles of ecologically sustainable development (ESD) (refer to **Error! Reference source not found.** below).

Table 1-1 Consideration of principles of ecologically sustainable development (ESD)

Principle	Consideration in project
Precautionary principle - *if there are threats of serious or irreversible environmental damage, lack of scientific uncertainty should not be a reason for postponing measures to prevent environmental degradation. Public and private decisions should be guided by careful evaluation to avoid serious or irreversible damage to the environment where practicable, and an assessment of the risk-weighted consequences of various options.*	The project will not result in serious or irreversible environmental damage and there is no scientific uncertainty relating to the proposal. The proposal is designed to locate pipes in disturbed road corridors and access tracks where possible to minimise environmental impact.
Inter-generational equity - *the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.*	The project will help to meet the needs of future generations by providing water servicing and improving system resilience.
Conservation of biological diversity and ecological integrity - *conservation of the biological diversity and ecological integrity should be a fundamental consideration in environmental planning and decision-making processes.*	The project will not have a significant impact on biological diversity or ecological integrity. The proposal will require clearing of native vegetation. However, the proposal was designed to minimise clearing by constructing pipelines along road corridors and access tracks.
Improved valuation, pricing and incentive mechanisms - *environmental factors should be included in the valuation of assets and services, such as 'polluter pays', the users of goods and services should pay prices based on the full life cycle costs (including use of natural resources and ultimate disposal of waste) and environmental goals.*	The project will provide cost efficient use of resources and provide optimum outcomes for the community, environment and with respect to financial cost. All options were subject to a lifecycle cost analysis.

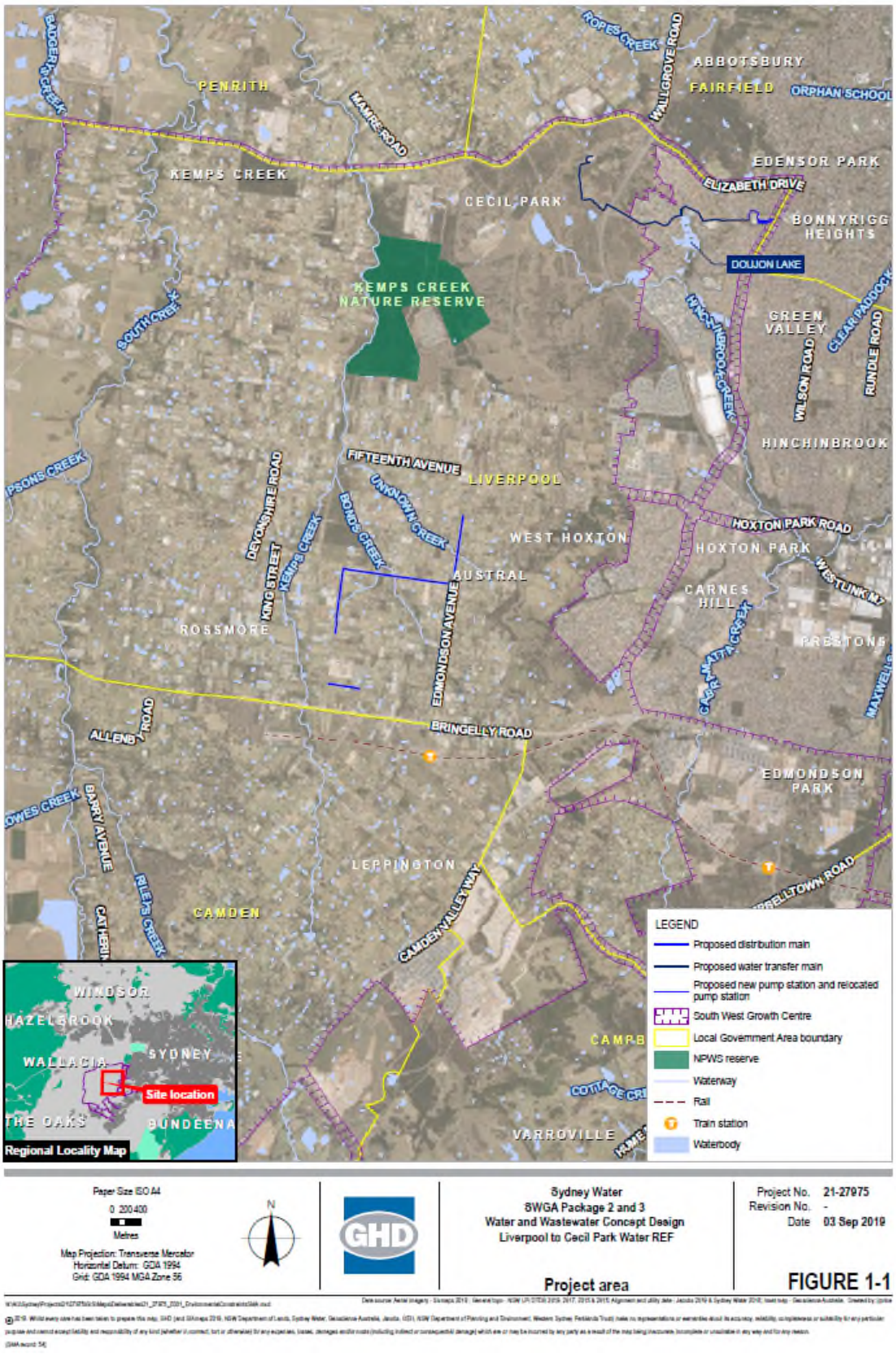


Figure 1-1 Project location

2 Project Description

2.1 Project details

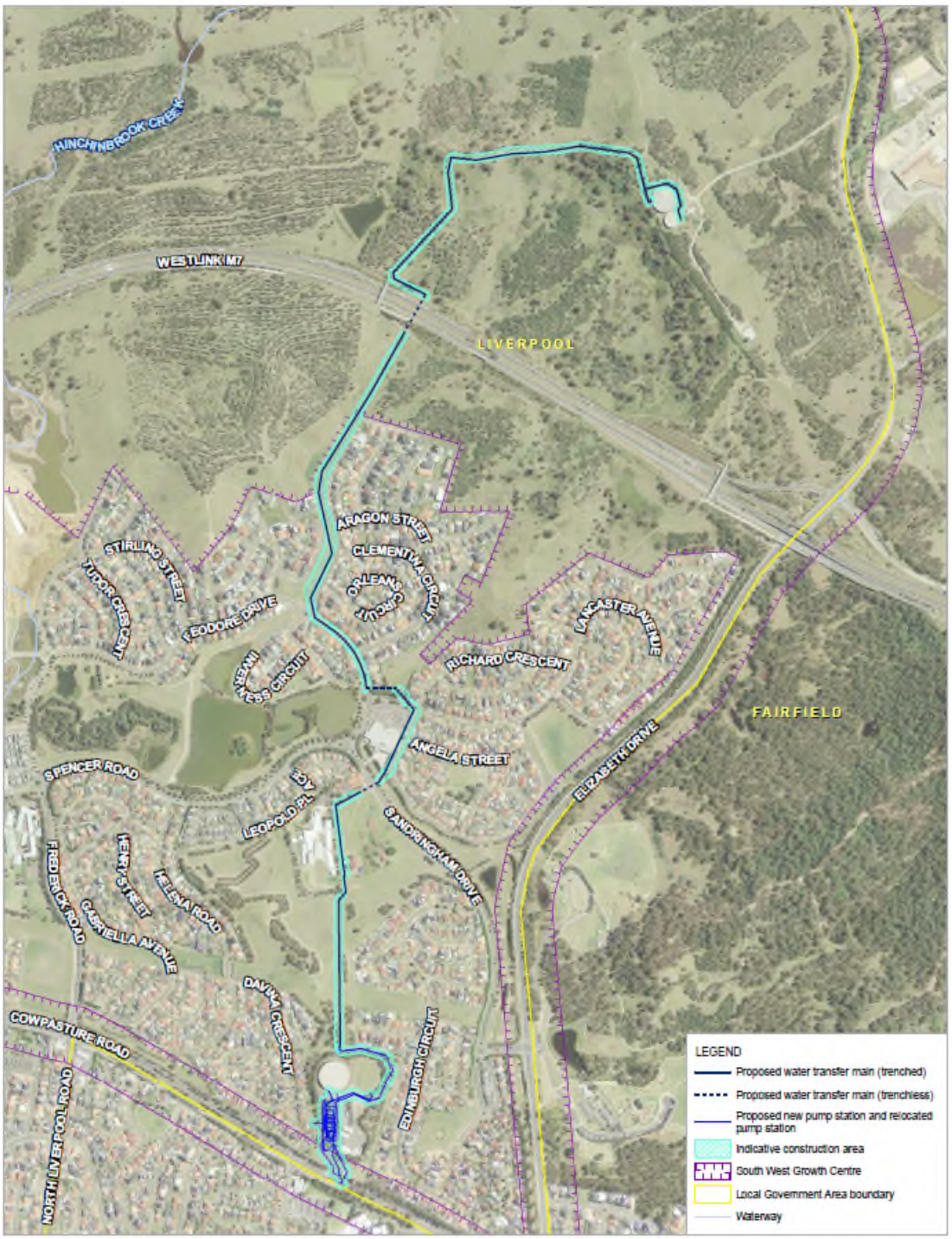
Table 2-1 describes the project location and broadly describes the scope of work involved in the construction and operation of the project and Figure 2-1 shows the project layout.

Table 2-1 Description of project

Scope of work	Detailed description of work/ activity
Land ownership and location	The project is situated within the suburbs of Cecil Hills, Cecil Park and Austral within the local government area of Liverpool City Council. The project is located within Sydney Water owned land, Western Sydney Parklands, road verges and some private properties.
Project description	The project includes the following three major components: • a 4km DN900 water main connecting Liverpool Reservoir and Cecil Park Reservoir. • water pump stations and associated mains at Liverpool Reservoir, including a new station (WP0433) to deliver flow to Cecil Park Reservoir and a relocated station (WP0012) to deliver flow to Bonnyrigg Reservoir. • smaller DN200/DN300 distribution mains in Austral. Each of the three major components are shown in Figure 2-1. The water main will transfer water from Liverpool Reservoir to Cecil Park Reservoir. It will be a 900mm size pipe about four kilometres in length. The main will be constructed by open trenching methods, however trenchless methods, such as microtunnelling, are planned where the main crosses the Westlink M7. The new water pump station at Liverpool Reservoir will be constructed at surface level within the boundaries of the existing Liverpool Reservoir property and include a new building housing seven pumps. Five of the pumps will pump water to Cecil Park Reservoir through the proposed water main. The other two pumps will replace an existing pump station and will pump water to Bonnyrigg Reservoir by connecting to an existing trunk main on Cowpasture Road adjacent to Liverpool Reservoir. The smaller distribution mains in Austral will total about 4 kilometres in length and have a diameter of 200 millimetres to 300 millimetres. The distribution mains will be constructed by open trenching within existing road corridors, however trenchless methods will be used to avoid waterways and vegetation along sections of Fifth Avenue, Tenth Avenue and Edmondson Avenue. While the smaller distribution mains will not connect directly to the water main or new water pump station, they will connect to existing distribution infrastructure and provide additional capacity for water servicing.
Site establishment and access tracks	Site establishment will include the installation of erosion and sedimentation controls in accordance with an approved Construction Environmental Management Plan.

	Site establishment may also include surveys, service location, or other investigations required prior to construction. As well as, service relocation where services are identified that will be affected. Access to the construction sites will generally be via existing roads as well as temporary access tracks within the construction corridor.
Ancillary facilities	Ancillary facilities during construction may include construction compounds laydown areas for equipment, machinery and construction materials. These will be located in the construction corridor and the reservoir sites.
Scope of work	The scope of work includes the construction and operation of the project. The construction of the DN900 water main and the DN200/DN300 distribution mains will occur progressively within a proposed 20 metre construction corridor. Installation will primarily be by open trenching methods, which allows for open access to the pipeline during construction. Construction activities associated with trenching include: • excavate tranches, including stockpiling of spoil material on the upslope side of trenches, or at temporary site compounds • shore and dewater trenches, depending on trench depth and groundwater levels • spread granular material such as sand or gravel along the bottom of the trench before pipe laying • install the water pipeline • backfill the trench with bedding material and excavated soil • compact trench fill material and restoring areas disturbed by the works • test and commission the pipeline Trenchless methods such as microtunnelling will be applied where the DN900 water main will cross the Westlink M7. Entry and exist pits will be established at either side of the trenchless section. Pits are likely to be 5-12m long and about 4m wide. The section will then be microtunelled with the section of water pipe being fed through. The construction of the new water pump station at Liverpool Reservoir will involve limited earthworks as the pump station will be constructed at ground level. Some earthworks will occur to create a flat and stable construction pad. Some works will also be carried out at the site in order to provide connections to the DN900 water main and existing trunk main on Cowpasture Road. The layout of the project and construction area, including indicative trenchless sections for the water main and distribution mains, is shown in Figure 2-1.
Commissioning	Commissioning of the project will involve testing the water main, pump station and distribution mains to check that they are operating correctly.
Restoration	As construction progresses, areas disturbed by construction will be restored to a condition similar to prior to the disturbance occurring. This may include restoration of grass and other groundcover, reuse of any cleared vegetation as mulch and habitat features such as hollow logs, and more substantial revegetation where compatible with the operational requirements of the project. Revegetation will be carried out in accordance with Sydney Water procedure *SWEMS0025.11 Guideline for native revegetation following construction*.

Materials/ equipment	The materials required for the construction of the project will largely be prefabricated and include sections of piping, pumps and associated instrumentation, and various building materials. A range of vehicles, equipment and machinery will be used which will indicatively include: • bobcats • compactors • cranes • dump trucks • dumpers • excavators • front loaders • generators • micro-tunnelling machines • portable pumps • rock breakers • rollers • semi-trailers • water carts Trenching and some other earthworks that will have the potential to generate spoil. The spoil will generally be reused in backfilling or trenches or other onsite reuses if suitable. It is estimated that in the order of 4000 m^3 of excess spoil may be generated over the construction timeframe. It is expected that the construction of the project will require a construction workforce in the order of 50 people across all construction areas.
Work hours	Work and deliveries will be scheduled to occur during standard daytime hours: • 7am to 6pm, Monday to Friday • 8am to 1pm, Saturdays Sometimes work is required at different times (eg, for work in roads and delivery of oversize equipment). Sydney Water's Project manager can approve work outside of standard daytime hours, following the approval process outlined in section 5.2.7.
Project timing	Construction is expected to commence in early to mid 2020 and take approximately 6 months.
Operational requirements	Once operational, the project will be subject to standard routine maintenance activities such as inspections, testing and repairs as necessary.


HINCHINBROOK CREEK
WESTLINK M7
LIVERPOOL
ARAGON STREET
CLEMENTINA CIRCUIT
ORLEANS CIRCUIT
STIRLING STREET
TUDOR CRESCENT
THEODORE DRIVE
INNES CIRCUIT
RICHARD CRESCENT
LANCASTER AVENUE
FAIRFIELD
ANGELA STREET
SPENCER ROAD
LEOPOLD PL
ELIZABETH DRIVE
SANDRINGHAM DRIVE
FREDERICK ROAD
HENRY STREET
HELENA ROAD
GABRIELLA AVENUE
DAVINA CRESCENT
COWPASTURE ROAD
EDINBURGH CIRCUIT
NORTH LIVERPOOL ROAD
LEGEND
Proposed water transfer main (trenched)
Proposed water transfer main (trenchless)
Proposed new pump station and relocated pump station
Indicative construction area
South West Growth Centre
Local Government Area boundary
Waterway
Paper Size ISO A4
0
200
400
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56
N
GHD
Sydney Water
SWGA Package 2 and 3
Water and Wastewater Concept Design
Liverpool to Cecil Park Water REF
Project layout
Project No. 21-27975
Revision No. -
Date 03 Sep 2019
FIGURE 2-1a

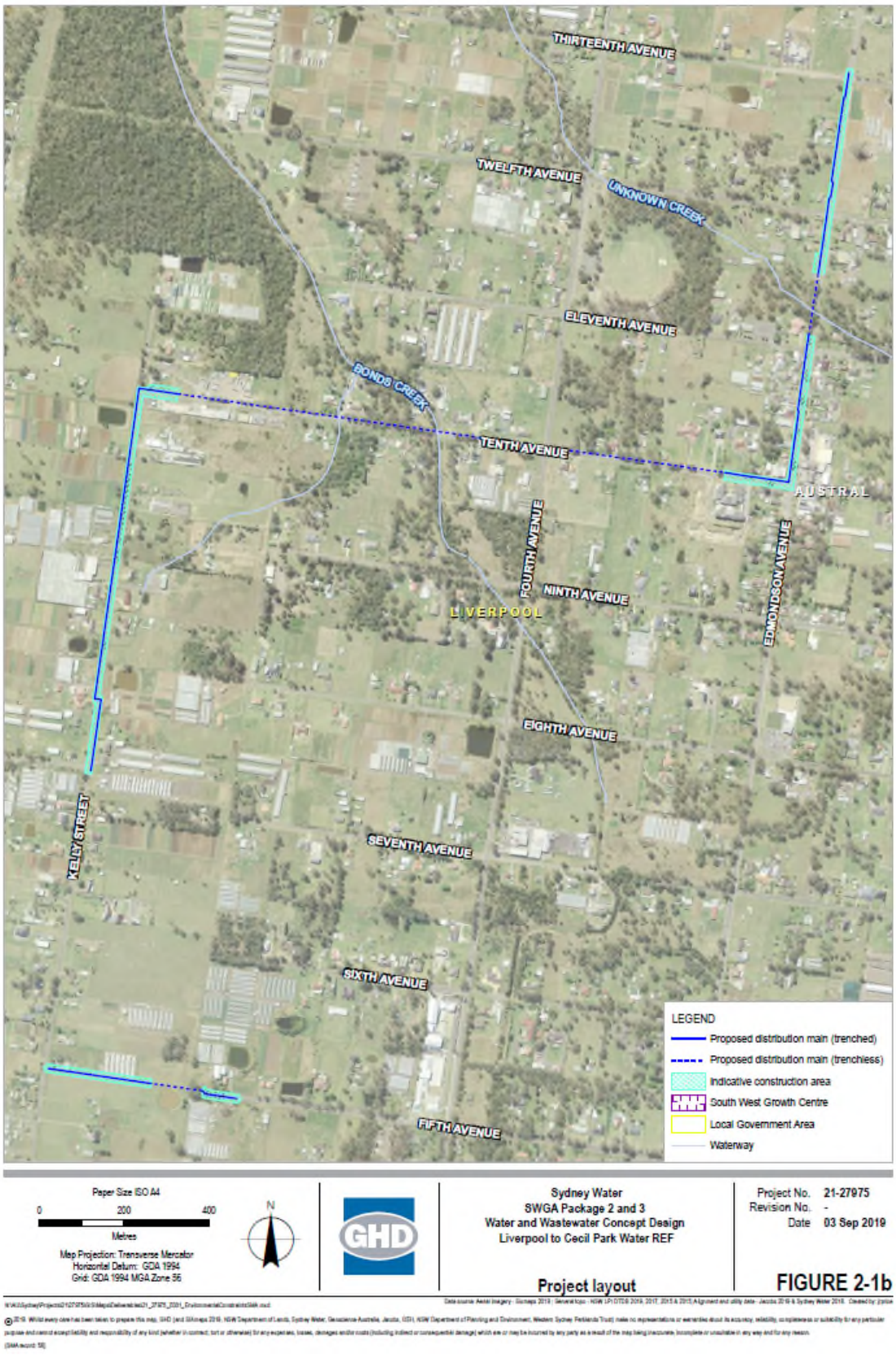


Figure 2-1 Project layout

2.2 Field assessment area and changes to the scope of work

The field assessment area (study area) was defined as a 20m direct impact corridor along pipeline alignments and the footprint of all fixed assets (pumping station). The direct impact area is shown in Figure 2-1 is:

The project design shown in this REF is indicative and based on the latest design at the time of REF preparation. The final design may change based on further design or construction planning. If the design or construction methods described in this REF change significantly, supplementary environmental impact assessment must be prepared for the amended components in accordance with SWEMS0019. An addendum is not required provided the changed design:

- remains within the study area of the REF and has no net additional environmental impact; or
- is outside the study area of the REF but reduces the overall environmental impact of the project (s.5.4(a) of the Act).

Changes to the project outside the study area can only occur:

- to reduce impacts to biodiversity, heritage or human amenity; or
- to avoid engineering (for example, geological, topographical) constraints; and
- after consultation with any potentially affected landowners and relevant agencies.

The Delivery Contractor will demonstrate in writing how the changes meet these requirements and Sydney Water's Project Manager will review the request, in consultation with the environmental and communication representatives.

3 Consultation

3.1 Community and stakeholder consultation

Our approach to community and stakeholder consultation is guided by the Sydney Water Community and Stakeholder Engagement Policy.

Stakeholder and community engagement is a planned process of initiating and maintaining relationships with external parties who have an interest in our activities. Community and stakeholder engagement:

- enables us to explain strategy, policy, projects, projects or programs
- gives the community and stakeholders the opportunity to share their knowledge, issues and concerns
- enables us to understand community and stakeholder views in our decision-making processes alongside safety, environment, economic, technical and operational factors.

If our work will impact the community in some way, we will consult with affected groups through a variety of ways and through different stages of a project. This includes engaging the broader community and stakeholders during plan or strategy development or before making key decisions.

We will also provide local councils with reasonable notice when we would like to commence works, regardless of the need for development consent. Local council will be consulted about: public safety issues, the placement of any temporary site sheds or laydown areas on council land, or full or partial road closures of council managed roadways.

Sydney Water has consulted with a range of stakeholders to date concerning the project, including:

- Liverpool City Council — mainly concerning reserves, roads and stormwater services.
- Road and Maritime Services and NorthWestern Roads — mainly concerning potential impacts to major roads, i.e. Cowpasture Road and M7 Motorway, and coordination with regard to planned road upgrade projects, i.e. M12 and Elizabeth Drive.
- Western Sydney Parklands — mainly concerning works in the parklands and the avoidance of the identified land subject to a biodiversity stewardship agreement.
- WaterNSW — mainly concerning works within the curtilage of the Upper Canal.
- TransGrid — mainly concerning works in the vicinity of transmission easements.
- Endeavour Energy — mainly concerning interaction with works in the South West Growth Area including along Elizabeth Drive, Cecil Hills and Fifteenth Avenue, Austral.
- NSW Ambulance — mainly concerning the existing ambulance access outside the gate to the site of Liverpool Reservoir and shared driveway access to Cowpasture Road.

3.2 Consultation required under State Environmental Planning Policies and other legislation

Sydney Water must consult with councils and other authorities for work in sensitive locations, (eg. Part 2 Division 1 of the *State Environmental Planning Policy (SEPP) Infrastructure 2007*).

Consultation was required under clauses 13(1)(e), 13(1)(f), as the project involves enclosing of a public place and excavation of a road. Liverpool City Council was consulted on 8 February 2019 and 17 October 2019 and feedback was considered in the design of the project.

Consultation with the Department of Planning, Industry and Environment is required for clearing of native vegetation within non-certified land under *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*. The project will involve clearing of vegetation on land that is not subject land to the biodiversity certification. As such, the Department of Planning, Industry and Environment must be consulted in accordance with *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*.

4 Legislative requirements

The following environmental planning instruments (Table 4-1) and legislation (Table 4-2) are relevant to the project. Table 4-2 also documents any licences and permits, timing and responsibility for obtaining them.

Table 4-1 Consideration of environmental planning instruments relevant to the project

Environmental Planning Instrument	Relevance to project
State Environmental Planning Policy (Infrastructure) 2007. ISEPP	Clause 125(1) of *State Environmental Planning Policy (Infrastructure) 2007* states development for the purpose of water reticulation systems, which includes water supply reservoirs may be carried out by or on behalf of a public authority without consent on any land. As Sydney Water is a public authority and the project meets the definition of water reticulation systems the proposal is permitted without consent.
Liverpool Local Environmental Plan 2008	The project is situated on land zoned: • SP2 Infrastructure • RE1 Public Recreation • R2 Low density residential • R3 Medium density residential. Land in Western Sydney Parklands is not zoned under this LEP.
State Environmental Planning Policy (Sydney Region Growth Centres) 2006	The Growth Centres SEPP coordinates the release of land for residential, employment and other urban development in the North West Growth Centre, South West Growth Area and the Wilton Priority Growth Area. The proposal is partly located within the South West Growth Centre (SWGC), both on 'certified' and 'non-certified land' according to the order to confer biodiversity certification on the *State Environmental Planning Policy Sydney Region Growth Centres 2006*. Therefore, the benefits of biodiversity certification do not apply to the sites identified as 'non-certified'. Accordingly, an ecological assessment of the proposed works to assess the potential impact to native vegetation, threatened species, populations or ecological communities on land identified as non-certified is required. Clause 18A(2) requires a public authority to consult with the Department of Planning, Infrastructure and Environment if it proposed to clear non-certified vegetation.

State Environmental Planning Policy No 55—Remediation of Land	This SEPP provides a consistent State-wide planning approach to the remediation of contaminated land. As discussed in section 5.2.1 the project will not be situated on land that is known to be contaminated.
State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017	The policy applies to land in local government areas listed in Clause 5.1, including the local government area of Liverpool City Council. It sets requirements for council permits and approval from a native vegetation panel for clearing of native vegetation in non-rural areas. However, Clause 6(1) of the policy states it does not affect the provisions of any other SEPP. As the project is permitted without consent under the ISEPP 2007, a permit or approval under this SEPP is not required.
State Environmental Planning Policy (Western Sydney Parklands) 2009	Clause 6(2) of the SEPP states that Part 3 of the Infrastructure SEPP, including Clause 125, applies as if the parklands were in a prescribed zone under that policy. Therefore, works in the parklands are permitted without consent. Schedule 1 of the SEPP identified heritage items in the parklands. The proposal will not impact heritage items in the parklands.

Table 4-2 Consideration of key environmental legislation

Legislation	Relevance to project	Permit or approval	Timing and responsibility
Environmental Planning and Assessment Act 1979	Sydney Water is the proponent and determining authority under this Act. The project does not require development consent and is not classified as State Significant Infrastructure. We have assessed this project under Division 5.1 of the EP&A Act. This REF has concluded that the project is unlikely to have a significant impact on the environment.	REF	Pre-construction, Sydney Water

Protection of the Environment Operations Act 1997	The *Protection of the Environment Operations Act 1997* aims to, among other things, protect, restore and enhance the quality of the environment in NSW. It includes offences for polluting the environment and establishes a regime of environment protection licences. The project is not be a scheduled activity and will not require an environment protection licence. There is a requirement under Part 5.7 of the PoEO Act to immediately report any pollution incidents to the relevant authority where material harm to the environment is caused or threatened. The definition of material harm and the relevant authorities are identified in Part 5.7 of the PoEO Act. The Contractor is responsible for immediately reporting such incidents in accordance with SWEMS0009 Responding to incidents with an environmental impact.	—	—
Biodiversity Conservation Act 2016	Protection of listed species and ecological communities in NSW falls under the *Biodiversity Conservation Act 2016* (BC Act). Threatened species and communities are listed in the Schedules of the Act. Assessment of impact to threatened species and communities in certified land within the SWGC is not required. The impact of the proposal on threatened species, communities and their habitats in non-certified land and land not in the SWGC is described in Section 5.2.3. Significant impacts to threatened species or communities are unlikely. Part 5 of the *Biodiversity Conservation Act 2016* establishes a regime of private land conservation agreements including for the establishment of biodiversity stewardship sites. These sites are set aside for the preservation of biodiversity values. The project is near a biodiversity stewardship site but will not have a direct impact on the biodiversity values at the site.	—	—
National Parks and Wildlife Act 1974	Under Section 86 of this Act, it is an offence to harm or desecrate an Aboriginal place or object unless authorised by an Aboriginal heritage impact permit (AHIP), or where it is	AHIP	Post REF, pre-construction, Sydney Water

	reasonably determined that no Aboriginal object will be harmed. The proposal will impact Aboriginal sites and an AHIP under Section 90 of the Act will be sought.		
Heritage Act 1977	*The Heritage Act 1977* aims to promote conservation of heritage items in NSW. Part 3A establishes a State heritage register for the listing of heritage items including places, buildings, works, relics, moveable objects, precincts or land. Section 57(1) states that a person must not, amongst other things, carry out any development in relation to the land where an item that is listed on the State heritage register is situated. A permit under section 60 of the *Heritage Act 1977* is required for works that may impact a site listed on the State heritage register, except for works that comply with an exemption under section 57(2). Potential impacts of the project on non-Aboriginal heritage are assessed in section 5.2.5. The project will be within the curtilage of the Upper Canal System (Pheasants Nest Weir to Prospect Reservoir) listed on the State heritage register. A statement of heritage impact has been provided in Appendix E, which has found the project will have negligible impact on the heritage value of the item.	Section 57(2) exemption	Pre-construction, Sydney Water
Fisheries Management Act 1994	For a public authority to undertake works in Key Fish Habitat, we are required to give the Minister notification of the works and consider any matters raised within 21 days of giving the notice. A permit under Part 7 of the Act is required for obstructing fish passage in key fish habitat. A permit may be required if trenching through creeks is the preferred construction method.	Notification and/or permit potentially required	Pre-construction, Sydney Water

Water Management Act 2000	Section 60A of the Water Management Act states that it is an offense to take water without a licence. A Water Access Licence (WAL) is required under section 61 where groundwater extraction will be greater than 3 ML. A water supply work (WSW) approval is required under Section 90(2) of the Act to construct or use a water supply work. The project would involve relatively shallow excavation and is not expected to interfere with an aquifer in more than a minimal impact activity under the NSW *Aquifer Interference Policy*.	—	—
Roads Act 1993	Section 138 of the *Roads Act 1993* states a person must not carry out work in, on or over a public road without consultation and consent of the appropriate roads authority. Potential impacts of the project on traffic and access, including road works, are assessed in section 5.2.8. The project will involve work in, on or over a public road.	Road Occupancy Licence	Pre-construction, Contractor
Environment Protection and Biodiversity Conservation Act 1999	The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the principal environmental law administered by the Commonwealth. It provides for the protection of matters of national environmental significance. Under the EPBC Act, an action that is likely to have a significant impact on a matter of national environmental significance must be referred to the Commonwealth Minister for the Environment and Energy. The project is not likely to have a significant impact on a matter of national environmental significance and accordingly it is not required to be referred.	—	—

5 Environmental assessment

The potential environmental aspects and impacts associated with construction and operation of the project are identified in section 5 as well as safeguards to minimise these. These safeguards will be incorporated into contract documents and a Construction Environmental Management Plan (or similar) to be developed by the Contractor prior to commencement of work.

A risk assessment will be undertaken by the Project Manager following Sydney Water's Corporate Risk Framework (QMAF0081).

5.1 Existing environment

The project is situated within the suburbs of Cecil Hills, Cecil Park and Austral within the local government area of Liverpool City Council. The surrounding land use is predominantly residential with medium to high density residential development in Cecil Hills and Cecil Park and lower density rural residential development in Austral. The surrounding land use also includes Western Sydney Parklands, which is characterised by open space, bushland and walking and cycling tracks. The Westlink M7 motorway runs north-south through the parklands in the vicinity of the project.

Environmentally sensitive areas in the surrounding area include waterways, water bodies and bushland areas. The main waterways in the region include Hinchinbrook Creek in Cecil Hills and Cecil Park and Kemps Creek in Austral. The project will cross a number of smaller waterways including Bonds Creek and two unnamed tributaries of Kemps Creek in Austral. Waterbodies in the surrounding area are limited to Doujon Lake in Cecil Hills and small farm dams in Austral.

Heritage items recorded in the surrounding area include the Sydney Water Supply Upper Canal / Upper Canal System, Cecil Hills Farm Group and Austral Town Centre Conservation Area. A number of Aboriginal heritage items have also been recorded.

Native vegetation in the surrounding area is mainly confined to Western Sydney Parklands and other reserves further away from the project including Kemps Creek Nature Reserve. Stands of mature vegetation are also present in the vicinity of the project in Austral and particularly in the vicinity of waterways. A number of street trees are also in the vicinity of the project in Cecil Hills.

The existing environment in the vicinity of the project is described further throughout section 5.2.

5.2 Environmental aspects, impacts and safeguards

5.2.1 Topography, geology and soils

Existing environment

The topography of the study area is generally flat to undulating with some steeper slopes toward Western Sydney Parklands. Elevation ranges between about 50 metres above sea level near Liverpool Reservoir to about 100 metres above sea level near Cecil Park Reservoir.

The geology is characterized by Bringelly Shale of the Wianammatta Group of sedimentary rocks in the Sydney Basin. The soil types are mapped as kurosols with some limited hydrosols in the areas surrounding waterways.

The study area is not mapped as containing acid sulfate soils (NSW Government 2019a).

The map of salinity potential in Western Sydney indicated the study area has moderate salinity potential with areas of high salinity potential associated with waterways.

A search of the NSW Environment Authority public register of licences and notices in the suburbs of Cecil Hills, Cecil Park and Austral did not return any areas of known contamination within the vicinity of the project.

Historic and current land uses such as farming and storage yards as well as uncontrolled dumping and filling has occurred in the study area and presents a risk of encountering contamination, particularly in Austral.

Potential impacts

The main potential impacts of the project on topography, geology and soils during construction is erosion and sedimentation. Construction of the project will involve trenching and excavation as well as temporary stockpiling of excavated material in construction areas. In the event of rainfall, this material will have potential to erode and lead to sedimentation of land and waterways.

The stockpiles will be situated outside of flood prone areas and as far as practicable will be situated on level surfaces. The stockpiles will be established for a relatively short duration before being used in backfilling and restoration. As such, the potential for significant erosion and sedimentation to occur will be limited.

As the study area is not mapped as containing acid sulfate soils interaction with acid sulfate soils is not considered likely.

While the study area is not near any known contamination, there is potential for previously unidentified contamination to be present.

As the study area is mapped as having moderate to high salinity potential, there is the potential that over time the materials used to construct the project will be affected through salt corrosion. While primarily being an operational issue, the potential effects of salinity may increase the need for ongoing maintenance with associated potential environmental impacts. As such, the project will incorporate suitably resistant materials to limit this impact.

The construction of the project will temporarily change the surface topography, and associated drainage patterns, during trenching or other excavation. The excavations will be progressively backfilled and restored a condition similar to prior to the disturbance. As such, the potential impacts of the project on topography following construction will be negligible.

Aside from the requirement for routine or emergency maintenance, which is expected to be relatively infrequent, the operation of the project will not affect topography, geology or soils.

Overall, the project will have potential limited impacts on topography, geology and soils, mainly where construction will involve open trenching. Environmental safeguards for topography, geology and soils are provided in Table 5-1. With the proposed environmental safeguards, the project can be constructed and operated at a low level of environmental risk.

Table 5-1 Environmental safeguards — Topography, geology and soils

Safeguards
Prepare a soil and water management plan, including an erosion and sediment control plan prior to the start of construction. The plan must identify stockpile locations at reservoir and pumping station sites and identify management measures to minimise erosion and sedimentation, and dust generation.
Contamination management measures must be included in the soil and water management plan: • Method for assessing the handling and disposal of illegally dumped waste • No asbestos containing materials, soil mixed with wastes or wastes should be used for trench backfill or surface compaction If unexpected contamination is identified during construction, the works would cease, access would be restricted, and the nature and extent of the contamination determined. Contaminated excavated material would be classified in accordance with the Waste Classification Guidelines before any off-site disposal at a suitably licensed waste facility.
Prevent sediment moving offsite in accordance with Managing Urban Stormwater, Soils and Construction, Volume 1 and 2A (Landcom 2004 and DECC 2008), including: • divert surface runoff away from disturbed soil and stockpiles • install sediment and erosion controls before construction starts • reuse topsoil where possible and stockpile separately • inspect controls at least weekly and immediately after rainfall • rectify damaged controls immediately • remove controls once surfaces have been stabilised, including removing trapped sediment in drainage lines
Minimise ground disturbance and stabilise disturbed areas progressively
Delivery Contractor to ensure imported material is certified for intended use.
Stop work in the immediate vicinity of suspected contamination. Indicators of contamination include discoloured soil, strong chemical or petrol odours and leachate. Contain disturbed material on an impermeable surface and cordon areas off. Notify the Sydney Water Project Manager and the Environmental Representative. Contact Property Environmental Services for advice on management options.
Stop work during heavy rainfall or in waterlogged conditions when there is a risk of sediment loss off site.
Sweep up any sediment/soil transferred off site at least daily, or before rainfall.
Eliminate ponding and erosion by restoring natural landforms to the pre-works condition.
Adopt appropriate soil salinity mitigation measures in accordance with Western Sydney Salinity Code of Practice (Western Sydney Regional Organisation of Councils, 2003). This may include: • (if relevant) treat existing salinity with gypsum

- (if relevant) establish salt tolerant species in existing or potential salinity problem areas after construction
- stabilise existing areas of erosion
- minimise water use on site
- avoid rotation and vertical displacement of the original soil profile
- backfill excavations deeper than one metre in the same order, or treat or use this material as fill at depths more than one metre from the finished level.

5.2.2 Water and drainage

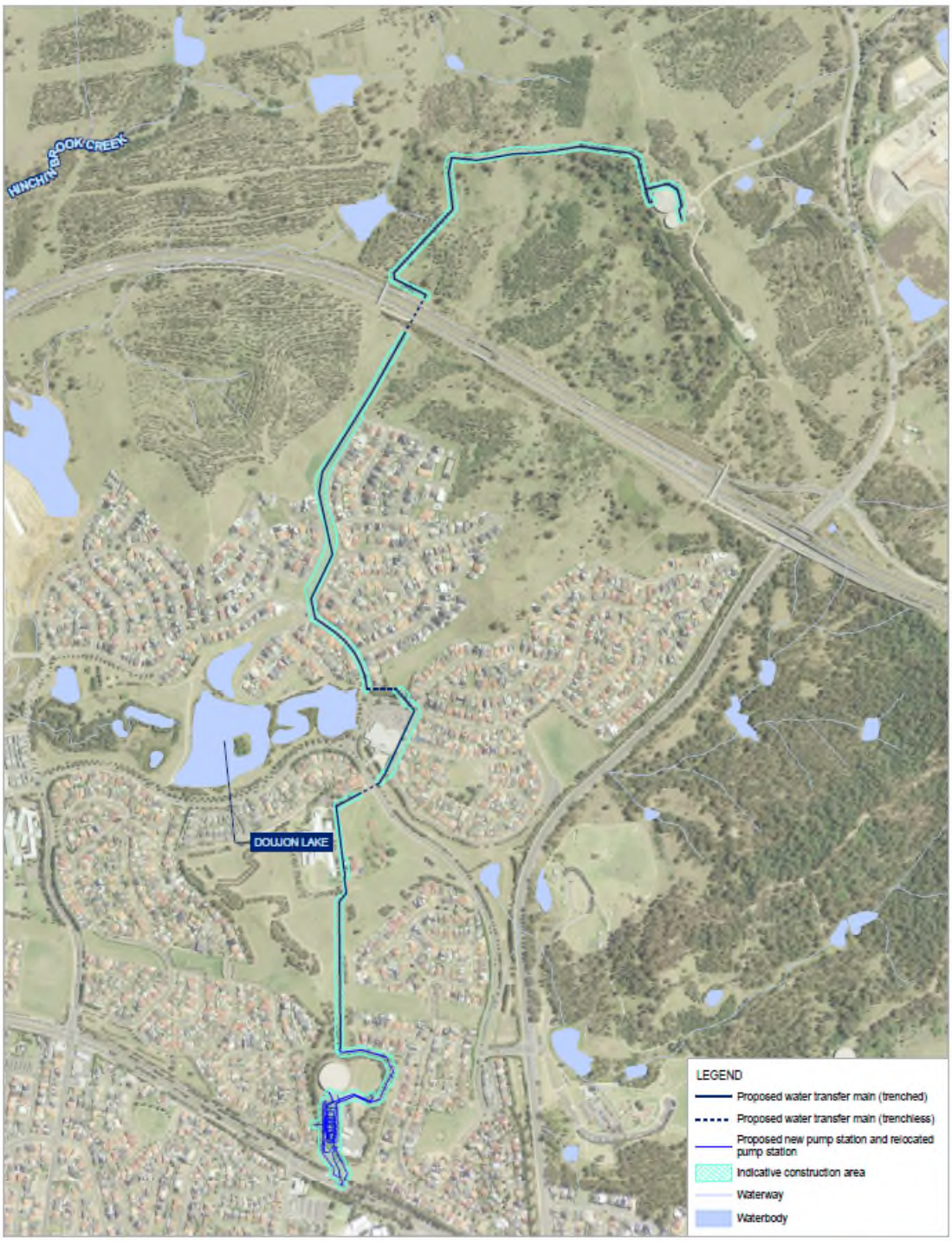
Existing environment

The project will cross Bonds Creek and three smaller unnamed tributaries of Kemps Creek in Austral. The waterbodies in the area are limited to a number of small artificial dams in Austral and Doujon Lake in Cecil Hills.

The study area also contains flood planning areas associated with Bonds Creek and the unnamed tributaries of Kemps Creek in Austral (NSW Government 2019b) and is therefore expected to be flood affected during the one in 100 year average recurrence interval (ARI) event and potentially smaller events.

There is potential for groundwater to be encountered, particularly in the vicinity of identified waterways. A search of the Bureau of Meteorology Australian Groundwater Explorer returned several groundwater bores. However, water levels in the bores were not recorded.

Identified water bodies and drainage in and around the study area are shown in Figure 5-1.



Paper Size ISO A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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GHD

Sydney Water
SWGA Package 2 and 3
Water and Wastewater Concept Design
Liverpool to Cecil Park Water

Water and drainage

Project No. 21-27975
Revision No. -
Date 03 Sep 2019

FIGURE 5-1a

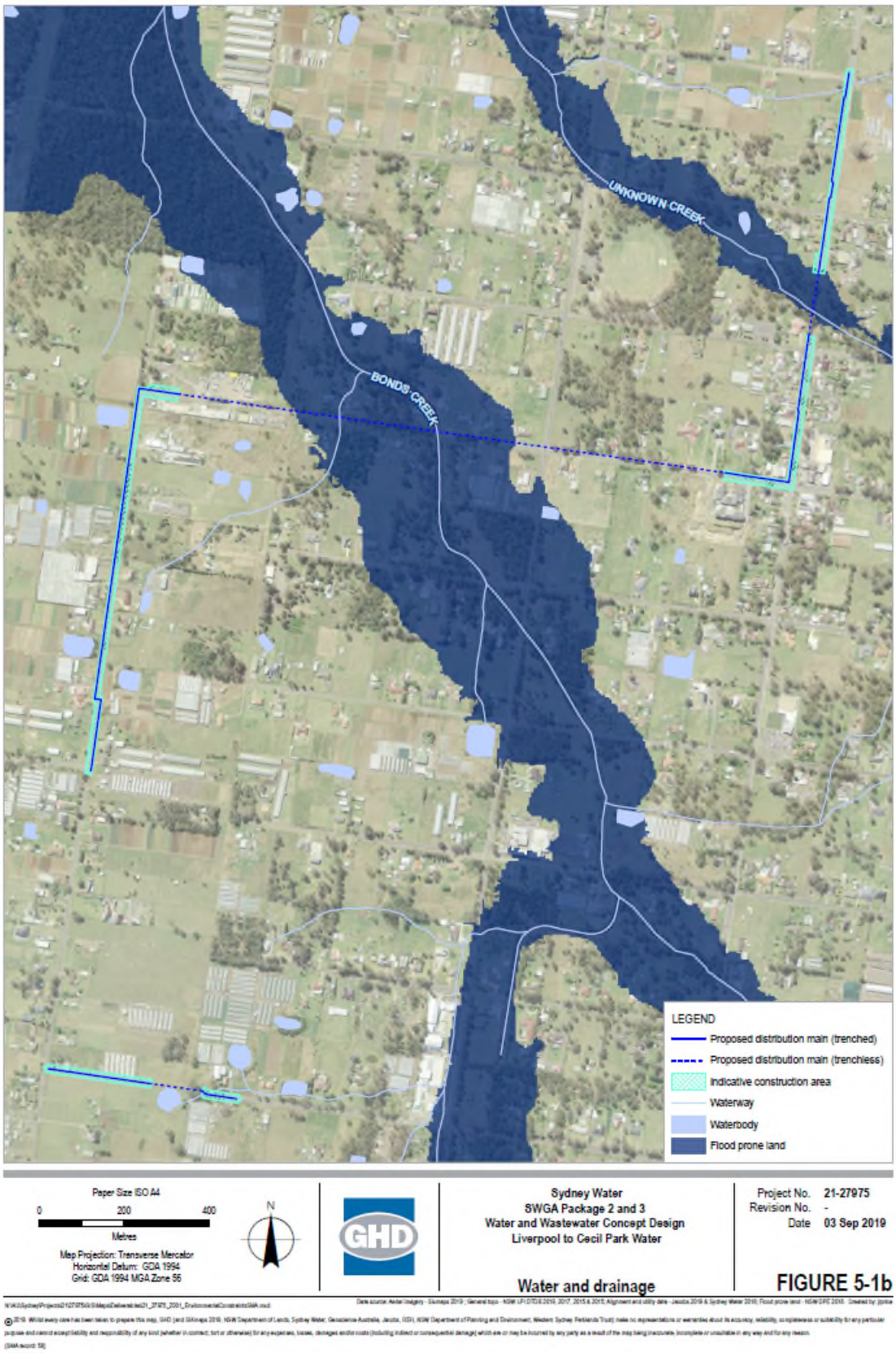


Figure 5-1 Water and drainage

Potential impacts

The main potential impacts of the project on water and drainage during construction will be direct impacts on waterways such as excavation or accidental spills and leaks. Potential erosion and sedimentation impacts during construction are discussed separately in section 5.2.1.

The distribution mains will be installed in the vicinity of Bonds Creek and two unnamed tributaries of Kemps Creek in Austral. Bonds Creek and an unnamed tributary are situated along Tenth Avenue while the other tributary is situated along Edmondson Avenue. Construction in the vicinity of these waterways will be carried out using trenchless methods. Pits will be established at either side of the trenchless section of the water main, outside the associated flood planning areas for these tributaries and at the crossing point the alignment will be in order of three to five metres below ground level. Therefore, direct impacts to these waterways are unlikely.

The construction of the project will temporarily change the surface topography, and associated drainage patterns, during trenching or other excavation. The excavations will be progressively backfilled and restored to a condition similar to prior disturbance. As such, the potential impacts of the project on topography following construction will be negligible.

Construction will involve the use of equipment and machinery that contain fuels and other chemicals which, in the event of an accidental spill or leak, will have the potential to pollute water. In general, relatively small quantities of fuels and other chemicals will be stored at the site and no bulk storage is proposed. Safeguards to avoid, mitigate and manage impacts are listed below.

Earthworks for the project including the water pump station, trenching and trenchless construction will be relatively shallow and unlikely to encounter significant volumes of groundwater, if any. Due to the limited volumes of groundwater expected to be encountered it is not expected that active dewatering will be required. In the event any dewatering is required it will not be expected to be at a volume (>3ML) that will require water access licence.

Aside from the requirement for routine or emergency maintenance, which is expected to be relatively infrequent, the operation of the project will not affect water and drainage.

Overall, the project will have the potential to have limited impacts on water and drainage, mainly due to the implementation of trenchless methods at waterways. Environmental safeguards for water and drainage are provided in Table 5-2. With the proposed environmental safeguards the project could be constructed and operated at a low level of environmental risk.

Table 5-2 Safeguards — Water and drainage

Safeguards
Minimise the impacts to creeks where creek crossings are required. Prior to construction the methodology will be assessed on the following information sources): • geotechnical and constructability issues (eg depth of cover, potential for future scouring) • size of construction footprint • construction duration • ease of reinstatement • environmental issues (flora/fauna, geomorphology, contamination, water quality and hydrology) The decision and reasons for the decision would be documented by the Contractor in consultation with the Sydney Water Environmental Representative.
Use appropriate controls to avoid potential sedimentation to waterbodies (eg floatation boom).
Minimise groundwater ingress during detailed design. Prepare Dewatering Management Plan as part of the CEMP for groundwater dewatering, (eg. including measures for protecting water quality; monitoring extraction volumes).
Bund potential contaminants and store on robust waterproof membrane, away from drainage lines
Keep functioning spill kit on site for clean-up of accidental chemical/fuel spills. Keep the spill kits stocked and located for easy access.
Locate portable site amenities away from watercourses or drainage lines.
Store all chemicals and fuels in accordance with relevant Australian Standards and Safety Data Sheets. Record stored chemicals on site register. Bunded areas to have 110% capacity of stored liquid volume. Chemicals and fuels in vehicles must be tightly secured.
Conduct refuelling, fuel decanting and vehicle maintenance in compounds where possible. If field refuelling is necessary, designate an area away from waterways and drainage lines with functioning spill kits close by.
Conduct any equipment wash down within a designated washout area.
Ensure equipment is leak free. Repair oil/fuel leaks immediately or remove from site and replace with a leak-free item.
Prepare Drilling Management plan to avoid impacts, including: • contain and monitor drilling fluids at entry/exit points • identify and manage frac-outs • re-use and/or disposal of drilling fluids (checking waste classification).
Discharge all water in accordance with Sydney Water's Discharge Protocols Standard Operating Procedure (WPIMS5021), including erosion controls, discharge rate, de-chlorination, monitoring. Re-use potable water/ groundwater where possible.
Dewater excavations in accordance with the Delivery Management Guidance Standard 9.1 Excavation Dewatering.

5.2.3 Flora and fauna

A specialist assessment for flora and fauna has been undertaken and is summarised here. The flora and fauna assessment included a desktop review including database searches for flora and fauna previously recorded, a flora and fauna survey, likelihood of occurrence assessment for the identified flora and fauna, and assessment of significance for those species that were found to be likely to occur. The complete specialist flora and fauna assessment is provided as Appendix C.

Existing environment

Given the nature of the surrounding land use, much of the study area has been previously cleared of previously residential development, roads and other infrastructure. The flora and fauna values at the study area are largely contained to Western Sydney Parklands.

A flora and fauna survey of the study area (20 metre pipeline corridors and pump station footprint) was carried out. The survey characterised the existing vegetation in the study area into a number of vegetation zones. The area of these vegetation zones at the project site along with their conservation status under the *Biodiversity Conservation Act 2016* (BC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is summarised in Table 5-3.

It is noted that the instances of Grey Box – Forest Red Gum grassy woodland comprised the Cumberland Plain Woodland threatened ecological community under the BC Act and EPBC Act.

Identified flora and fauna values in and around the study area as well as areas where targeted surveys were conducted are shown below in Figure 5-2.

Table 5-3 Vegetation zones

Vegetation zone	Condition	BC Act	EPBC Act	Area
Exotic grassland	—	—	—	1.68 ha
Planted native species	—	—	—	1.64 ha
Planted lawn	—	—	—	3.00 ha
Grey Box – Forest Red Gum grassy woodland on shale	Moderate/good	Critically endangered	Critically endangered	1.36 ha
	Poor	Critically endangered	—	0.14 ha
Grey Box – Forest Red Gum grassy woodland on flats	Poor	Critically endangered	—	0.08 ha

A total of 67 flora species were recorded during the survey, comprising 34 native and 33 exotic species. The native tree species that were identified include Grey Box (*Eucalyptus moluccana*) and

Forest Red Gum (*Eucalyptus tereticornis*) with various other native mid story and groundcover species. No threatened flora species were recorded during the survey however the following were considered to have potential to occur based on the presence of suitable habitat:

- *Marsdenia viridiflora* subsp. *viridiflora* — threatened population under the BC Act
- *Persoonia nutans* — endangered species under the BC Act and EPBC Act
- *Pimelea spicata* — endangered species under the BC Act and EPBC Act.

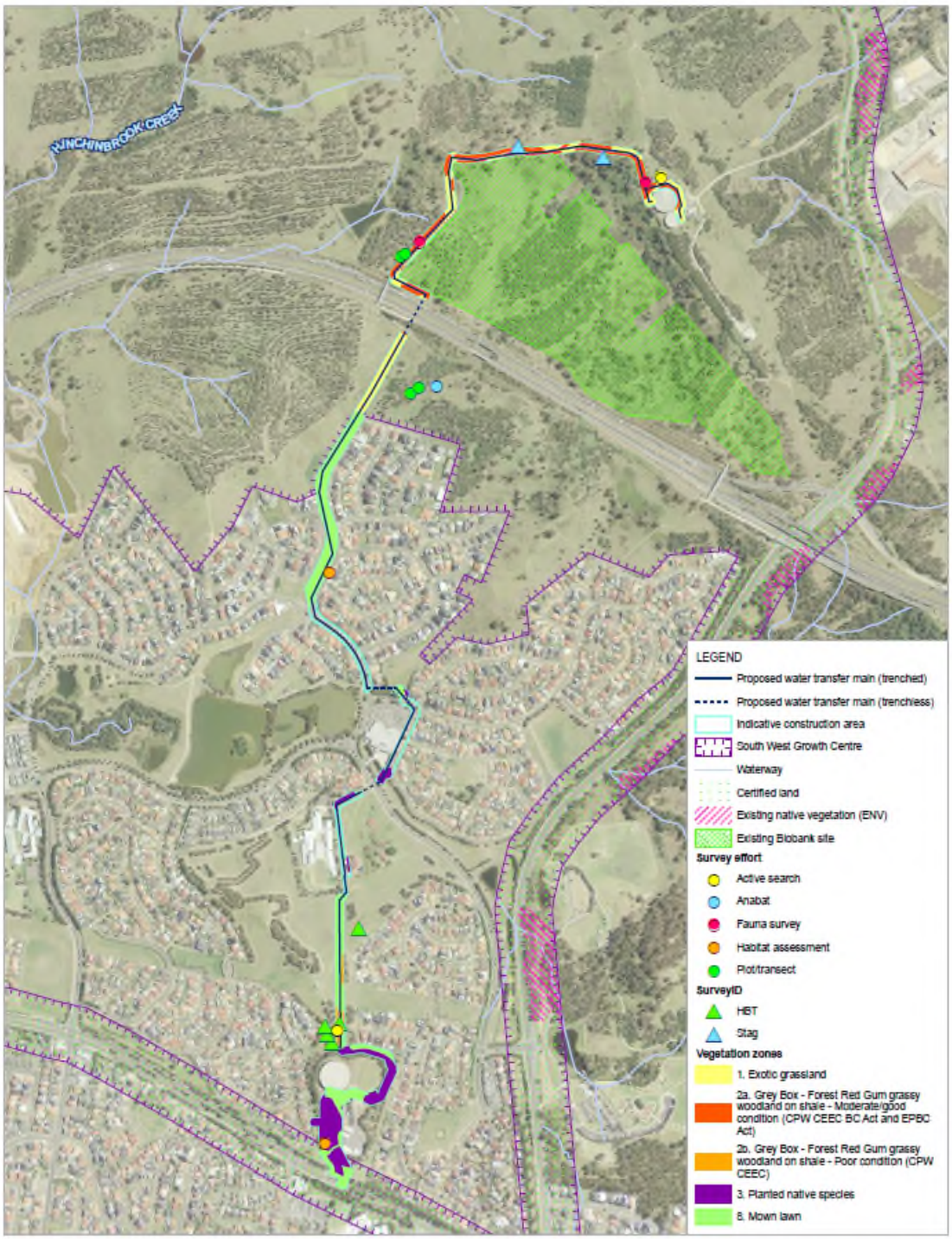
Despite the presence of suitable habitat, due to the absence of records of the above species over the last 20 years, including well-surveyed areas of Western Sydney Parklands, it was considered unlikely that the species would occur within the study area and they were not assessed further.

Identified exotic flora species included a number of weeds such as African olive (*Olea europaea subsp. Cuspidate*), bridal creeper (*Asparagus asparagoides*), prickly pear (*Opuntia stricta*), lantana (*Lantana camara*), African boxthorn (*Lycium ferocissimum*), blackberry (*Rubus fruticosus*) and fireweed (*Senecio madagascariensis*).

No threatened fauna species were recorded during the survey. A desktop review indicated that 49 fauna species had been recorded previously in the locality including 21 threatened fauna species. A likelihood of occurrence assessment of the threatened fauna species found those more likely to occur included Cumberland plain land snail (*Meridolum corneovirens*) listed as endangered under the BC Act, and hollow-roosting microbats Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Eastern Coastal Freetail-bat (*Micronomus norfolkensis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Little Bentwing-bat (*Miniopterus australis*), Southern Myotis (*Myotis macropus*) and Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) listed as vulnerable under the BC Act.

The aquatic habitat values at the study area were limited given the small number of minor waterways that will be crossed. Bonds Creek at the in the study area classifies as key fish habitat. Fish species were not observed at Bonds Creek however noxious fish species such as carp (*Cyprinus carpio*) and Mosquitofish (*Gambusia holbrooki*) were likely to occur. The two smaller unnamed tributaries of Kemps Creek in Austral do not classify as key fish habitat.

Further detail on flora and fauna species and habitat is provided in the flora and fauna assessment in Appendix C.


WINCHINBROOK CREEK
LEGEND
Proposed water transfer main (trenched)
Proposed water transfer main (trenchless)
Indicative construction area
South West Growth Centre
Waterway
Certified land
Existing native vegetation (ENV)
Existing Biobank site
Survey effort
Active search
Anabat
Fauna survey
Habitat assessment
Plot/transect
SurveyID
HBT
Stag
Vegetation zones
1. Exotic grassland
2a. Grey Box - Forest Red Gum grassy woodland on shale - Moderate/good condition (CPW CEEC BC Act and EPBC Act)
2b. Grey Box - Forest Red Gum grassy woodland on shale - Poor condition (CPW CEEC)
3. Planted native species
8. Mown lawn
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Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56
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Sydney Water
SWGA Package 2 and 3
Water and Wastewater Concept Design
Liverpool to Cecil Park Water
Flora and Fauna
Project No. 21-27975
Revision No. -
Date 03 Sep 2019
FIGURE 5-2a

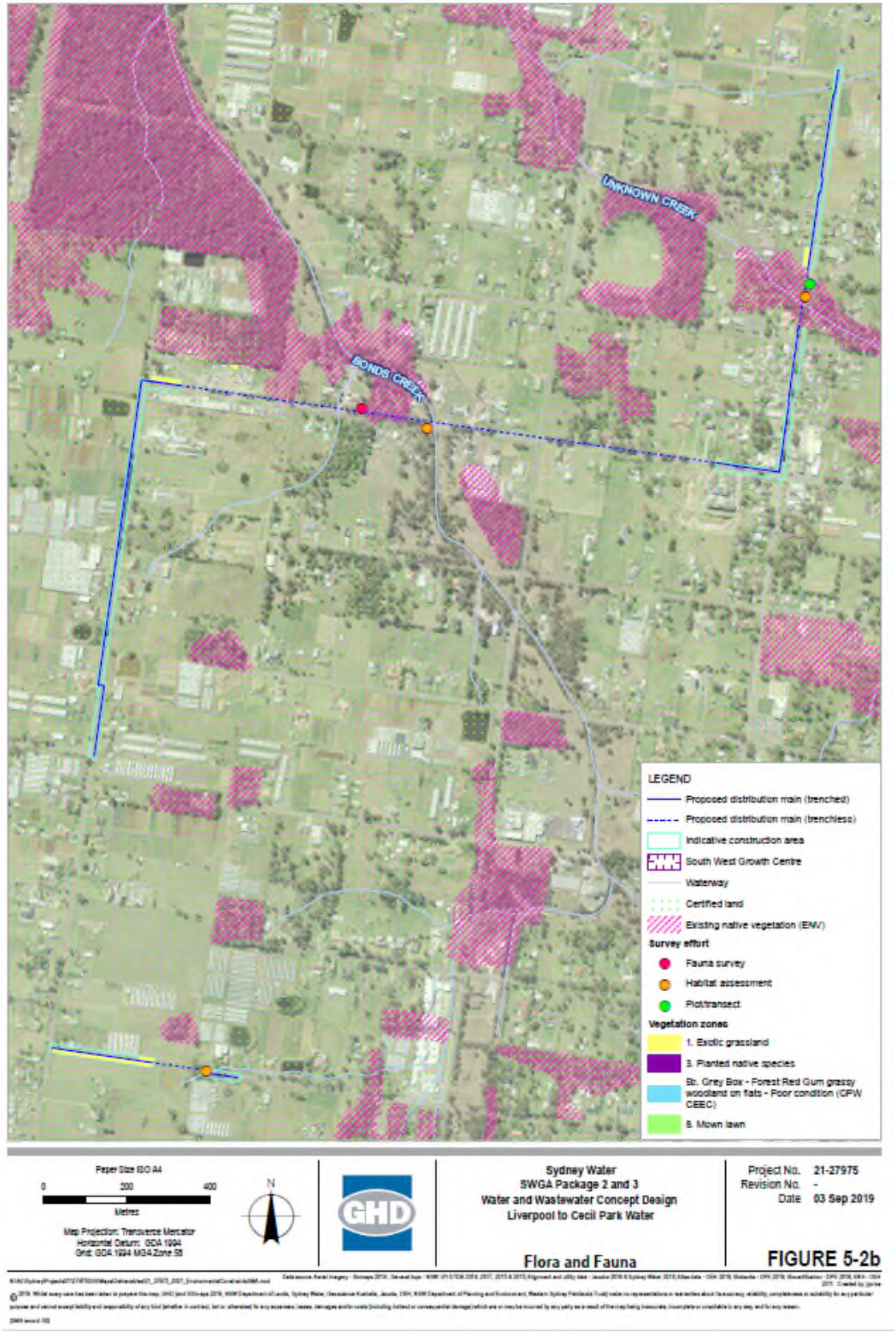


Figure 5-2 Flora and fauna

Potential impacts

The potential impacts of the project on flora and fauna will primarily be due to clearing of vegetation and associated potential habitat for threatened flora and fauna species.

As summarised in Table 5-3, the project will involve clearing up to 1.58 hectares of native vegetation. About 1.50 hectares of this vegetation will be on non-certified land within Western Sydney Parklands. The clearing is not classified as “existing native vegetation” as defined under *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* and accordingly biodiversity offsets are not required.

As the alignment of the project generally follows existing roads, tracks or other cleared areas, the vegetation that will be cleared will constitute edges of patches, meaning the clearing will be unlikely to further fragment the patches or introduce significant additional edge effects.

The clearing will also represent the removal of potential habitat for identified threatened fauna species including Cumberland plain land snail and potential foraging habitat for microbats.

Assessments of significance were carried out for threatened species and ecological communities that were considered likely to occur and be affected by the project. Accordingly, assessments of significance were carried out for Cumberland Plain Woodland, Cumberland Plain land snail and hollow-roosting microbats as discussed in section 5.2.3. The assessments of significance found the project will not be likely to constitute a significant impact on the threatened species and ecological communities. The full assessments of significance are documented in Appendix C.

Potential impacts to vegetation and aquatic habitat at Bonds Creek and the two smaller unnamed tributaries will be entirely avoided through the proposed use of trenchless methods.

Overall, the project was found not be likely to have a significant impact on flora and fauna. Environmental safeguards for flora and fauna are provided in Table 5-4.

Table 5-4 Safeguards — Flora fauna

Safeguards
Minimise vegetation clearance and disturbance, including impacts to standing dead trees and riparian zones. Where possible, limit clearing to trimming rather than removing whole plants and adjust methodology (eg avoid area, hand excavate, implement exclusion fencing) to protect sensitive areas where possible.
Vegetation clearing must not occur until the following are complete: • the area to be removed has been physically delineated by fencing, • the Contractor's Environmental Representative has confirmed consistency with approval documentation • pre-clearing surveys, if relevant and • written authorisation to commence clearing from Sydney Water Project Manager.
An arborist should be engaged to supervise trenching in the vicinity of large trees, to advice on the ability to retain trees with protective measures. Protect trees in accordance with the requirements of Australian Standard 4970-2009 for the Protection of

Trees on Development Sites. For example, do not damage tree roots unless absolutely necessary, and where roots >50 mm are impacted within the Tree Protection Zone, engage a qualified arborist to maintain structural integrity and tree health.

If more than 10% of the Tree Protection Zone is to be affected, a suitably qualified and experienced arborist will be required to advise on the ability for the tree to be retained and survive.

Residual impacts to native vegetation and trees will be offset in accordance with the Biodiversity Offset Guideline (SWEMS0019.13). Sydney Water will identify a suitable offset area for residual offsets.

Pre-clearance surveys will be carried out by a suitably qualified ecologist:

- check hollows-bearing trees to be removed for fauna species. An inspection process must be developed that includes:
    - marking hollows
    - protecting hollows during loping of other parts of the tree
    - lowering hollows for inspection by the ecologist
    - retain felled hollow-bearing tree in-situ to allow fauna to self-relocate
    - method to safely remove nests
    - relocation areas for fauna
    - nearest RSPCA or veterinary clinic for injured fauna
- any threatened flora species identified should be flagged and the individuals and their habitat protected where possible
- relocate threatened fauna species such as the Cumberland Plain Land Snail. Cumberland Plain Land Snail habitat should be surveyed immediately prior to the start of any works.

Manage biosecurity in accordance with:

- Biosecurity Act 2015 (see NSW Weedwise)
- contemporary bush regeneration practices, including disposal of sealed, bagged weeds to a licenced waste disposal facility
- wrap straw bales in geofabric to prevent seed spread
- Implement hygiene protocols to minimise the potential to spread soil pathogens.

If native fauna is encountered on site, stop work and allow the fauna to move away un-harassed. Engage an ecologist if assistance is required to move fauna.

If any threatened species (flora or fauna) is discovered during the works, stop work immediately and notify the Sydney Water Environmental Representative. Work will only recommence once the impact on the species has been assessed and appropriate control measures provided.

If any damage occurs to vegetation outside of the direct disturbance area, notify the Sydney Water Project Manager and Environmental Representative so that appropriate remediation strategies can be developed.

In TOBAN period:

- Check specific TOBAN notice to confirm whether the work can be carried out under standard exemptions (Govt Gazette No18 Feb 2018)
- If not, apply to RFS for specific exemption.

Map and report native vegetation clearing greater than 0.01 ha in extent (and any associated rehabilitation) to the Sydney Water Environmental Representative. Track vegetation clearing as per SWEMS0015.26 Contractor Native Vegetation Clearing and Rehabilitation template.

5.2.4 Aboriginal Heritage

A due diligence assessment for Aboriginal heritage has been undertaken and has been summarised here. The due diligence assessment included a database search of the Aboriginal heritage information management system and review of prior Aboriginal heritage studies, visual inspection of the area, assessment of potential impacts and recommendation of safeguards.

The complete specialist due diligence assessment is provided as Appendix D.

Existing environment

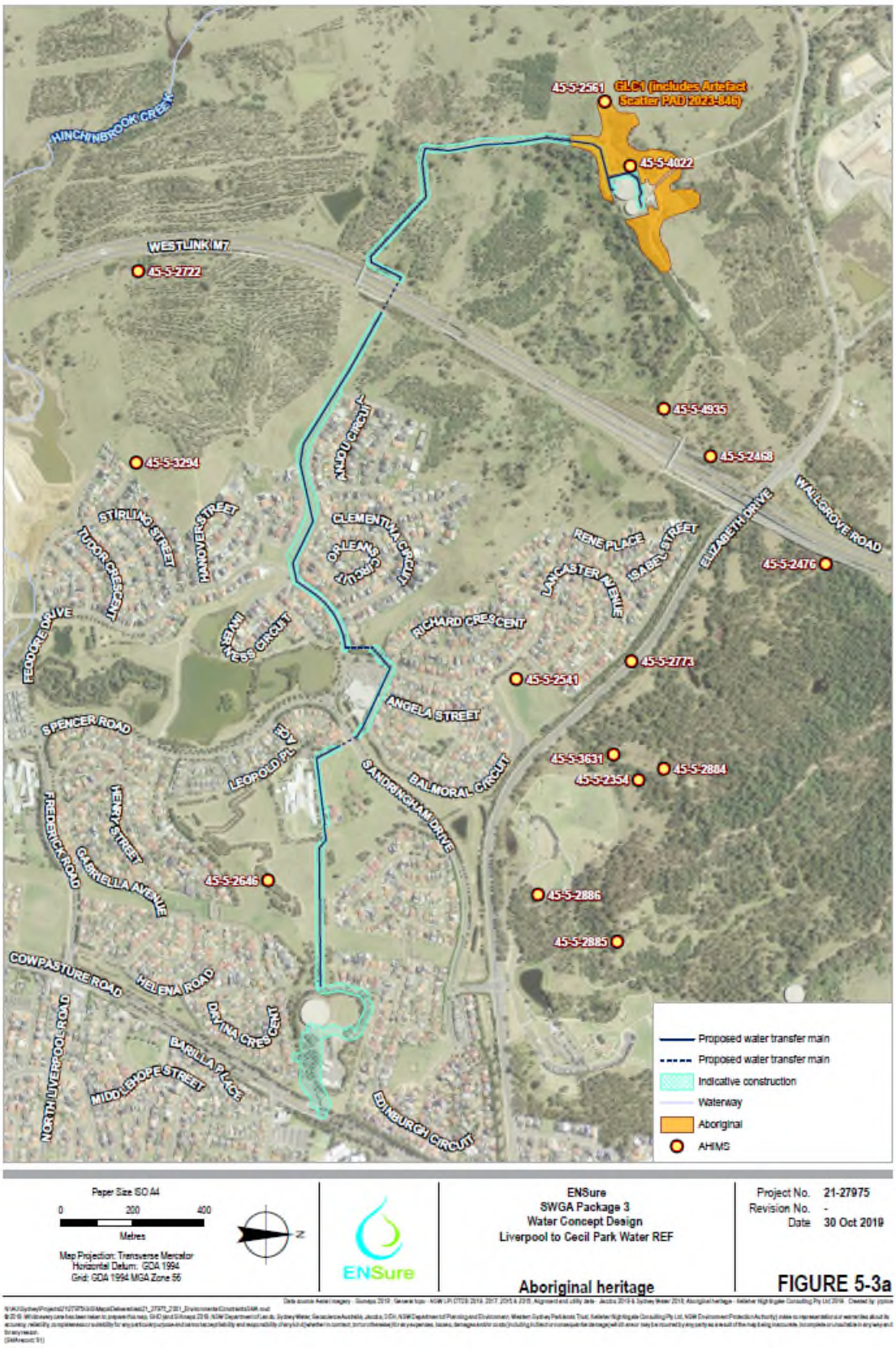
A search of the Aboriginal heritage information management system and review of prior Aboriginal heritage studies identified a number of Aboriginal heritage items in the area surrounding project. The identified items were a combination of artefacts and potential archaeological deposits.

A visual inspection of the area surrounding the project was also undertaken by a suitably qualified archaeologist accompanied by a representative of the Gandangara Local Aboriginal Land Council. The purpose of the visual inspection was to further validate the findings of the desktop analysis and to identify any additional Aboriginal heritage items or sensitive landscapes near the project.

The majority of area that will be affected by the project was found to be highly disturbed by prior development including residential development, road construction and installation of utilities. As such, it was generally assessed to have low potential to contain Aboriginal heritage items. The exception to this was the undisturbed ground of the Western Sydney Parklands and a ridgeline in the Cecil Hills, being a landform often associated with Aboriginal occupation.

A total of two Aboriginal heritage items were confirmed to be in close proximity to the project — an artefact scatter and potential archaeological deposit near Cecil Park Reservoir (GLC1) and second artefact scatter and potential archaeological deposit on the road verge at Tenth Avenue (AFT1).

The locations of the identified Aboriginal heritage items are shown in Figure 5-3.


45-5-2561
GLC1 (includes Artefact Scatter PAD 2023-846)
45-5-4022
WINCHINBROOK CREEK
WESTLINK M7
45-5-2722
45-5-4935
45-5-2468
45-5-3294
WALLGROVE ROAD
ELIZABETH DRIVE
45-5-2476
STIRLING STREET
HANOVER STREET
TUDOR CRESCENT
CLEMENTINA CIRCUIT
ORLEANS CIRCUIT
RENE PLACE
ISABEY STREET
LANCASTER AVENUE
FEODORE DRIVE
INVERNESS CIRCUIT
RICHARD CRESCENT
45-5-2773
45-5-2541
ANGELA STREET
SPENCER ROAD
ACE
LEOPOLD PL
45-5-3631
45-5-2804
45-5-2354
SANDRINGHAM DRIVE
BALMORAL CIRCUIT
FREDERICK ROAD
HENRY STREET
GABRIELLA AVENUE
45-5-2646
45-5-2886
45-5-2885
COWPASTURE ROAD
HELENA ROAD
RAVINA CRESCENT
BARILLA PLACE
MIDDLEHOPE STREET
NORTH LIVERPOOL ROAD
EDINBURGH CIRCUIT
Proposed water transfer main
Proposed water transfer main
Indicative construction
Waterway
Aboriginal
AHIMS
Paper Size ISO A4
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Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56
N
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SWGA Package 3
Water Concept Design
Liverpool to Cecil Park Water REF
Aboriginal heritage
Project No. 21-27975
Revision No. -
Date 30 Oct 2019
FIGURE 5-3a

Figure 5-3 Aboriginal heritage

Potential impacts

The Aboriginal heritage item GLC1 will be at least partially disturbed by the construction of the project. Prior to any disturbance to the item occurring, consultation with the Aboriginal community and further assessment of the item will be required. An Aboriginal heritage impact permit (AHIP) will also be required under the *National Parks and Wildlife Act 1974.*

The project will be constructed using trenchless methods, such as microtunnelling along the majority of Tenth Avenue. The entry and exit pits for the trenchless construction will be situated over 100 metres from the Aboriginal heritage item AFT1 and at the site of the item the alignment of the project will be in the order of five metres below ground level. The construction of the project is therefore not expected to cause any harm to the item.

Environmental safeguards for Aboriginal heritage are provided in Table 5-5.

Table 5-5 Environmental safeguards — Aboriginal heritage

Safeguards
Impact to Aboriginal heritage sites can only occur when an Aboriginal Heritage Impact Permit (AHIP) is granted. Work must be in accordance with AHIP conditions. All site workers must be inducted in protection measures required by the AHIP.
Do not make publicly available or publish, in any form, Aboriginal heritage information on sites / potential archaeological deposits, particularly regarding location.
If any Aboriginal object is found, cease all excavation or disturbance in the area and notify Environmental Representative in accordance with SWEMS0009.

5.2.5 Non-Aboriginal heritage

Existing environment

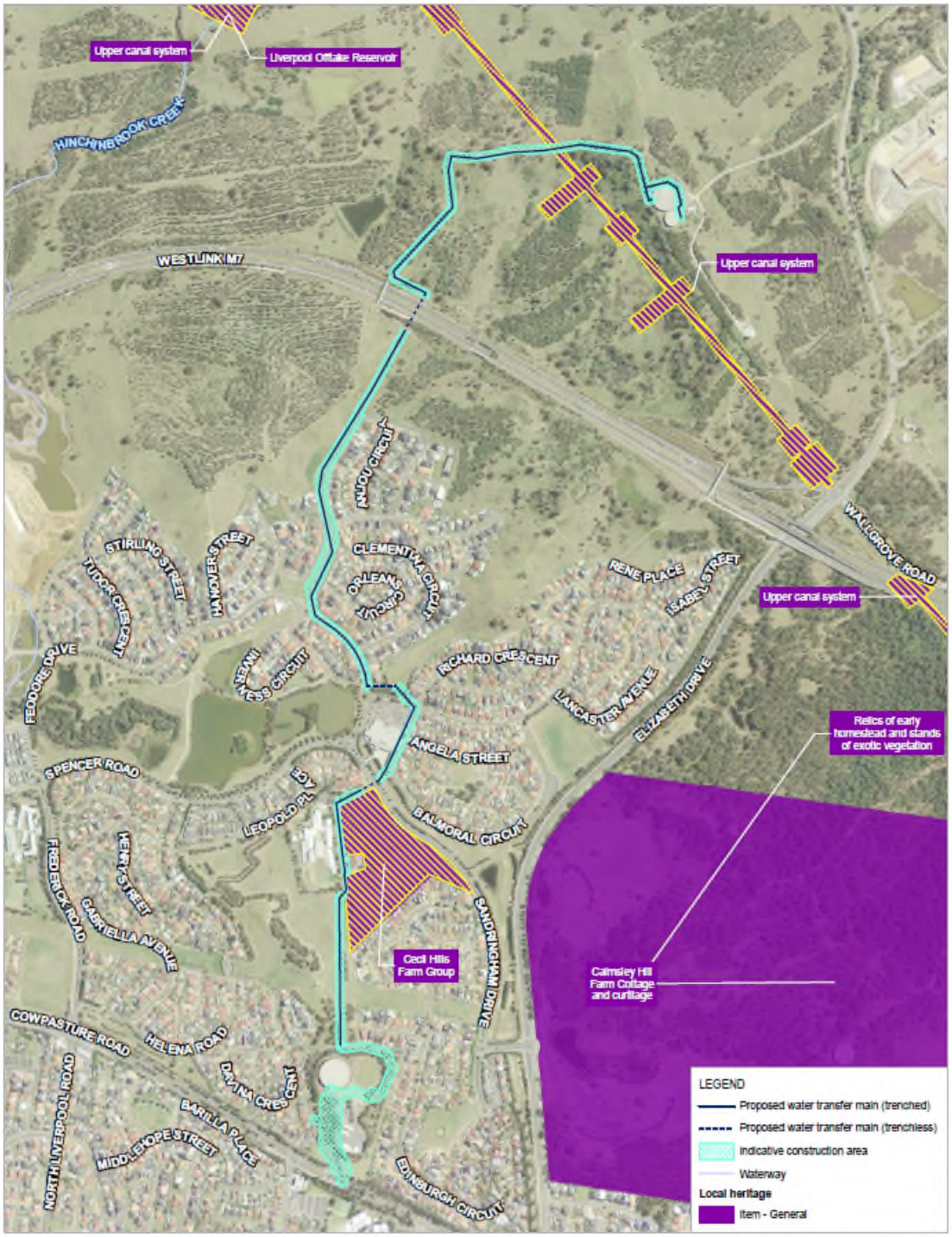
A number of non-Aboriginal heritage items are situated in and around the study area.

The identified non-Aboriginal heritage items are listed and described in Table 5-6.

The location of the identified non-Aboriginal heritage items is shown in Figure 5-4.

Table 5-6 Non-Aboriginal heritage items

Item	List	Description
Sydney Water Supply Upper Canal / Upper Canal System	Liverpool Local Environmental Plan 2008, Heritage Act 1977, State Environmental Planning Policy (Western Sydney Parklands) 2009	The item is described as "an early water supply canal built in 1880–1888" (OEH 2019a).
Cecil Hills Farm Group	Liverpool Local Environmental Plan 2008 / Heritage Act 1977	The item is described as "one of the earliest surviving farm complexes in the Liverpool district" (OEH 2019b).
Austral Town Centre Conservation Area	State Environmental Planning Policy (Sydney Region Growth Centres) 2006	The relevant precinct plan states "the buildings within the proposed conservation area …illustrate a … period of development and way of life [and have] value as [a group] of residential, commercial and community buildings of the mid-twentieth century" (NSW Government 2012).
H J Starr Progress Hall	State Environmental Planning Policy (Sydney Region Growth Centres) 2006	
Brick house and garden	State Environmental Planning Policy (Sydney Region Growth Centres) 2006	
Ian's Hardware and House	State Environmental Planning Policy (Sydney Region Growth Centres) 2006	



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Grid: GDA 1994 MGA Zone 56

Sydney Water
SWGA Package 2 and 3
Water and Wastewater Concept Design
Liverpool to Cecil Park Water

Non-Aboriginal heritage

Project No. 21-27975
Revision No. -
Date 03 Sep 2019

FIGURE 5-4a

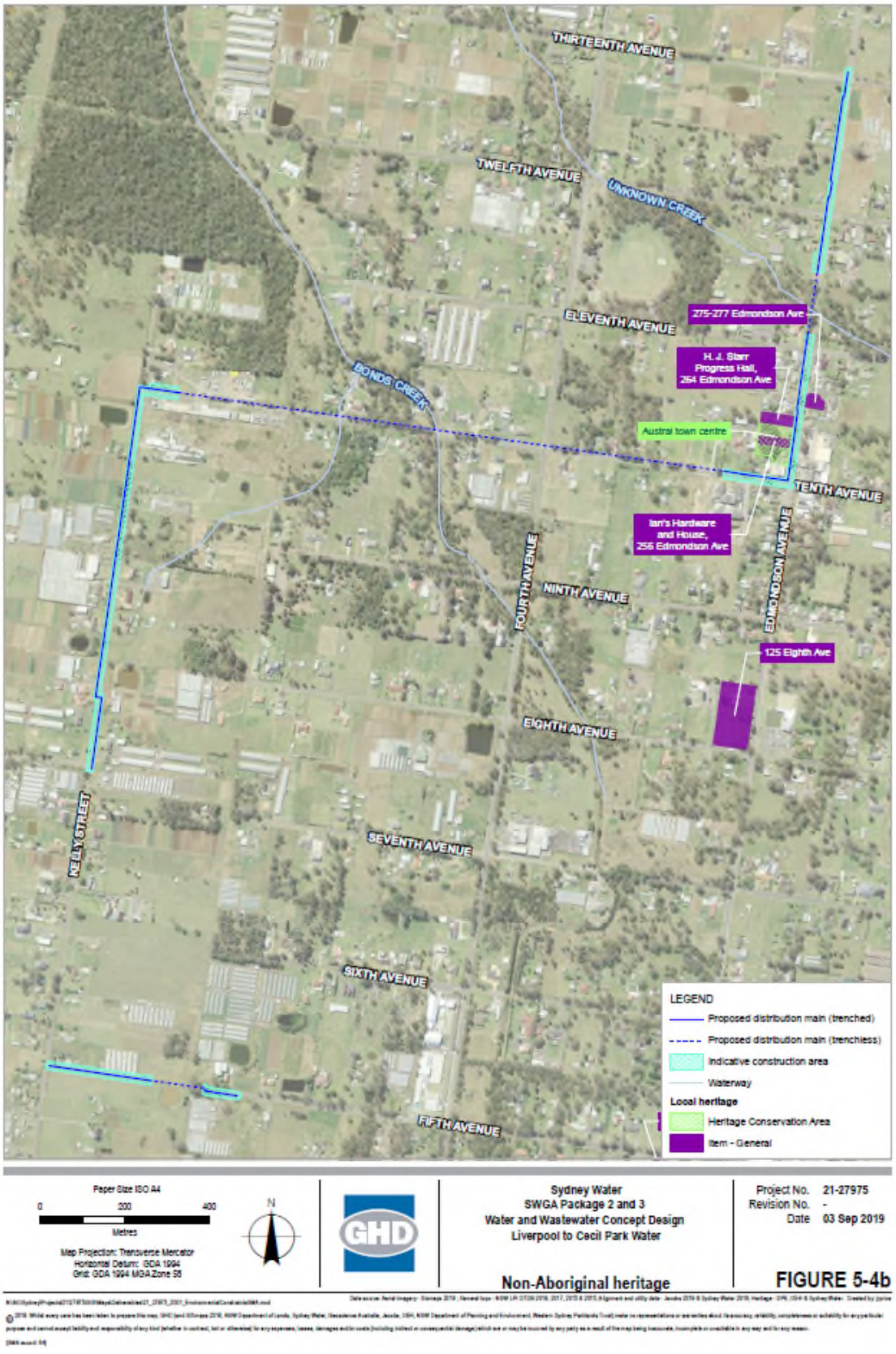


Figure 5-4 Non-Aboriginal heritage

Potential impacts

The project will be partly within the curtilage of the Sydney Water Supply Upper Canal / Upper Canal System. Construction within the curtilage of this heritage item will involve shallow excavation in the order of one to two metres, whilst the heritage item will be beneath ground level at a depth in the order of 50 metres. Accordingly, the project will have a negligible impact on the heritage value of the Sydney Water Supply Upper Canal / Upper Canal System. Further detail is contained in the statement of heritage impact provided as Appendix E.

The project will not be within the curtilage of the remaining non-Aboriginal heritage items. While the project will be near the Cecil Hills Farm Group impacts are not predicted.

Overall, the project will have negligible impacts on non-Aboriginal heritage. Environmental safeguards for non-Aboriginal heritage are provided in Table 5-7. With the proposed environmental safeguards the project can be constructed and operated at a low level of environmental risk.

Table 5-7 Environmental safeguards — Non-aboriginal heritage

Safeguards
Works within the curtilage of the Sydney Water Supply Upper Canal / Upper Canal System must not proceed until an exemption has been granted under section 57(2) of the *Heritage Act 1977*.
Works must not occur within the curtilage of heritage items, including Cecil Hills Farm Group, with the exception of Sydney Water Supply Upper Canal / Upper Canal System as described in this REF.
If any non-Aboriginal relic is found, cease all excavation or disturbance in the area and notify Environmental Representative in accordance with SWEMS0009

5.2.6 Air and energy

Existing environment

The main sensitive receivers in the vicinity of the project with regard to potential air quality impacts are residential areas of Cecil Hills, Cecil Park and Austral. Notable sensitive receivers include Cecil Hills Public School, Cecil Hills Community Centre, Austral Public School and Austral Community Preschool adjacent to the proposed water main and distribution mains. The recreational areas of Western Sydney Parklands are also considered a sensitive receiver.

Identified sensitive receivers are shown in Figure 5-5.

Existing area quality in the region is expected to be relatively good given the nature of the surrounding land uses and developments. The National Pollutant Inventory shows there are two facilities within about two kilometers of the project, which are:

- PGH Bricks and Pavers at 69–77 Cecil Road, Cecil Park
- Jemena Austral Main Line Valve, Eighteenth Avenue, Austral.

The former facility is for the manufacture of clay bricks and pavers while the latter facility is a valve on a gas pipeline. Neither facility will have material impacts on regional air quality.

Potential impacts

During construction open trenching and excavation will generate dust with the potential to affect sensitive receivers. Construction will also involve the use equipment and machinery which will generate exhaust emissions. The limited scale and progressive nature of construction of the project will mean potential air quality impacts at any one location will be limited and temporary. Potential air quality impacts during operation will be negligible as the pump station will be electrically powered meaning it will not release emissions to air.

Overall, the project will have the potential to have limited air quality impacts. Environmental safeguards for air quality are provided in Table 5-8. With the proposed environmental safeguards the project could be constructed and operated at a low level of environmental risk.

Table 5-8 Environmental safeguards — Air and energy

Safeguards
Use alternatives to fossil fuels where practical and cost-effective.
Track energy use as per SWEMS0015.27.
Maintain equipment in good working order, comply with the clean air regulations of the Protection of the Environment Operations Act 1997, have appropriate exhaust pollution controls, and meet Australian Standards for exhaust emissions.
Switch off vehicles/machinery when not in use.
Implement measures to prevent offsite dust impacts, for example: • water exposed areas (using non-potable water source where possible such as water from excavation pits) • cover exposed areas with tarpaulins or geotextile fabric • modify or cease work in windy conditions • modify site layout (place stockpiles away from sensitive receivers) • vegetate exposed areas using appropriate seeding.
Cover all transported waste.

5.2.7 Noise and vibration

A specialist assessment of noise and vibration has been undertaken and has been summarised here. The complete specialist assessment of noise and vibration is provided as Appendix F.

Existing environment

The main sensitive receivers in the vicinity of the project with regard to potential noise impacts are residential areas of Cecil Hills, Cecil Park and Austral. Other notable sensitive receivers include:

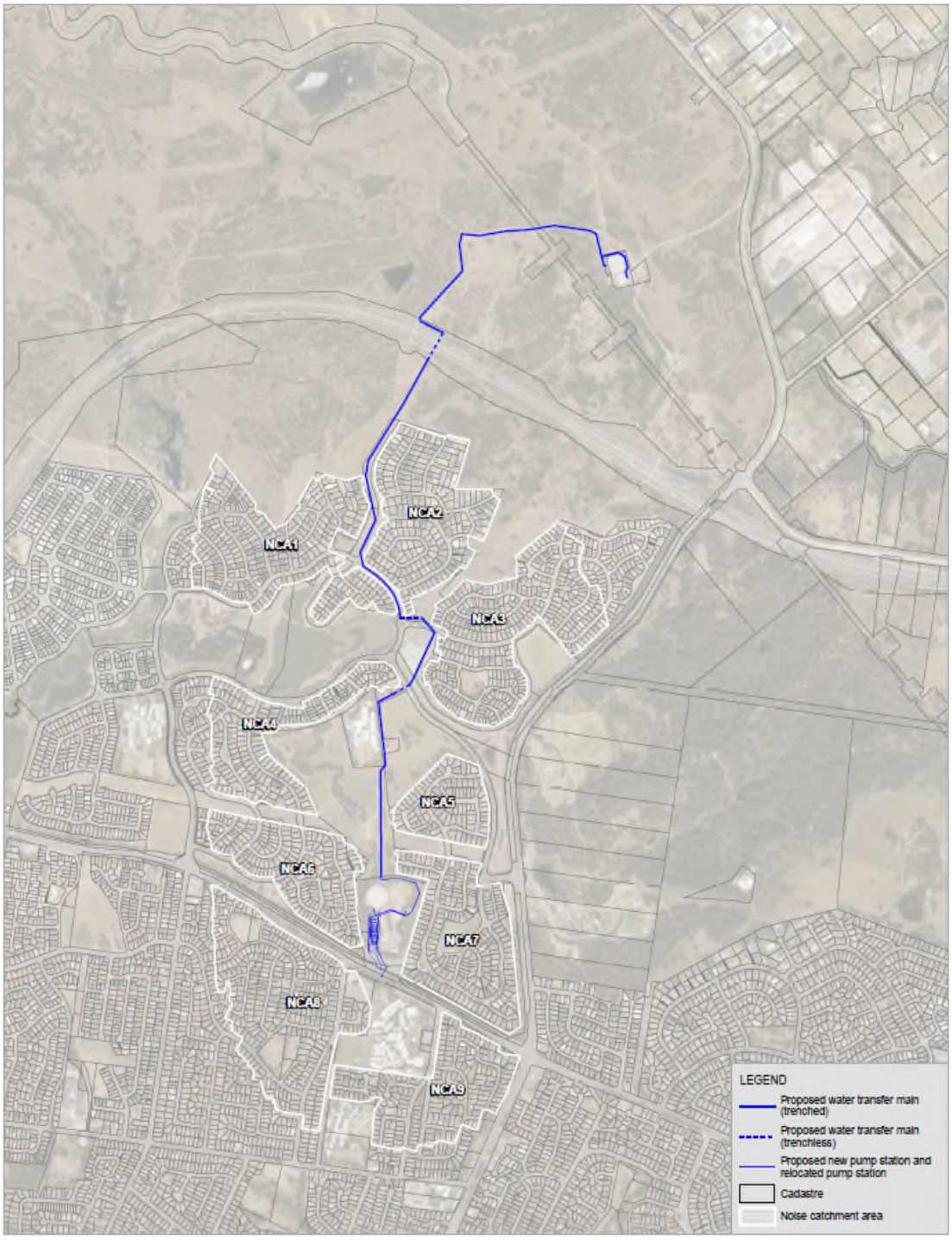
- Cecils Hills Shopping Village
- Cecil Hills Community Centre
- Cecil Hills Public School
- Freeman Catholic College
- Bonnyrigg Heights Primary School
- Austral Public School
- Austral Community Preschool
- Austral Shopping Centre
- Church of Christ Austral
- St Rafqa's Parish
- Unity Grammar.

The sensitive receivers in Cecil Hills and Cecil Park have been divided into noise catchment areas due to the relatively high residential density. The identified noise catchment areas in relation to the project are shown in Figure 5-5. The sensitive receivers in Austral have been mapped individually due to their relatively low density. The identified sensitive receivers are also shown in Figure 5-5.

The existing noise environment in the area surrounding the project was characterised based on background noise logging. The logged background noise levels are summarised in Table 5-9.

Table 5-9 Background noise logging

Location	Background noise $L_{A90(period)}$			Ambient noise $L_{Aeq(period)}$		
Cecil Hills	39	40	36	52	51	52
Cecil Hills	40	44	37	66	50	48
Austral	40	36	31	56	51	46



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Liverpool to Cecil Park Water Noise Assessment

Noise and vibration

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FIGURE 5-5a

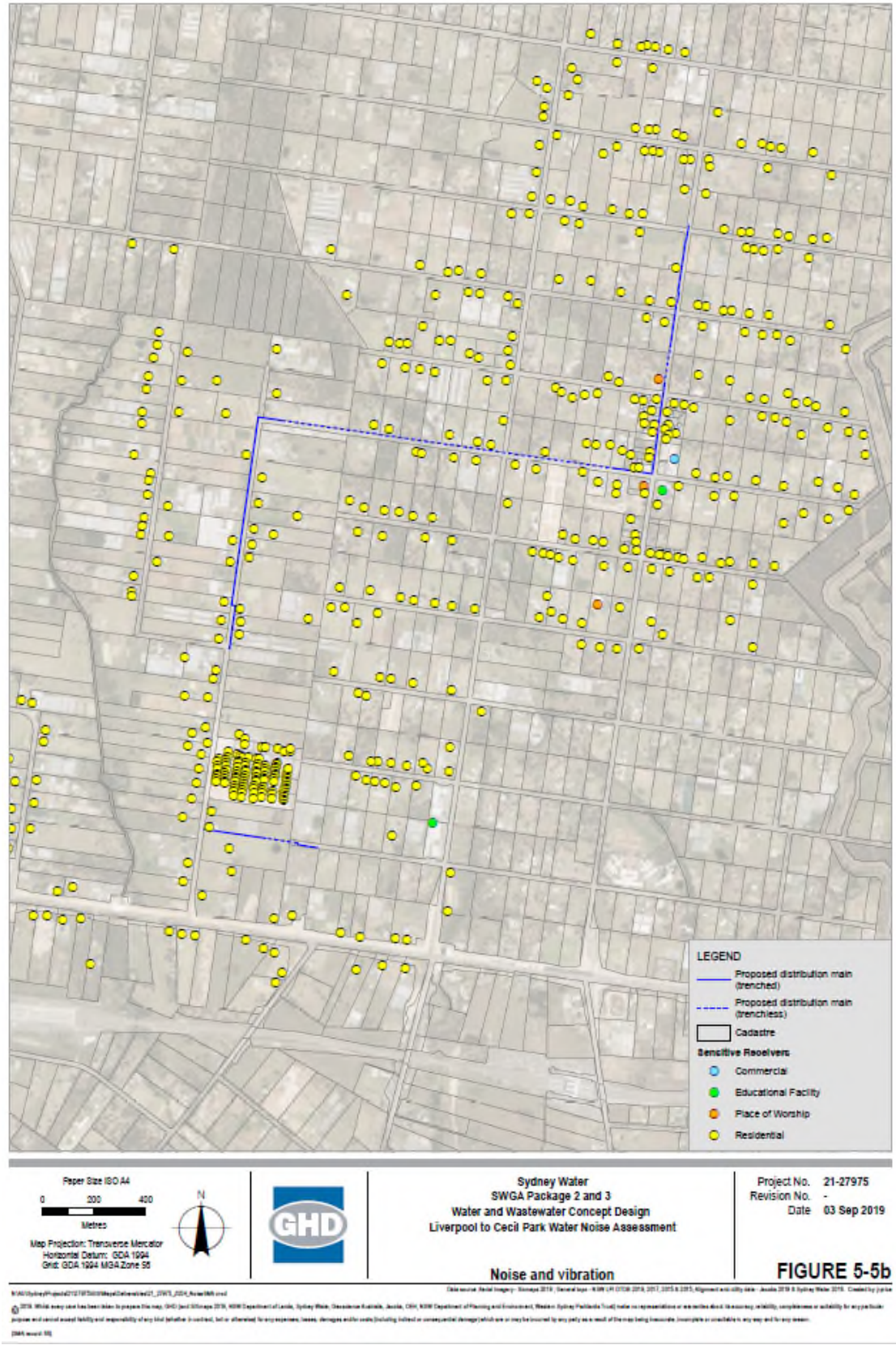


Figure 5-5 Noise and vibration sensitive receivers

Compliance criteria

Noise compliance criteria were developed in accordance with the Interim Construction Noise Guideline (DECC 2009) and the Noise Policy for Industry (EPA 2017). The criteria are summarised in Table 5-10. The criteria assume construction during standard daytime hours stated in section 2.

Table 5-10 Noise compliance criteria

Phase	Receiver	Value (dBA)	Note
Construction	Cecil Park (NCA1–3)	49	Noise affected
	Cecil Park (NCA4–9)	50	
	Austral	50	
	Residential	75	Highly noise affected
	Commercial	70 (external)	—
	Industrial	75 (external)	—
	Education facility	55 (external)	—
	Place of worship	55 (external)	—
Operation	Residential	45	Day
		49	Evening
		38	Night
	Commercial	65 (external)	—
	Education facility	55 (external)	—
	Place of worship	50 (external)	—
	Active recreation	55 (external)	—

In addition to the above, noise compliance criteria for construction traffic were adopted in accordance with the *NSW Road Noise Policy* (RMS 2011), which states that the traffic noise level including the project should be limited to 2 dB increase on the traffic noise level without the project.

Compliance criteria for vibration have also been determined with reference to relevant guidelines and standards. The adopted vibration compliance criteria are summarised in Table 5-11.

Table 5-11 Vibration compliance criteria

Receiver	Value (mm/s)	Note
Residential	1	Human comfort
	5	Structural damage
Heritage structure	3	Structural damage

Potential impacts

The construction of the project will have the potential to generate noise and vibration noticeable at nearby sensitive receivers. The potential noise and vibration levels were estimated based on the typical construction equipment that will be utilised for a construction project of a similar nature.

The assessment of construction noise found that construction activities will have the potential to exceed the noise compliance criteria at a relatively large number of sensitive receivers due to the relatively high density of residential development in proximity to some of the construction areas.

Construction noise was predicted to temporarily exceed the adopted noise compliance criteria at a number of locations in Cecil Hills and Austral during construction. It is noted that the predicted noise levels were based on a worst case 15 minute period during construction where noisiest construction equipment and machinery will be in use in the part of the construction area nearest a given receiver. Accordingly, the noise levels at a given sensitive receiver and at a given time during construction will usually be lower and these noise levels will only occur temporarily and ultimately only for the duration of construction in the vicinity of the given sensitive receiver.

Some work outside standard daytime hours is expected to be required for the works at Cowpasture Road, which will tie in the existing potable water network. The assessment found there will be potential for noise to exceed the relevant noise compliance criteria, particularly in NCA7 and NCA8 but also parts of NCA5, NCA6 and NCA7. Additional measures are proposed in the event of this work outside of standard daytime hours occurs to avoid, mitigate and manage potential impacts.

The predicted noise contours at the identified noise catchments for construction scenarios are provided in the complete noise and vibration assessment in Appendix F.

The assessment of construction vibration determined buffer distances that will need to be employed in order to remain below the relevant vibration compliance criteria. It found that the vibration criteria will not be expected to be exceeded beyond 12 metres for residential dwellings and 18 metres for heritage structures. Given construction will mainly be contained to existing road verges it was expected that these buffer distances will be practicable.

The potential noise impacts of the project during operation will be limited to the operation of the pump station. The assessment found that predicted noise from the pumps and transformers in the pump station will not produce noise exceeding the relevant noise compliance criteria in most of the surrounding noise catchments areas. The exception to this was some sensitive receivers in NCA7 shown in Figure 5-5, which will experience maximum noise levels of up to 41 dBA, which will exceed the relevant noise compliance criterion during the night by about 3 dBA.

The potential noise impacts of the proposed extraction fans at the pump station were found to have more significant potential noise impacts, with sound power levels at the noise source in the order of 100 dBA. These noise levels will exceed the relevant noise compliance criteria at a large number of sensitive receivers. Accordingly, it is recommended that further modelling be carried out during detailed design to lower the sound power levels emitted from these project components.

Table 5-12 Environmental safeguards — Noise and vibration

Safeguards
Schedule work and deliveries during standard daytime working hours of 7am to 6pm Monday to Friday and 8am to 1pm Saturday. No work to be scheduled on Sundays or public holidays (DECC Interim Construction Noise Guideline, 2009). Works will be carried out in accordance with: • Sydney Water's Noise Management Procedure SWEMS0056 • Industrial Noise Policy (EPA, 2000).
Incorporate **standard daytime hours noise management safeguards** into the CEMP: • identify and consult with the potentially affected residents prior to the commencement: o describe the nature of works; the expected noise impacts; approved hours of work; duration, complaints handling and contact details. o determine need for, and appropriate timing of respite periods (eg times identified by the community that are less sensitive to noise such as mid-morning or mid-afternoon for works near residences) o acceptance by the community of longer construction periods in exchange for restriction to construction times. • implement a complaints handling procedure for dealing with noise complaints • plant or machinery will not be permitted to warm-up near residential dwellings before the nominated working hours • appropriate plant will be selected for each task, to minimise the noise impact (eg all stationary and mobile plant will be fitted with residential type silencers) • engine brakes will not be used when entering or leaving the work site(s) or within work areas • regularly inspect and maintain equipment in good working order • arrange work sites where possible to minimise noise (eg generators away from sensitive receivers, minimise use of vehicle reversing alarms) • schedule noisy activities around times of surrounding high background noise (local road traffic or when other noise sources are active).
If works **beyond standard daytime hours are needed**, the contractor's environmental representative will: • justify the need for out of standard daytime work • consider potential noise impacts and: implement the relevant standard daytime hours safeguards; Sydney Water's Noise Management Code of Behaviour (SWEMS0056.01) and other reasonable and feasible management measures • identify community notification requirements • seek approval from the Sydney Water Project Manager.
If night works are needed, the contractor's environmental representative would: • justify the need for night works

Safeguards
• consider potential noise impacts and implement the relevant standard daytime and out of hours safeguards and other reasonable and feasible management measures • identify community notification requirements (ie for scheduled night work (not emergency works)), • notify all potentially impacted residents and sensitive noise receivers not less than one week prior to commencing night work. seek approval from the Sydney Water Project Manager.
If works on Sundays or public holidays are required, the contractor's environmental representative would: • justify why all other times are not feasible • consider potential noise impacts and, implement relevant standard daytime, out of hours and night-time safeguards and other reasonable and feasible management measures • identify community notification requirements seek approval from the Sydney Water Project Manager.
Conduct a dilapidation survey / asset condition assessment prior to works which have potential to damage existing structures
Monitor compliance with the recommended vibration levels in DIN 4150-3 1999: Structural Vibration – Part 3; Effects of vibration on structures.
Inductions for the work crew will include the specific noise issues and mitigation measures required for the site. The induction will include: • all relevant project specific and standard noise mitigation measures • relevant licence and approval conditions • permissible hours of work • location of nearest sensitive receivers • construction employee parking areas • designated loading/ unloading areas and procedures • site opening/closing times (including deliveries) • behavioural practices including: o avoiding the use of outdoor radios when working outside the recommended standard hours o avoiding shouting and slamming doors o where practical, operating machines at low speed or power and switching off when not being used rather than left idling for prolonged periods o minimising reversing o avoiding dropping materials from height and avoiding metal to metal contact on material.
Where the predicted and/or measured construction noise is greater than the noise affected level, works will be conducted in accordance with the Interim Construction Noise Guideline and all reasonable and feasible practices will be undertaken to minimise or avoid noise.
Inform property owners/occupiers within the study area in advance of the proposed work and provide a contact phone number for any complaints or concerns during the construction period.
Establish and maintain a community information telephone number during construction hours and implement a complaints handling procedure.

Safeguards
Machines found to produce excess noise compared to industry best practice will be removed from the site or stood down until repairs or modifications can be made.
Where the predicted and/or measured construction noise is greater than the highly noise affected level, all feasible and reasonable measures will be implemented, and consideration will be given to implementing respite periods by restricting the hours of the activity.
Sensitive land uses such as educational institutions and places of worship will be consulted about construction programs and respite periods be considered for particularly sensitive time periods (such as exams, sleep time or times of worship).
The following temporary noise barriers during construction have been recommended: • A noise barrier on the southern boundary of the pump station construction site to minimise the risk of the highly noise affected management level being exceeded. • Where trenchless drilling site are located within 30 m of sensitive receivers then a temporary noise barrier be installed.
During detailed design of the pump station, the following mitigation measure could be explored to reduce noise to compliant levels: • equipment selection, • internal reverberation control, • ventilation design, including: o lined ductwork o attenuators o acoustic louvres o ventilation positioning. The operation of the pump station can be designed to achieve operational noise criteria with the inclusion of these reasonable and feasible mitigation measures. This should be assessed at detailed design phase to determine the appropriate mitigation measures. During commissioning, noise monitoring will be conducted to assess compliance within the operational noise criteria. Should this monitoring identify any exceedance, additional mitigation measures will be considered to reduce received noise levels to acceptable levels.

5.2.8 Traffic and access

Existing environment

The local area surrounding the project includes a number of minor roads, major roads and highways. Minor roads are mainly situated in the residential areas of Cecil Hills, Cecil Park and Austral. Major roads include Cowpasture Road and Sandringham Drive in Cecil Hills and Edmondson Avenue in Austral. The Westlink M7 also crosses through the area surrounding the project in Cecil Hills, Cecil Park and the Western Sydney Parklands.

Based on a review of schedule of classified roads (NSW Government 2017) Roads and Maritime Services will be the roads authority for Cowpasture Road and the Westlink M7 while Liverpool City

Council will be the roads authority for the remaining roads in the area surrounding the project under the *Roads Act 1993*.

A number of locations in the study area may be particularly sensitive to impacts on the road network as well as being substantial sources of existing vehicle movements, including:

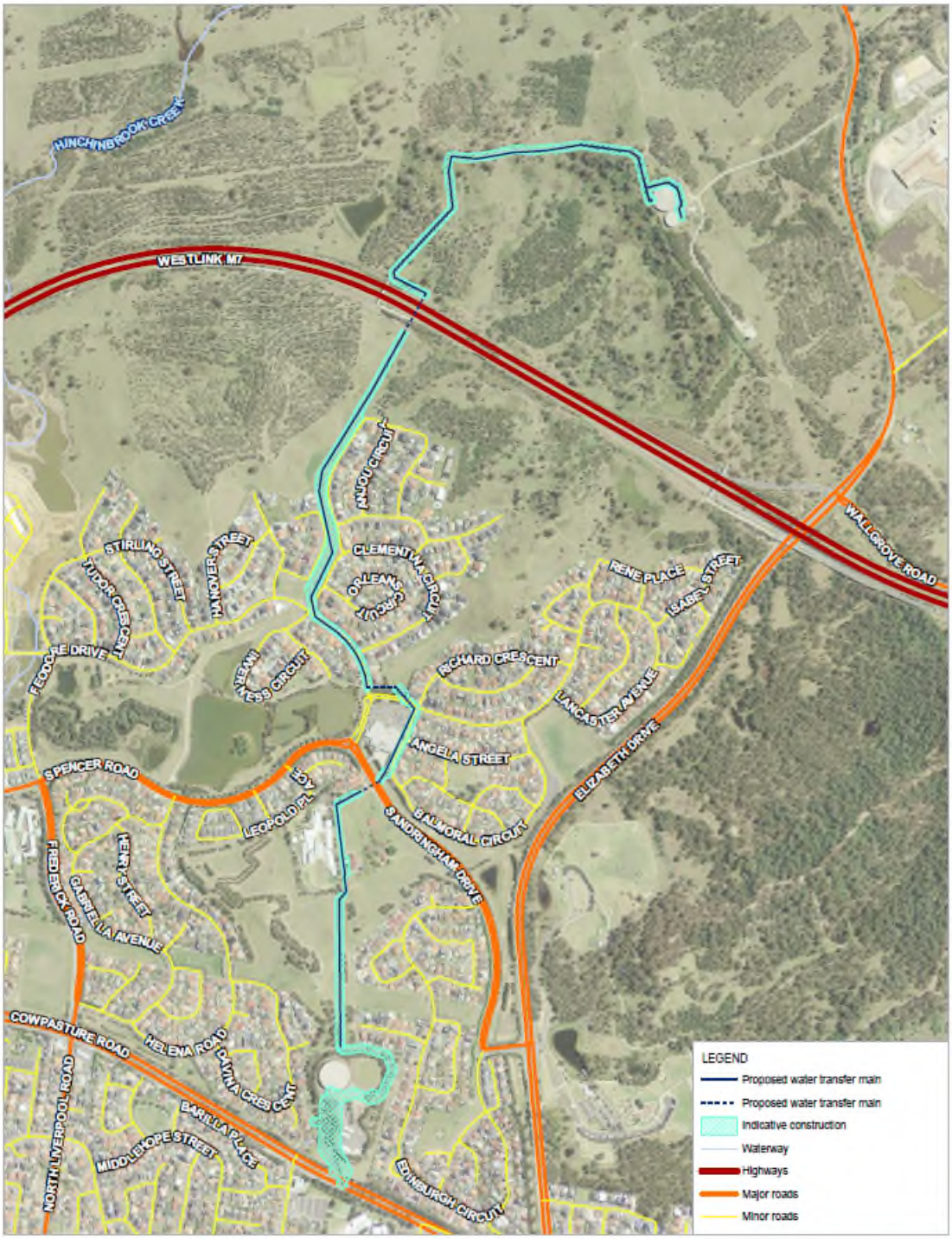
- Cecil Hills Shopping Village
- Cecil Hills Community Centre
- Cecil Hills Public School
- Freeman Catholic College
- Bonnyrigg Heights Primary School
- Austral Public School
- Austral Community Preschool
- Austral Shopping Centre
- Church of Christ Austral
- St Rafqa's Parish
- Unity Grammar.

All of the above will be adjacent to the project with the exception of Freeman Catholic College, Bonnyrigg Heights Primary School, St Rafqa's Parish and Unity Grammar. It is also noted the NSW Ambulance utilise an access way just outside the gate to Liverpool Reservoir and also utilise a section of shared driveway through to Cowpasture Road.

The identified roads listed in Table 5-13 and shown in Figure 5-6.

Table 5-13 Existing roads

Road	Type	Lanes	Speed limit
Cowpasture Road	Major	4	70 km/hr
Prince Close	Minor	2	50 km/hr
Sandringham Drive	Major	2	50 km/hr
Balmoral Circuit	Minor	2	50 km/hr
Lancaster Avenue	Minor	2	50 km/hr
Feodore Drive	Minor	2	50 km/hr
Clementina Circuit	Minor	2	50 km/hr
Westlink M7	Highway	4	100 km/hr
Kelly Street	Minor	2	50 km/hr
Tenth Avenue	Minor	2	50 km/hr
Edmondson Avenue	Major	2	50 km/hr



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Grid: GDA 1994 MGA Zone 56

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Traffic and access

FIGURE 5-6a

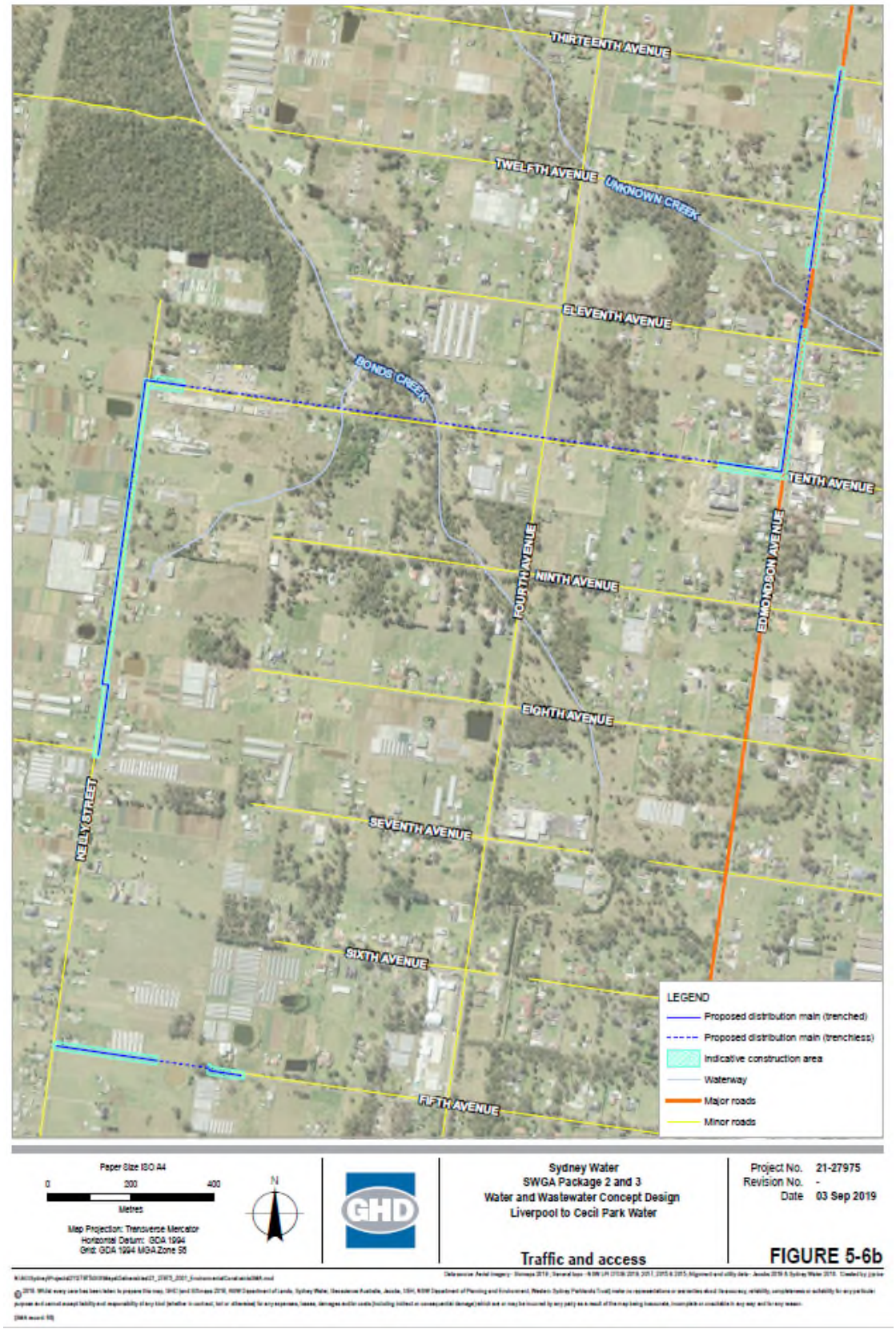


Figure 5-6 Traffic and access

Potential impacts

The construction of the project will have the potential to affect traffic and access where construction activities such as trenching or other excavation will occur in a road corridor.

The proposed construction activities by road are summarised in Table 5-14. The extent of the proposed construction activities is shown as the indicative construction area in Figure 5-6.

Table 5-14 Construction activities by road

Road	Construction activity
Cowpasture Road	Open trenching and trenchless
Prince Close	Open trenching
Sandringham Drive	Open trenching
Balmoral Circuit	Open trenching
Lancaster Avenue	Open trenching
Feodore Drive	Open trenching
Clementina Circuit	Open trenching
Westlink M7	Trenchless
Fifth Avenue	Open trenching and trenchless
Kelly Street	Open trenching
Tenth Avenue	Open trenching and trenchless
Edmondson Avenue	Open trenching and trenchless

The project will involve open trenching a number of roads. Open trenching on Prince Close, Sandringham Drive, Balmoral Circuit, Lancaster Avenue, Feodore Drive and Clementina Circuit in Cecil Hills will be progressive and affect one lane of traffic at a time. Trenchless methods will be employed at Cowpasture Road to limit impacts to the road surface however some open trenching or excavation in the road corridor and median is expected be required. The project will also involve open trenching within road corridors along Kelly Street, Tenth Avenue and Edmondson Avenue in Austral. The trenching in these areas will be kept to the road shoulder as far as practicable meaning only one lane maximum will be affected. As shown in Figure 5-6, some sections of the alignment on Tenth Avenue and Edmondson Avenue will be constructed by trenchless methods, avoiding impacts to the road surface in these areas.

Potential impacts to the most significant road in the area, being Westlink M7, will be avoided by the use of trenchless methods such as microtunnelling.

As stated in section 2, the construction of the project will require a construction workforce of 50 people across all construction areas. The transport of the construction workforce to and from the

construction areas will generate in the order of 50 two-way light vehicle movements per day for the duration of construction. These vehicles will be parked within construction areas and will not be expected to materially affect the availability of roadside parking in the broader area.

Construction activities will have the potential to generate spoil. The spoil will generally be reused in backfilling or trenches or other excavations. It is estimated that in the order of 4,000 m^3 of excess spoil may be generated over the construction timeframe. Excess spoil will be transported away from construction sites in heavy vehicles such a dump trucks. Assuming a dump truck capacity in the order of 20 m^3, it has been estimated that in the order of 200 two-way heavy vehicle movements will be required to transport the spoil over the duration of construction, averaging about one per day. Some additional heavy vehicle movements will also be required for general construction and material deliveries. The additional vehicle movements will not be expected to materially affect road performance.

The construction and vehicle movements have the potential to temporarily disrupt access to residences or other sensitive locations at certain times. The duration of disruption will generally be short, in the order of a few days or less, and will be timed as far as practicable to avoid peak times at sensitive locations such as schools and shopping areas. The impact of the additional vehicle movements will also be limited as parking will primarily occur within the construction corridor and will not utilise dedicated community parking areas such as schools and shopping areas.

The construction of the project will also have the potential to impact the access way utilised by NSW Ambulance including the shared driveway through the Cowpasture Road. As discussed in section 3, consultation has been carried out with NSW Ambulance concerning this issue. NSW Ambulance has state is requires 24/7 access as an emergency service response unit, with the access gate and shared driveway to be always kept clear for ambulance access.

Overall, the project will have the potential to have limited and temporary impacts on traffic and access, mainly where construction will involve temporary partial road closure. Environmental safeguards for traffic and access are provided in Table 5-15. While potential traffic and access impacts will be a key potential impact requiring management, with the proposed environmental safeguards the project could be constructed and operated at a low level of environmental risk.

Table 5-15 Environmental safeguards — Traffic and access

Safeguards
Prepare a Traffic Control Plan (TCP) in consultation with the relevant traffic authority to meet NSW Roads and Maritime Service's Traffic Control at Worksites Manual V4 requirements.
The TCP must include measures to avoid impacting emergency vehicle services and must allow for 24/7 unimpeded access for emergency vehicles.
Minimise traffic impacts near residential properties, schools and businesses by consulting with them (e.g. no major materials deliveries at school drop off or pick up times etc.).
Manage sites to allow people to move safely past the works, including alternative pedestrian, bicycles, pram and wheelchair access.
Consult with the relevant traffic authority about managing impacts to pedestrian traffic, signposting, meters, parking, line-marking or if traffic control or pavement restoration is required.
Erect signs to inform road users of the proposed works and any temporary road closures.
Ensure work vehicles do not obstruct vehicular or pedestrian traffic, or private driveway, public facility or business access unless necessary and only if appropriate notification has been provided.
Road occupancy licences for works in road corridors will be required as stated in section 4.
Roads impacted by construction activities including trenching will be restored to their pre-existing condition and in consultation with the relevant roads authority.

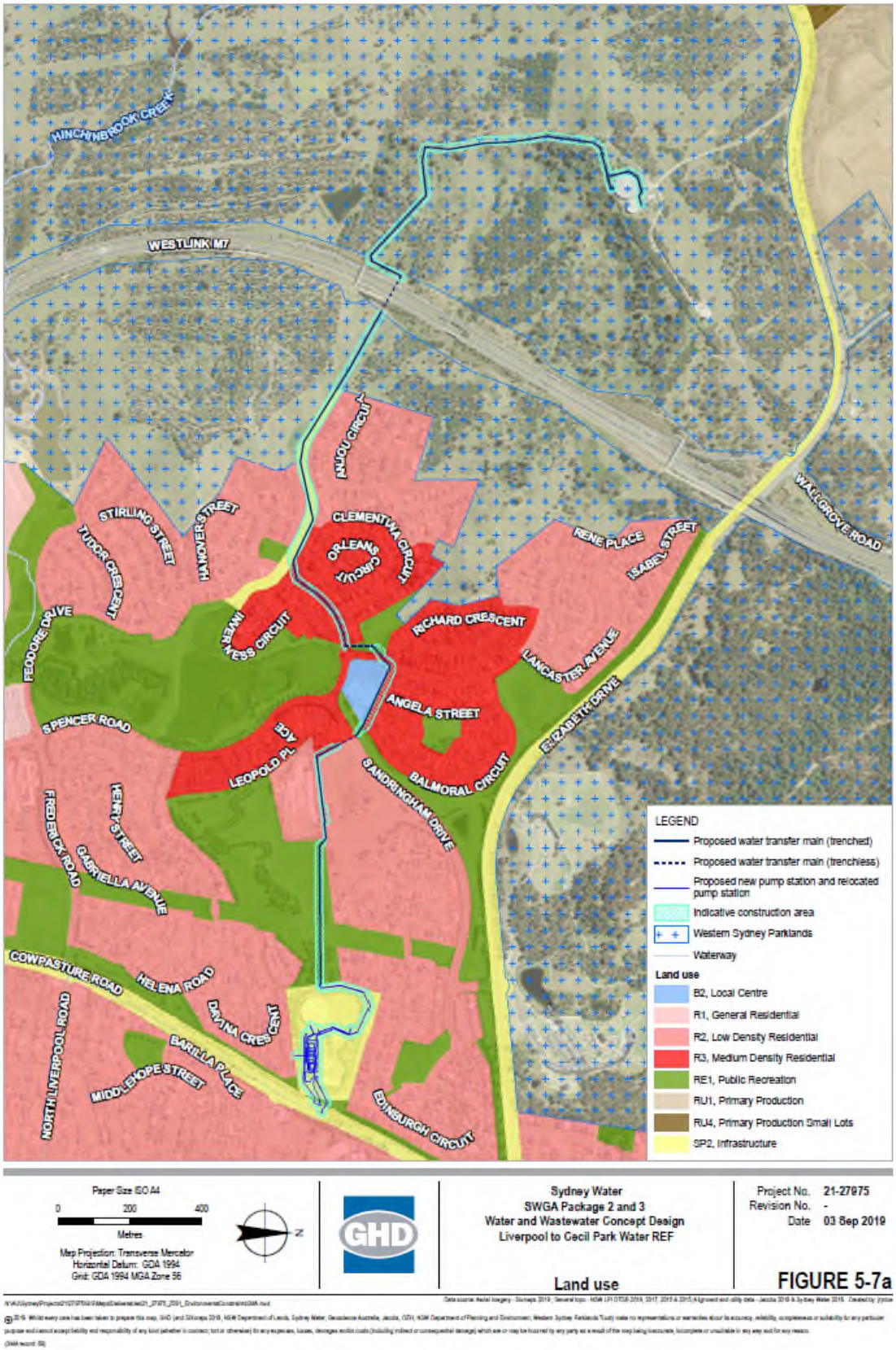
5.2.9 Social and visual

Existing environment

The project is situated within the suburbs of Cecil Hills, Cecil Park and Austral within the local government area of Liverpool City Council. The surrounding land use is predominantly residential with medium to high density residential development in Cecil Hills and Cecil Park and lower density rural residential development in Austral. The surrounding land use also includes Western Sydney Parklands, which are characterised by open space, bushland and walking and cycling tracks.

The existing social values relevant to the project include social infrastructure such as the existing roads and nearby community and education facilities including Cecil Hills Public School, Cecil Hills Community Centre, Austral Public School and Austral Community Preschool.

The existing land use in and around the study area, including areas zoned for recreational use (Western Sydney Parklands) that may be of social and visual amenity to the community, is shown in Figure 5-7.


HINCHINBROOK CREEK
WESTLINK M7
INJOU CIRCUIT
CLEMENTWA CIRCUIT
ORLEANS CIRCUIT
STIRLING STREET
TUDOR CRESCENT
HANOVER STREET
INVERNESS CIRCUIT
FEODORE DRIVE
SPENCER ROAD
LEOPOLD PL
ANGELA STREET
RICHARD CRESCENT
RENE PLACE
ISABEL STREET
WALGROVE ROAD
LANCASTER AVENUE
ELIZABETH DRIVE
SANDRINGHAM DRIVE
BALMORAL CIRCUIT
HENRY STREET
FREDERICK ROAD
GABRIELLA AVENUE
COWPASTURE ROAD
HELENA ROAD
DAMINA CRESCENT
BARILLA PLACE
MIDDLEHOPE STREET
NORTH LIVERPOOL ROAD
EDINBURGH CIRCUIT
LEGEND
Proposed water transfer main (trenched)
Proposed water transfer main (trenchless)
Proposed new pump station and relocated pump station
Indicative construction area
Western Sydney Parklands
Waterway
Land use
B2, Local Centre
R1, General Residential
R2, Low Density Residential
R3, Medium Density Residential
RE1, Public Recreation
RU1, Primary Production
RU4, Primary Production Small Lots
SP2, Infrastructure
Paper Size ISO A4
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Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56
N
GHD
Sydney Water
SWGA Package 2 and 3
Water and Wastewater Concept Design
Liverpool to Cecil Park Water REF
Land use
Project No. 21-27975
Revision No. -
Date 03 Sep 2019
FIGURE 5-7a

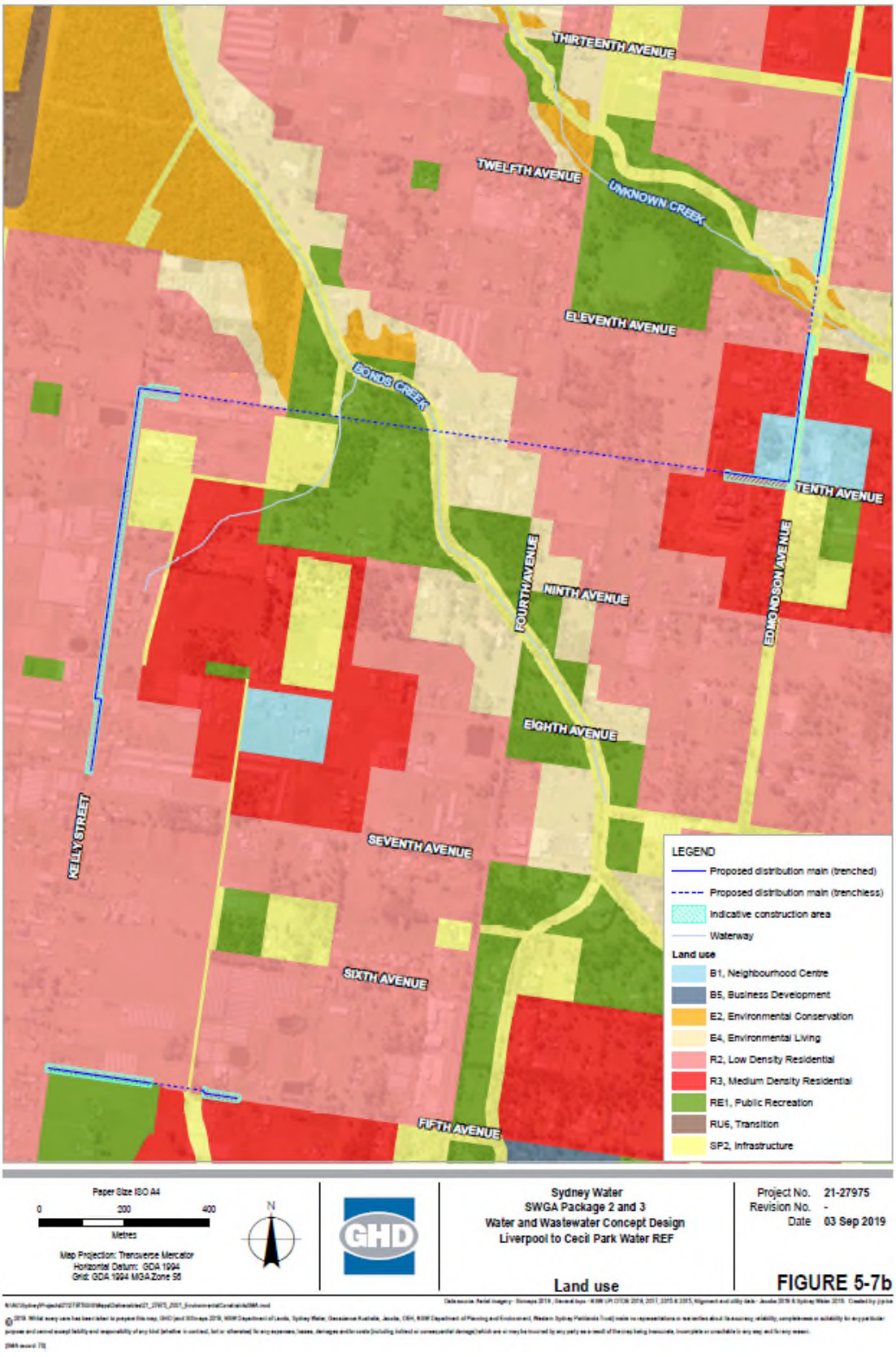

Figure 5-7 Land use

Potential impacts

The potential social and visual impacts of the project will mainly be in relation to the potential impacts of construction through residential and recreational areas. Potential social amenity impacts of air emissions, noise and vibration and traffic and access have been assessed separately in section 5.2.6, section 0 and section 5.2.8 respectively. The potential impacts will generally be temporary due to the progressive nature of construction.

While construction of the water main in Western Sydney Parklands will generally follow existing tracks and trails in order to minimise vegetation clearing, this will also have the effect of having a longer term impact on the use of those tracks and trail by recreational users. Nonetheless, these potential impacts will be temporary and affected tracks or trails will be backfilled and restored to similar to pre-existing condition as construction progresses along the water main alignment.

The construction of the project will represent a temporary visual impact. Water mains and distribution mains will be progressively backfilled and restored to similar to pre-existing condition meaning long term potential visual impacts of these project components will be negligible.

The pump station will be visible during operation but will be situated at an existing Sydney Water reservoir site and will be consistent with the existing use of the land. The pump station will nonetheless require clearing of native vegetation at the site and will be situated near a number of residences that may experience visual impacts. As such, environmental safeguards have been proposed to minimise the potential visual impacts of the pump station.

Table 5-16 Environmental safeguards — Social and visual

Safeguards
Undertake works in accordance with Sydney Water Communications policies and requirements including: • notify impacted residents and businesses • erect signs to inform the public on nature of work • personnel treat community enquiries appropriately
Minimise visual impacts (e.g. retain existing vegetation where possible).
Direct artificial light away from sensitive receivers where possible (i.e. residents, fauna or roadways).
Maintain work areas in a clean and tidy condition.
As far as practicable, provide alternate routes and associated signage for recreational users of Western Sydney Parklands to minimise the potential impacts of the project during construction.
Consider the potential visual impacts of the pump station during detail design, including incorporation of vegetation screening or other treatments to improve the visual amenity of the site.

5.2.10 Waste and hazardous materials

Existing environment

There are a number of existing waste management facilities in the region of the project including Kemps Creek Resource Recovery Park seven kilometres to the west, Wetherill Park Resource Recovery seven kilometres to the north-east and Penrith Landfill 20 kilometres north-west.

Historic and current land uses such as farming and storage yards as well as uncontrolled dumping and filling has occurred in the study area and presents a risk of encountering contamination, particularly in Austral, which will potentially introduce an additional waste stream.

Potential impacts

The construction of the project will generate a number of waste streams, including:

- General construction and demolition waste including excavated road material
- Green waste, including potential weed waste, from vegetation clearing during construction
- Excess spoil from trenching or other excavations required as part of construction
- General waste from the construction workforce such as food packaging waste
- Sewage waste or grey water from the construction workforce at construction sites.

As construction materials will be procured based on a detailed design the construction of the project is not expected to result in any more than a small volume of general construction waste. This will classify as general solid waste under the *Waste Classification Guidelines* (EPA 2014).

As stated in section 2, it is estimated that in the order of 4,000 m^3 of excess spoil may be generated over the construction timeframe. The excess spoil also be classified under the waste guidelines (EPA 2014).

As discussed in section 5.2.1, uncontrolled dumping and filling has occurred in some of the study area, including parts of Austral in particular. Historic and current uses, such as farming, and storage yards also present a risk of contamination. some of the study area. As such, the project has the potential to encounter material that would classify as hazardous waste. As the project will largely be contained to existing road corridors where no large scale contamination has been identified, the volume of hazardous waste is expected to be small, if any.

Overall, the project will have limited potential impacts with regard to waste and hazardous materials, mainly where construction will generate excess spoil. Environmental safeguards for waste and hazardous materials are provided in Table 5-17. With the proposed environmental safeguards the project could be constructed and operated at a low level of environmental risk.

Table 5-17 Environmental safeguards — Waste and hazardous materials

Safeguards
Manage waste in accordance with relevant legislation and maintain records to show compliance e.g.

Safeguards
waste register, transport and disposal records.
Provide adequate bins for general waste, hazardous waste and recyclable materials. Remove bins when 80% full.
Minimise the generation of waste, sort waste streams to maximise reuse/recycling in accordance with the Waste Avoidance and Resource Recovery Act 2001.
Manage waste and excess spoil in accordance with the NSW EPA Waste Classification Guidelines (2014). Dispose wastes at an appropriately licenced facility.
Securely store all wastes to prevent pollutants from escaping.
Dispose excess vegetation (non-weed) that cannot be used for site stabilisation at an appropriate green waste disposal facility.
If fibro or other asbestos containing material is identified, restrict access and follow Sydney Water's Asbestos Management procedure, WHSMS0064. Contact Property Environmental Services for advice.
The Contractor will prepare an unexpected finds protocol to be included in the Construction Environmental Management Plan (CEMP) to address the potential for encountering contaminated soils or other unexpected waste streams during construction.

5.2.11 Cumulative

Existing environment

A review of the NSW Government Major Projects database (NSW Government 2019c) returned a number of projects in the suburbs of Cecil Hills, Cecil Park and Austral listed in Table 5-18.

Table 5-18 Major projects

Project	Stage	Distance
Elizabeth Drive Subdivision	Response to submissions	500 metres north
Saints Peter and Paul Assyrian Primary School	Assessment	1.5 kilometres north
Brandown Resource Recovery Facility	Environmental impact statement	2 kilometres west
Fifteenth Avenue Commercial Hub	Determination	1.5 kilometres north-east
St Anthony of Padua Catholic School Redevelopment	Response to submissions	Adjacent north
CFC Warehouse Facility	Determination	3.5 kilometres east

The EIS for each of these projects does not specify a construction start date, as such there is the potential for construction activities to overlap. However, construction of the watermains will be progressive and the timeframe relatively short.

Potential impacts

The main potential cumulative impact of the project in combination with the above major projects is for additional air quality, noise and vibration and traffic and access impacts during construction.

Potential air quality impacts from the project are expected to be very limited with implementation of the environmental safeguards proposed in section 5.2.6. Accordingly, the potential for the project to contribute to significant cumulative impacts in the event one or more projects is simultaneously under construction is expected to be limited.

With regard to potential noise and vibration impacts, the majority of the identified major projects are expected to be sufficiently distant from the project to prevent cumulative impacts occurring.

The project will generate a relatively small volume of traffic that will be managed in accordance with the environmental safeguards that are proposed in section 5.2.8, including the preparation and implementation of a traffic management plan. Accordingly, with the implementation of the proposed safeguards, the potential for the project to contribute to significant cumulative impacts is expected to be limited.

A potential exception to the above is St Anthony of Padua Catholic School Redevelopment, which is proposed adjacent to the project on Tenth Avenue in Austral. In the event that construction was to occur simultaneously there will be potential for additional air quality, noise and vibration and traffic and access impacts in the surrounding area. An additional environmental safeguard is proposed below to consult with the relevant proponents of this redevelopment and minimise potential interaction with the project as far as practicable through construction planning.

Table 5-19 Environmental safeguards — Cumulative impacts

Safeguards
Consult with the relevant proponents of St Anthony of Padua Catholic School Redevelopment and minimise potential interaction with the project as far as practicable through construction planning.

5.2.12 General Environmental Management

Table 5-20 Environmental safeguard — General

Safeguards
Prepare a Construction Environmental Management Plan (CEMP) addressing the requirements of this environmental assessment. The CEMP should specify approval and notification requirements. Prior to the start of work, all project staff and contractors will be inducted in the CEMP. The CEMP should be readily available on site and include a site plan which shows:

Safeguards
• no go areas and boundaries of the work area • location of environmental controls (such as erosion and sediment controls, fences or other measures to protect vegetation or fauna, spill kits) • location and full extent of any vegetation disturbance.

The pipeline alignment shown in this REF is indicative and based on latest concept design at the time of REF preparation. The final alignment may change based on activities such as detailed design and construction planning. No further environmental assessment is required provided the changed alignment:

- remains within the field assessment area for the REF and has no net additional environmental impact; or
- is outside the field assessment area for the REF but reduces the overall environmental impact of the project (as per clause 110E(a) of the Environmental Planning and Assessment Act 1979).

Changes to the Proposal outside the field assessment area will only occur:

- to reduce impacts to biodiversity, heritage or human amenity; or
- to avoid engineering (for example, geological, topographical) constraints; and
- after consultation with any potentially affected landowners and relevant agencies.

The Delivery Contractor must demonstrate in writing how the changes meet these requirements, for approval by Sydney Water's Project Manager in consultation with the environmental and communication representatives.

Sydney Water's Project Manager (after consultation with Sydney Water's environment and community representatives and affected landowners) can approve temporary ancillary construction facilities (such as compounds and access tracks), without additional environmental assessment or approval if the facilities meet the following principles:

- Limit proximity to sensitive receivers
- No disruption to property access
- No impact to known items of non-Aboriginal and Aboriginal heritage
- Outside high-risk areas for Aboriginal heritage
- Use existing cleared areas and existing access tracks
- No impacts to remnant native vegetation or key habitat features
- No disturbance to waterways
- Potential environmental impacts can be managed using the safeguards in this REF
- No disturbance of contaminated land or acid sulphate soils
- Will be rehabilitated at the end of construction.

The Delivery Contractor must demonstrate in writing how the proposed ancillary facilities meet these principles. Any facilities that do not meet these principles will require additional environmental impact assessment.

The agreed location of these facilities must be shown on the Construction Environmental Management Plan site plan and appropriate environmental controls installed.

Prepare an Incident Management Plan (IMP) outlining actions and responsibilities during:

- onset of heavy rain during works
- spills
- unexpected heritage finds
- other potential incidents relevant to the scope of works.

Safeguards
All site personnel should be inducted into the IMP.
Immediately notify the Sydney Water Project Manager and Community Relations Representative of any complaints.
To ensure compliance with legislative requirements for incident notification (eg. *Protection of the Environment Operations Act 1997*), Sydney Water's employees and contractors will follow SWEMS0009.

6 Conclusion

Sydney Water has prepared this REF to assess the potential environmental impacts of construction and operation of the Liverpool to Cecil Park Water Project. During construction, the main potential environmental impacts of the project are typical construction impacts such as erosion and sedimentation, vegetation clearing, noise and vibration, visual and traffic impacts. During operation, the main potential impact is associated with noise from the operation of the water pump station at Liverpool Reservoir.

The project is required to cater for the predicted growth in demand for water servicing in parts of the South West Growth Area. The project will result in positive long-term environmental improvements, aligned with the principles of ecologically sustainable development.

It is considered that, given the nature, scale and extent of impacts and implementation of the safeguards outlined in this REF, the proposed work is unlikely to have a significant impact on the environment and an environmental impact statement is not required under Division 5.1 of the EP&A Act.

7 References

AE Design Partnership 2018, Elizabeth Drive Business Hub, https://www.planningportal.nsw.gov.au/major-projects/project/11516

DECC 2008, Managing Urban Stormwater: Soils and construction, https://www.environment.nsw.gov.au/research-and-publications/publications-search/managing-urban-stormwater-soils-and-construction-volume-2a-installation-of-services

DECCW 2008, Hygiene protocol for the control of disease in frogs.

DECC 2009, Interim Construction Noise Guideline.

ENSure 2018, Preliminary Environmental Assessment, South West Priority Growth Area (SWPGA) 'Eastern Front' (Location B).

Ethos Urban 2018, Environmental Impact Statement, https://www.planningportal.nsw.gov.au/major-projects/project/5346

EPA 2000, Industrial Noise Policy.

GHD 2019, Austral & Leppington Wastewater Stage 3 Concept Design, Contamination and Geotechnical Desktop Study.

Golder 2018, Scoping Report, https://www.planningportal.nsw.gov.au/major-projects/project/11571

Landcom 2004, Managing Urban Stormwater: Soils and construction, https://www.environment.nsw.gov.au/research-and-publications/publications-search/managing-urban-stormwater-soils-and-construction-volume-2a-installation-of-services

NSW DPI 2012, NSW Aquifer Interference Policy, http://www.water.nsw.gov.au/__data/assets/pdf_file/0004/549175/nsw_aquifer_interference_policy.pdf

NSW EPA 2014, Waste Classification Guidelines, https://www.epa.nsw.gov.au/~/media/EPA/Corporate%20Site/resources/wasteregulation/140796-classify-waste.ashx

NSW Government 2012, Austral and Leppington North Precinct Plan, https://www.planning.nsw.gov.au/-/media/Files/DPE/Reports/austral-leppington-post-exhibition-planning-report-2012-06.ashx

NSW Government 2016, Development consent, https://www.planningportal.nsw.gov.au/major-projects/project/9031

NSW Government 2017, Schedule of Classified Roads and Unclassified Regional Roads, https://www.rms.nsw.gov.au/business-industry/partners-suppliers/lgr/documents/classified-roads-schedule.pdf

NSW Government 2019a, Sharing and Enabling Environmental Data, https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU

NSW Government 2019b, ePlanning Spatial Viewer, https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address

NSW Government 2019c, Major Projects, https://www.planningportal.nsw.gov.au/major-projects/projects/search-name?name=

OEH 2019a, Upper Canal System (Pheasants Nest Weir to Prospect Reservoir), https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5051481

OEH 2019b, Cecil Hills Farm, https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5045757

RMS 2011, NSW Road Noise Policy, https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/noise/2011236nswroadnoisepolicy.pdf

Urbis 2018, Environmental Impact Statement, https://www.planningportal.nsw.gov.au/major-projects/project/10761

Western Sydney Parklands 2019, Business, https://www.westernsydneyparklands.com.au/about-us/business/

Western Sydney Regional Organisation of Councils 2003, Western Sydney Salinity Code of Practice.

Willowtree Planning 2018, Environmental Impact Statement, https://www.planningportal.nsw.gov.au/major-projects/project/9886

8 Appendices

Appendix A — Clause 228 checklist

Clause 228 checklist	REF finding
Any environmental impact on a community	The project may cause short-term impacts on the community due to emissions of noise and vibration, and potential traffic and access impacts during construction. The project will provide environmental benefits to communities by providing a reliable water service to the local community.
A transformation of a locality	The project will not result in the transformation a locality. The water main and distribution mains will be below ground. The pump station will be situated at an existing Sydney Water reservoir site and will not be inconsistent with the existing use of the land.
Any environmental impact on the ecosystem of the locality	The proposed works will have impacts on flora and fauna. As discussed in section 5.2.3, the potential impacts have been assessed and found to not be likely to constitute a significant impact.
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality	The project will not reduce the aesthetic, recreational, scientific or other environmental quality or value of the locality.
Any effect upon a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or any other special value for present or future generations	The project will impact 1 potential artefact scatter. This is an area of lower significance; an Aboriginal Heritage Impact Permit will be obtained before any works within this area. No impacts are expected to non-Aboriginal heritage items.
Any impact on the habitat of any protected animals (within the meaning of the Biodiversity Conservation Act 2016)	The proposed work may have any impact on the habitat of protected animals. Tests of significance were prepared for potential impact to threatened fauna species or their habitats in non-certified land. The tests concluded that the proposal will not have a significant impact. In additional offsets will minimise impacts on habitats of protected animals.
Any endangering of any species of animal or plant or other form of life, whether living on land, in water or in the air	The proposed work will not be endangering any species of animal, plant or other form of life, whether living on land, in water or in the air.
Any long-term effects on the environment	The project will have relatively limited effects on the environment and mainly during construction. The potential impacts of the project during operation will mainly be limited to potential noise. Safeguards have been proposed to limit this potential impact.

Clause 228 checklist	REF finding
Any degradation of the quality of the environment	The proposed work will not cause the degradation of the quality of the environment.
Any risk to the safety of the environment	The proposed work will not increase risk to the safety of the environment. The detailed design of the pump station will include safety measures to protect the surrounding environment in the event of an operational failure.
Any reduction in the range of beneficial uses of the environment	The proposed work will not have any reduction in the range of beneficial uses of the environment.
Any pollution of the environment	Environmental safeguards will mitigate the potential for the proposed work to pollute the environment. No pollution of the environment is expected.
Any environmental problems associated with the disposal of waste	Waste generation will be avoided where possible. Re-use opportunities will be investigated to minimise the volume of waste to be disposed.
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply	The proposed work will not increase demand on resources that are, or are likely to become, in short supply.
Any cumulative environmental effect with other existing or likely future activities	During construction the proposed work has potential to have cumulative impacts with other road, utility and residential development in the area. Sydney Water will consult and coordinate work with key stakeholders.
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	The proposed work will not have any impact on coastal processes or hazards.

Appendix B — Consideration of ISEPP consultation

ISEPP clause	Yes	No
Clause 13, council related infrastructure or services – consultation with council		
Will the work:		
Potentially have a substantial impact on stormwater management services provided by council?		✓
Be likely to generate traffic that will strain the capacity of the road system in the LGA?		✓
Involve connection to, and have a substantial impact on, the capacity of a Council owned sewerage system?		✓
Involve connection to, and use of a substantial volume of water from a Council owned water supply system?		✓
Involve installation of a temporary structure on, or enclosing, a public space under council's control that will cause a disruption to pedestrian or vehicular traffic that is not minor?		✓
Involve excavation of the surface of, or a footpath adjacent to, a road for which the council is the roads authority that is not minor or inconsequential?	✓	
Clause 14, local heritage – consultation with council		
Is the work likely to affect the heritage significance of a local heritage item, or of a heritage conservation area (not also a State heritage item) more than a minor or inconsequential amount?		✓
Clause 15, flood liable land – consultation with council		
Will the work be located on flood liable land (that is land that is susceptible to flooding by the probable maximum flood event) and will they alter flood patterns other than to a minor extent?		✓
Clause 15AA, flood liable land – consultation with State Emergency Services		
Will the work be located on flood liable land (ie. land that is susceptible to flooding by the probable maximum flood event) and undertaken under a relevant provision*, but not the carrying out of minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance? * (e) Div.14 (Public admin buildings), (g) Div. 16 (Research/ monitoring stations), (i) Div. 20 (Stormwater systems)?		✓
Clause 15A, development with impacts on certain land within the coastal zone– council consultation		
Is the work on land mapped as coastal vulnerability area and inconsistent with a certified coastal management program?		✓

Clause 16 – consultation with public authorities other than councils		
Will the project be located on land adjacent to land reserved under the *National Parks and Wildlife Act 1974* or to land acquired under Part 11 of that Act*? If so, consult with OEH.*		✓
Will the project be located on land in Zone E1 Nationals Parks and Nature Reserves or in a land use zone that is equivalent to that zone? *If so, consult with OEH*		✓
Will the project be adjacent to an aquatic reserve or a marine park declared under *Marine Estate Management Act 2014? If so, consult with the Department of Industry.*		✓
Will the project be in the foreshore area within the meaning of the *Sydney Harbour Foreshore Authority Act 1998? If so, consult with Sydney Harbour Foreshore Authority*		✓
Will the project comprise a fixed or floating structure in or over navigable waters? consult *RMS*		✓
Will the project be located on land in a mine subsidence district within the meaning of the *Coal Mine Subsidence Compensation Act 2017*? *If so, consult with Subsidence Advisory NSW.*		✓
Will the project involve clearing of native vegetation on land that is not subject land (ie non-certified land)? *If so, notify DP&E at least 21 days prior to work commencing.*	✓	

Appendix C — Flora and fauna assessment

Appendix D — Aboriginal heritage assessment

Appendix E — Statement of heritage impact

Appendix F — Noise and vibration assessment