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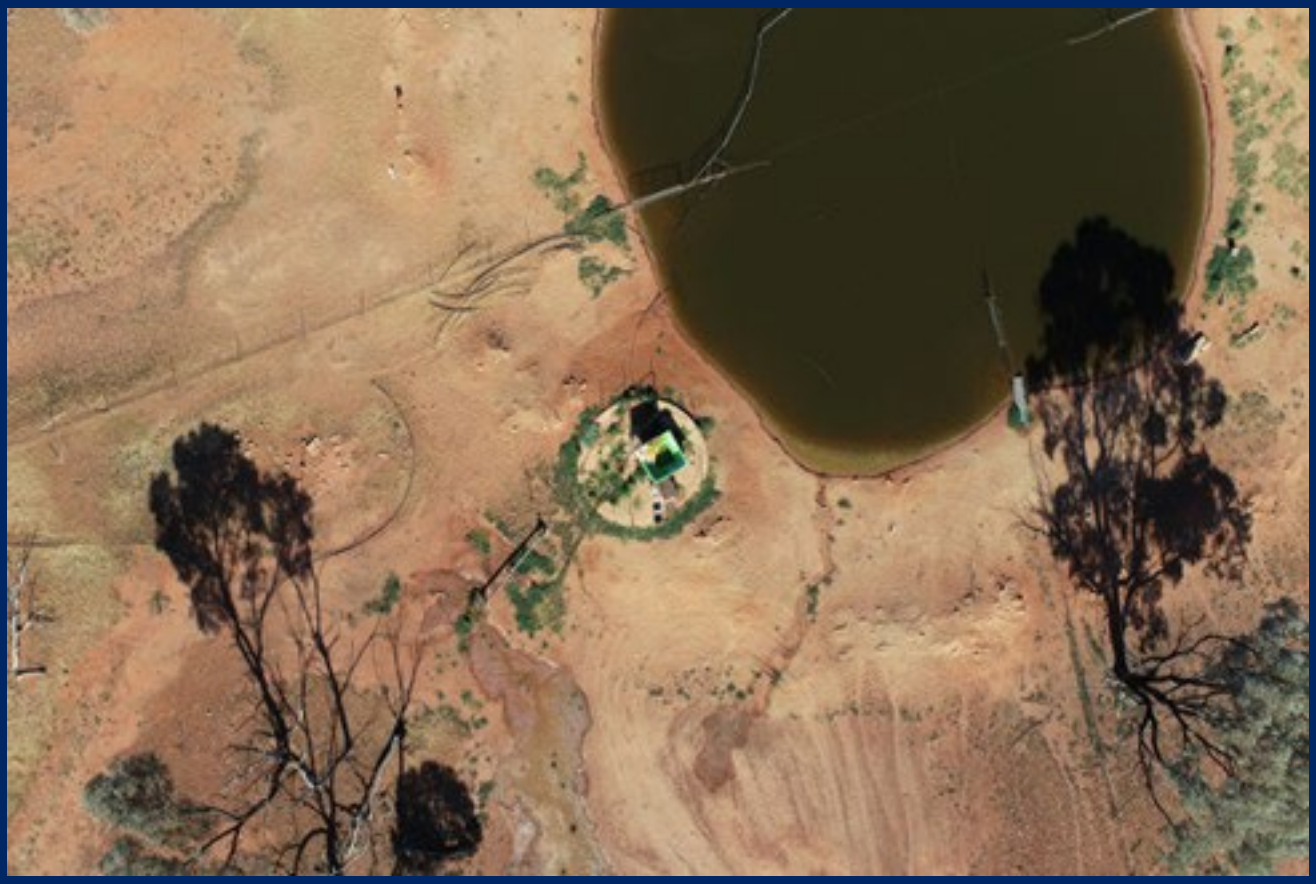
IGABDR – Wilga GW003859

Review of Environmental Factors

July 2022



Acknowledgement of Country

The Department of Climate Change, Energy, the Environment and Water acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

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Revision	Date	Prepared by	Reviewed by
V1.0	3/08/2022	Jane Dugdale-Bradley	David Workman
V1.1	21/08/2022	Jane Dugdale-Bradley	David Workman
V1.2	31/08/2022	Jane Dugdale-Bradley	Shavaun Tasker

Declaration

This Review of Environmental Factors (REF) has been prepared by Jane Dugdale-Bradley, Senior Water Efficiency Officer on behalf of the NSW DCCEEW – Water Group. The REF has been prepared to assess the environmental impacts to satisfy the requirements of Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and considers the factors listed in section 171 of the Environmental Planning & Assessment Regulation 2021 (EP&A Regs).

The REF provides a true and fair assessment of the proposed activity in relation to its likely effects on the environment. It examines and takes into account to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed activity.

Based on the information provided in the REF, it is concluded that:

1. the proposed activity is not likely to have a significant impact on the environment, and an Environmental Impact Assessment is not required.
2. the proposed activity will not be carried out in a declared area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations or ecological communities, or their habitats or impact biodiversity values. A Species Impact Statement (SIS) is not required.
3. the proposed activity is not likely to significantly affect any Matters of National Environmental Significance, nor is the activity being carried out on or is it likely to impact Commonwealth land.

Based on the information presented in this REF, it is concluded that by adopting the mitigation measures identified in this assessment, it is unlikely that the would be significant adverse environmental impacts associated with the project. Subject to the adoption of the measures to avoid, minimise or manage environmental impacts listed in this REF, the proposed activity is recommended for approval.

Author and qualifications	**Jane Dugdale-Bradley, B Land Management**
Designation	Senior Water Efficiency Officer
Reviewer and qualifications	David Workman, B Science (Hons)

Designation	Team Leader, Water Quality and Science Support
Organisation	Water Group of the NSW Department of Climate Change, Energy, the Environment and Water
Signature	
Date	

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1 Introduction

1.1 Project overview

The Water Group of the New South Wales (NSW) Department of Climate Change, Energy, the Environment and Water (DCCEEW) propose to install water supply infrastructure as part of the Improving Great Artesian Basin Drought Resilience (IGABDR) project.

The proposed works at Wilga bore are designed to meet the objectives of the IGABDR, being:

- rehabilitate (cap and pipe) high priority free flowing bores and drains in the Great Artesian Basin to save water and maintain artesian pressure which is essential for water supplies
- enhance reliability of water supply to significantly reduce the impact of drought
- improve drought resilience of landholders in the schemes.

1.2 Project justification

In the past, up to 95 percent of artesian water was being wasted through evaporation and seepage from bore drains. The NSW Cap & Pipe the Bores Program has improved the management of the GAB through the following achievements:

- Saving 80,000 ML of water every year
- Supplied approximately 4.2 million ha with permanent, reliability, efficient and strategically located watering points
- Controlled 400 free flowing bores
- Removed over 10,000 km of bore drains
- Installed 18,000 km of piping

The IGABDR project focuses on improving the delivery of stock and domestic water to properties by providing physical infrastructure, in return for water efficiency savings.

As such, the proposal meets the objectives of the IGABDR through improved efficiency of delivery of water, improved drought resilience, water savings, and a positive impact on groundwater-dependent springs in the vicinity of the proposed works.

1.3 Project location

Wilga bore is located on Bora Station, approximately 69 km due east-north-east of Enngonia and approximately 65 km north west of Brewarrina (see Figure 1). Wilga bore supplies water to both Bora and Paisley Stations.

The proposed scheme is located in the Brewarrina Shire Council area and falls with the Western Local Land Services (LLS) area in the Western Division of New South Wales (NSW).

1.4 Alternatives to proposed work

The objectives of the proposal are to:

- Establish reliable and efficient water supplies of artesian bore water to areas currently watered via bore drains from the Wilga bore on Bora and Paisley Stations.
- Minimise the environmental impacts of the proposed works during construction and operation.

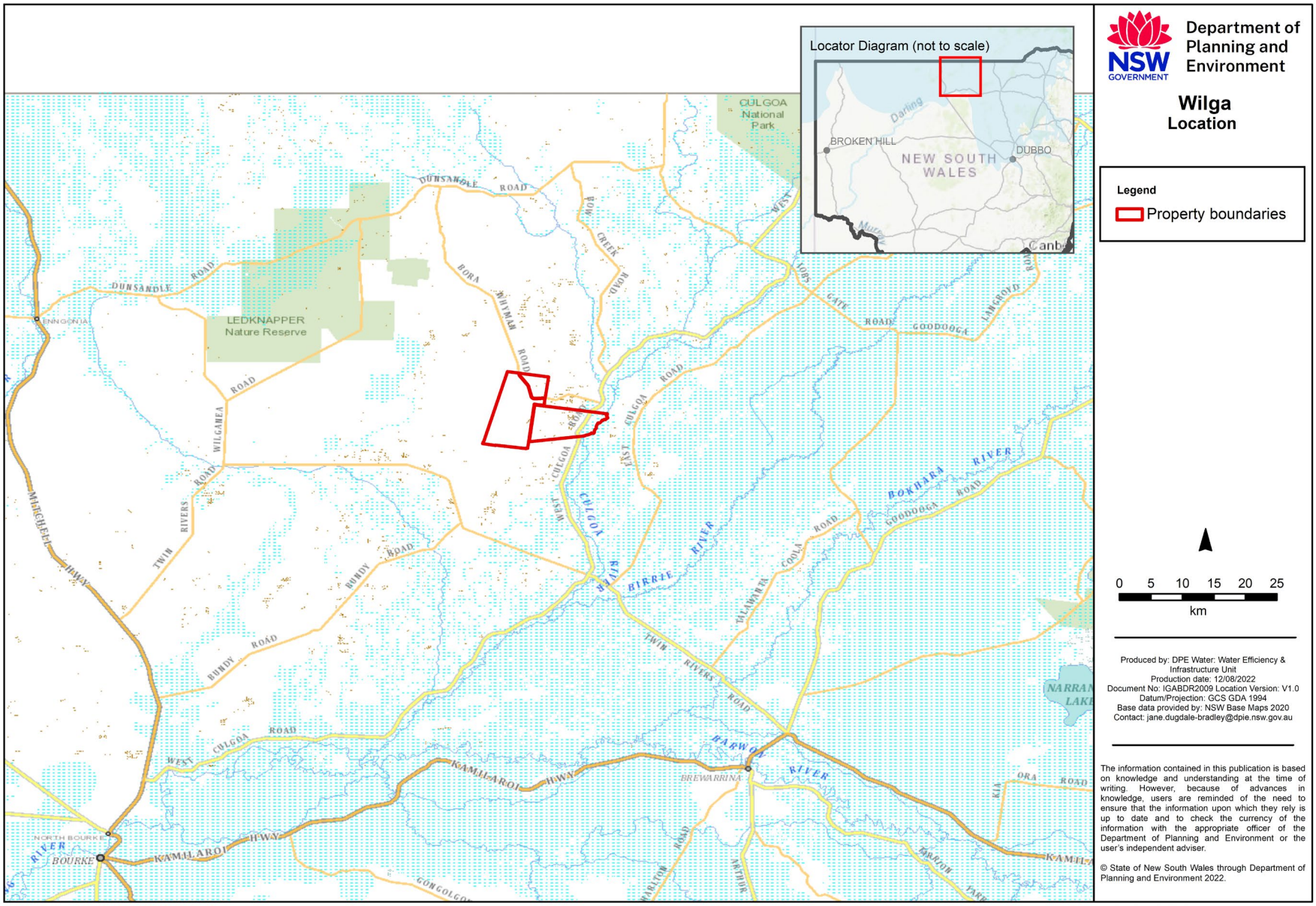

Figure 1: Location map

1.4.1 Consideration of alternatives

Option 1 – Do nothing

The “do nothing” option would require:

- No clearing of vegetation
- No impacts to the surrounding environment
- No interruptions to the water supply, and
- No capital expenditure.

However, this option will not meet the objectives of the proposal or the IGABDR.

Option 2 – Install water supply infrastructure – original route

Option 2 would involve the installation of the proposed water supply scheme along a route pre-determined prior to field work being conducted. The pre-determined route is shown in Figure 2.

Based on findings from the site inspection, this option was assessed as having a high likelihood of impacting on Aboriginal cultural heritage and biodiversity value and would therefore not meet the objectives of the proposal or the IGABDR.

Option 3 – Install water supply infrastructure – alternative route

This option would involve the installation of the proposed water supply scheme along a route designed to avoid wherever possible impacts to Aboriginal cultural heritage and minimise impacts on biodiversity value. This option also sees the removal of the pipeline, tanks and troughs on Boneda Station as the landholders have withdrawn from the Wilga scheme. The alternative pipeline route is shown in Figure 3.

While the route has been changed to minimise impacts to Aboriginal cultural heritage, it was not possible to avoid all impacts. As such an ACHAR and archaeological report are being prepared for an Aboriginal Heritage Impact Permit (AHIP) application.

This option would meet the objectives of the proposal and the IGABDR.

It should be noted, however, that there will be some environmental impacts which will need to be avoided where possible, or otherwise mitigated via the application of appropriate mitigation measures.

1.5 Selection of the preferred option

Option 3 meets the objectives of the proposal and the IGABDR and is therefore the preferred option.

As noted above, the proposal does have the potential for environmental impacts as described in Section 5, which should be avoided or mitigated with appropriate mitigation measures as described in Section 6.

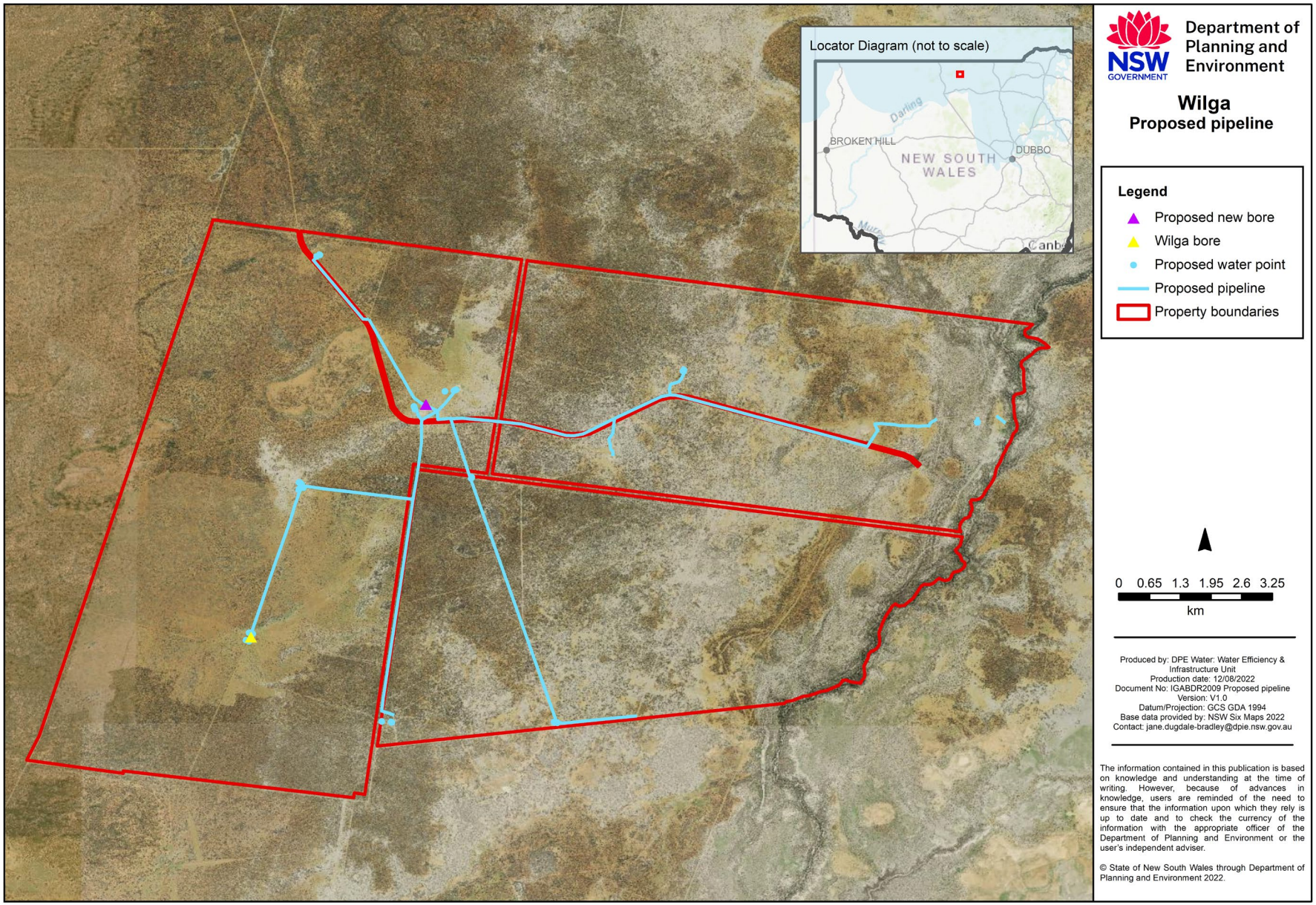

Figure 2: Proposed pipeline route

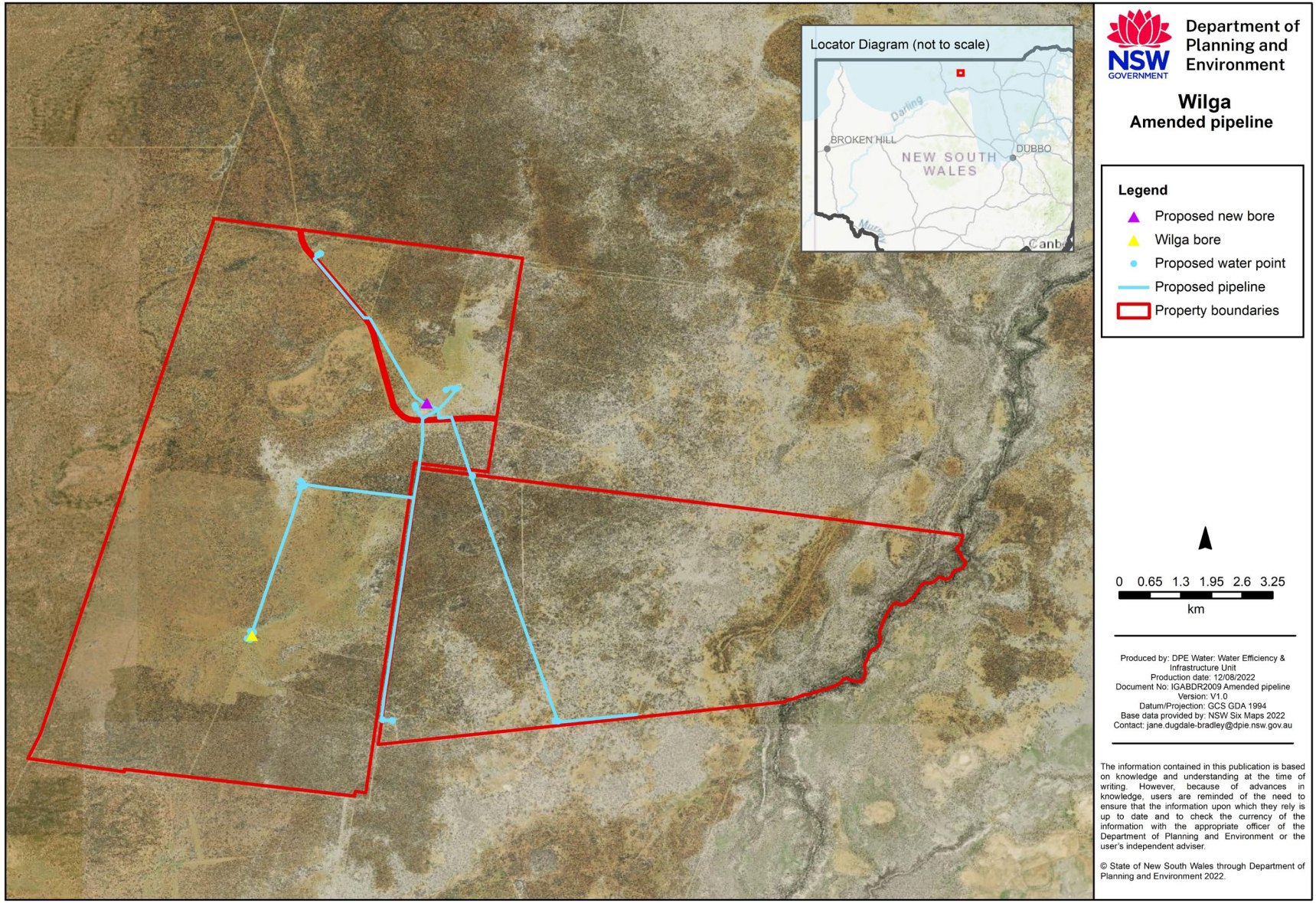

Figure 3: Amended pipeline route

2 Project description

2.1 Proposed works

The proposed works at Wilga bore consist of:

- Decommissioning/capping of the existing bore
- Construction of a new artesian bore within an area adjacent to the Bora homestead, and powerlines.
- Installation of approximately 26.2 km of polyethylene pipe to nine new 22,500 L poly tanks
- Installation of 16 concrete troughs on concrete pads.

The proposed works are anticipated to generate water savings of approximately 158 ML/year and have a positive impact on the artesian pressure and ecological health of 18 artesian springs, all of which are identified as having high priority groundwater dependent ecosystems under Schedule 2 of the *Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources* (NSW Government 2020).

The above figures are based on Option 3 (Section 1.4.1) which are revised figures based on results from site investigations. Figure 3 shows the revised proposed pipe layout.

2.2 Description of construction works

The proposed construction methodology will depend on a number of factors including the Contractor's chosen method, equipment and program. A construction methodology has been predicted based on previously constructed water supply schemes under the NSW Cap & Pipe the Bores program.

2.2.1 Construction site establishment

Construction sites and pipeline routes are to be established wherever possible on existing cleared areas, along fence lines and existing tracks to minimise disturbance, and will be determined in conjunction with the Principal's Authorised Person.

Where sites are to be cleared, topsoil is to be stripped and stockpiled separately to be used in restoration activities

2.2.2 New bore

It is likely that a rotary mud rig will be used to drill the new bore. A mud plant will treat the slurry, which is to be reused in the drilling process. Surplus slurry is to be dried and distributed within cleared areas on the site. An impact assessment area of 100 m x 70 m has been allowed for these works.

All bore headworks are to be carried out in accordance with the Principal's Drilling Specifications.

2.2.3 Decommissioning of existing bore

The existing Wilga bore is to be decommissioned as part of the works. Decommissioning must ensure that any physical hazard posed by the bore is eliminated.

Groundwater contamination or inter-aquifer flow must not occur during decommissioning.

Bore decommissioning is to be undertaken in accordance with the Principal's Drilling Specifications.

2.2.4 Vegetation clearing

The pipeline route will follow road reserves, property/paddock boundaries and fence lines as far as practicable as these areas are either cleared or are highly modified. This will reduce the need for clearing vegetation and reduce impacts on the landholder and the natural environment.

The works themselves will be confined to a narrow strip with clearing <=5 m wide, or in areas that contain Threatened Ecological Communities (TECs) <= 3 m wide, when required and as permitted under the Biodiversity Conservation Act 2016 (BC Act).

Clearing of the line will generally only occur when access for pipe laying machinery and support vehicles is less than the width of one vehicle and an alternate route cannot be located. Deviations in the pipeline alignment of up to 5 m can occur in order to further reduce vegetation clearing and avoid sensitive sites.

When clearing is required, smaller shrubs are to be removed and wherever possible, the line will divert around any vegetation with a basal diameter of greater than 10 cm. Clearing will not be the total removal of ground cover. It will only be sufficient to make the pipeline route trafficable. Any cleared areas will be allowed to regenerate naturally from the existing seed bank.

2.2.5 Trenching and pipe laying

The pipeline route is pegged and cleared as per the description in 2.2.4 above. The line is to be trenched to a depth of 700-800 mm and width of approximately 150 mm wide using a trenching machine. Pipe, which is typically 40-90 mm diameter polyethylene pipe, is to be buried with a

minimum cover of 600 mm from the top of the pipe, unless otherwise specified in the Principal's Plans and Specifications.

2.2.6 Water tank installation

Nine new poly tanks are to be installed as part of the proposed works. Tanks sites are to be levelled using earthmoving machinery such as a grader, front-end loader or bobcat. Tanks sites are to be on cut ground only.

Tanks must not be located on rocky or rough ground, or on sites with material present that may penetrate or otherwise damage the tank

Each tank site is to be approximately 4 m diameter and an area of approximately 12 m^2 with a maximum batter slope of 5:1 (horizontal:vertical). A circular impact area of no greater than 6 m radius (113 m^2) is allowed in areas of TECs. Where tanks are to be installed in disturbed areas, a circular impact area of 8 m radius (201 m^2) has been allowed.

Tanks are to be bedded as per the Manufacturer's instructions, or where there are no recommendations, or the recommendations are of a lesser standard than specified in the Principal's Specification, tanks are to be installed in accordance with the Principal's Reticulation Specification, unless directed otherwise by the Principal's Authorised Person.

2.2.7 Water trough installation

Sixteen new concrete troughs are to be installed as part of the proposed works. Trough sites are to be levelled using earthmoving machinery such as a grader, front-end loader or bobcat. Trough sites must be on cut ground only.

Each trough site is to consist of a level pad of 4.5 m x 6 m covering 27 m^2 formed for the boxing up and pouring of concrete pads. Concrete troughs are to be installed on the concrete pads. A circular impact area of no greater than 8 m radius (201 m^2) is allowed in areas of TECs. Where tanks are to be installed in disturbed areas, a circular impact area of 10 m radius (314 m^2) has been allowed.

Trough pads and troughs are to be installed as per the Reticulation Specification, unless directed otherwise by the Principal's Authorised Person.

2.2.8 Pumps and associated infrastructure

If required, a pump shed will be located adjacent to the new bore head and situated within a stockproof fenced area. If required, the pump and controls are to be powered by mains electricity.

2.2.9 Trench restoration

After laying of the pipe, trenches are to be backfilled using spoil from the excavations. The pipeline route is to be graded to a safe surface with no debris present, then mounded over the trench to allow for soil settlement and compaction over time.

Cross drains are to be installed along the pipeline to allow for drainage of overland flows. The drains are to be placed at every 2 m change in elevation, at slopes of more than 2% or as directed by the Principal's Authorised Person. The cross drains are to have a level sill to allow water to slow and spread out as it leaves the drain. The drains are to divert water to the downslope side of the pipeline.

All trench restoration works are to be undertaken as per the Principal's Reticulation Specification.

2.2.10 Bore drain backfilling

Soil disturbance is to be kept to a minimum during bore drain backfilling. Bore drains are to be backfilled using existing soil adjacent to the bore drains. The backfilled bore drain is to be mounded slightly to allow for soil settlement and compaction over time.

2.2.11 Construction sites restoration

Upon completion of the works, all construction sites are to be cleared of waste, debris and excess materials. Where mud pits have been used, these are to be drained and backfilled.

Any topsoil stripped and removed from excavated sites is to be evenly spread back over the sites and levelled.

All construction sites are to be restored as per the Principal's Drilling and Reticulation Specifications.

2.2.12 Construction timeframe

Construction works are anticipated to begin in late 2022 and are estimated to take approximately 15 weeks to complete – five weeks for bore drilling, two weeks for bore decommissioning and eight weeks for reticulation installation.

3 Statutory planning framework

3.1 Environmental Planning and Assessment Act 1979

Table 1 details the requirements for the proposal under the EP&A Act 1979.

Table 1: Assessment of proposal against the requirements of the EP&A Act 1979

Legislation, policy, regulation or plan	Requirement for the proposal
Environmental Planning & Assessment Act 1979 (EP&A Act)	NSW DCCEEW is a public authority and determining authority as defined in Part 5 of the EP&A Act. The proposal satisfies the definition of an activity under the Act. As such, NSW DCCEEW must assess and consider to the fullest extent possible all environmental impacts of the proposal before determining whether to proceed. This REF has been prepared with consideration of Section 171 of the EP&A Regs and Section 5.5 of the EP&A Act, and documents consideration of the environmental impact of the proposal and the necessary mitigation actions.

3.2 Other relevant NSW legislation

Table 2 details the requirements for the proposal under relevant NSW legislation.

Table 2: Assessment of proposal against the requirements relevant NSW legislation

Legislation, policy, regulation or plan	Requirement for the proposal
State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP)	The proposal is permissible without development consent under Chapter 2 Part 2.2 Division 24 s2.159 of the T&I SEPP. Chapter 2 Part 2.2 Division 1 of the T&I SEPP contains provisions for public authorities to consult with local councils and other public authorities. Consultation is discussed in Section 3.5 of this REF.

Legislation, policy, regulation or plan	Requirement for the proposal
Brewarrina Shire Council Local Environmental Plan 2013	The proposed Wilga scheme is zoned RU1 Primary Production under the Brewarrina LEP. Water reticulation systems are permissible without development consent in Zone RU1 Primary Production under the Brewarrina LEP. Therefore, the proposed works are permissible without development consent under the Brewarrina LEP. The project is consistent with the LEP land use objectives for the RU1 Primary Production Zone.
Brewarrina Shire Council Local Strategic Planning Statement 2020	The Brewarrina Shire Council Local Strategic Planning Statement (LSPS) sets the framework for economic, social and environmental land use needs over the next 20 years. The LSPS gives effect to the Far West Regional Plan 2036, implementing directions and actions at a local level. The proposal to cap and pipe the existing Wilga bore, drill a new artesian bore and connect it to a reticulated water supply system is compatible with the strategic vision and priority actions under the LSPS, specifically "deliver long-term water security" and "increase resilience to climate change"
State Environmental Planning Policy (Biodiversity and Conservation) 2021 **(B&C SEPP)** **Formerly** ***State Environmental Planning Policy (Koala Habitat Protection) 2020*** **(Koala SEPP)**	Chapter 3 of the B&C SEPP applies to land zoned RU1 Primary Production. Brewarrina Shire Council is listed in Schedule 2 of the B&C SEPP. The proposed works will occur on land zoned RU1 Primary Production (Brewarrina LEP 2013). Section 3.6(1) states "Before a council may grant consent to development application for consent to carry out development on land to which this Part applies, the council must be satisfied as to whether or not the land is a potential koala habitat." As no development application has or will be made and as Council is not the determining authority, as the development is being undertaken under Part 5 of the EP&A Act, the B&C SEPP 2021 Chapter 3 does not apply to this project.

Legislation, policy, regulation or plan	Requirement for the proposal
Crown Land Management Act 2019 (CLM Act)	Division 5.6 section 5.21 allows for the granting of a licence for the use or occupation of Crown Land for the purposes of transporting water from or across the land (including the use or undertaking of any ancillary works) As such, a licence must be acquired for works to be undertaken on Crown Land before construction begins. Division 5.9 allows for the creation of easements for public access, where required.
Local Land Services Act 2013 (LLS Act)	The clearing is part of an activity authorised under Part 5 of the EP&A Act and is therefore not subject to the provisions of the LLS Act.
Biodiversity Conservation Act 2016 (BC Act)	A Biodiversity Assessment Report has been prepared for the Wilga scheme. Tests of significance (as per section 7.3 of the BC Act) have been undertaken for a range of communities, flora and fauna considered threatened under the BC Act - one threatened ecological community, two threatened flora species, eleven threatened bird species, three threatened bat species and three threatened small mammal species. The project is unlikely to result in a significant effect on BC Act listed threatened species, ecological communities or their habitat. As such, a Species Impact Statement or opting into the Biodiversity Offset Scheme and preparation of a Biodiversity Development Assessment Report is not considered necessary (Biosis 2022). The full report is provided in Appendix A. A summary of threatened species, populations, ecological communities and critical habitat is provided in Section 4.4. An assessment of the potential impacts to threatened species, populations, ecological communities and critical habitat is provided in Section 5.5.

Legislation, policy, regulation or plan	Requirement for the proposal
Fisheries Management Act 1994 (FM Act)	No key fish habitat is present within the proposal area. The mapped waterways on Bora and Paisley Stations are not considered to be Key Fish Habitat. The waterbodies identified during the field assessment would be described as farm dams or agricultural drains and as such would also not be considered Key Fish Habitat according to Fairfull (2013) (Biosis 2022).
National Parks & Wildlife Act 1974 (NPW Act)	Assessment of potential impacts to Aboriginal cultural heritage has been undertaken and these are discussed in Sections 4.5.1 and 5.6. An Aboriginal Cultural Heritage Due Diligence Assessment Report has been prepared as a result of the field survey. The recommendation is that an Aboriginal Heritage Impact Permit (AHIP) is required if under-boring is not an option. As under-boring is not being pursued, an AHIP will be obtained. The full report is provided in Appendix B.
Aboriginal Land Rights Act 1983	Aboriginal land claims are discussed in Section 4.6.1. An Aboriginal land claim by NSW Aboriginal Land Council exists on Lot 110 DP 760481. This claim is incomplete. An Aboriginal land claim by the NSW Aboriginal Land Council on behalf of the Weilmoringle Local Aboriginal Land Council exists on Lot 5886 DP 1768778. This claim has been refused.
Native Title (New South Wales) Act 1994	The *Native Title (New South Wales) Act 1994* serves to implement the Commonwealth *Native Title Act 1993* in NSW and to ensure consistency with the standards set in the Commonwealth Act. The proposed Wilga scheme is not covered by a Native Title Application area.

Legislation, policy, regulation or plan	Requirement for the proposal
Water Management Act 2000 (WM Act)	Controlled activity approval Under the WM Act regulations, a public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that is carries out in, on or under waterfront land. A controlled activity approval is not required for the proposal. Water supply work approval - pipeline Under the WM Act regulations, a person is exempt from Section 91B (1) of the Act in relation to the construction of a water pipe used solely for conveying water from one place to another, or the construction of a water reticulation work on land the subject of a water use approval. A water supply work approval for the reticulation works is not required for the proposal in accordance with Subdivision 3 clause 37(1)(a) of the Water Management (General) Regulations 2018. Water supply work approval - bore drilling Under the WM Act Chapter 3 Part 1 Division 1 52(2)(b) does not allow a water bore to be constructed without a water supply work approval. Therefore, a water supply work approval must be sought from Water NSW for the drilling of the new bore. Use of water The WM Act requires approval to be obtained for the taking and use of water. The extraction of water during construction and operation of the proposed pipeline must comply with allowable stock and domestic water use limits.

Legislation, policy, regulation or plan	Requirement for the proposal
Biosecurity Act 2015	Under the Biosecurity Act, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Section 22 of the Act requires that any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised so far as is reasonably practicable. No priority weeds were identified during the biodiversity site assessment: The Contractor is required to develop a site-specific environmental management plan (EMP) which addresses biosecurity risk minimisation and mitigation. The Principal's Authorised Person will monitor and audit the Contractor's performance against the EMP.
Heritage Act 1977	Heritage impacts are addressed in Sections 4.5.2 and 5.8. The results of Heritage search reports are included in Appendix C. The proposal will not create any negative impacts on Historic heritage.
Roads Act 1993	The proposal is likely to generate a minor increase in local traffic; however, this increase will be temporary, and only occur during construction. During operation, the proposal is not expected to change road traffic movements.

Legislation, policy, regulation or plan	Requirement for the proposal
Protection of the Environment Operations Act 1997 (POEO Act)	An environment protection licence (EPL) is required for scheduled activities or development work listed by the POEO Act. The proposal is not of a kind listed in Schedule 1 of the POEO Act and would not require an EPL under this Act. Construction activities must comply with the requirements of the POEO Act, including but not limited to the following: Sections 115 and 116 (regarding disposal of waste, leaks, spillages and other escapes). Section 120 (regarding pollution of waters). Section 124 and 126 (regarding operations that result in air pollution) Section 139 (regarding noise pollution) Section 167 (regarding the appropriate maintenance and operation of plant and equipment. This has been addressed in Sections 5 and 6 of the Wilga REF.
Waste Avoidance and Resource Recovery Act 2001	This Act encourages the most efficient use of resources in order to reduce environmental harm. The proposed Wilga scheme works will seek to minimise waste wherever feasible and implement strategies to reuse or reduce waste.

3.3 Commonwealth legislation

Table 3 details the requirements for the proposal under the Commonwealth EPBC Act 1999.

Table 3: Assessment of proposal against the requirements of the EPBC Act 1999

Legislation, policy, regulation or plan	Requirement for the proposal
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	A Biodiversity Assessment has been undertaken as part of this REF. Section 4.4.1 summarises Matters of National Environmental Significance (MNES) and Appendix A provides the full MNES report. Section 4.4.2 provides a summary of the biodiversity assessment, and Appendix A provides the full Biodiversity Assessment Report. The works have been assessed as unlikely to have a significant impact on a MNES listed under the EPBC Act, as such a referral to the Minister for the Environment for determination under the EPBC Act is not considered necessary (Biosis 2022).
Native Title Act 1993	The proposed Wilga scheme does not sit within a Native Title Application area. Native Title is discussed in Section 4.6.2.

3.4 Summary of licenses and approvals

Table 4 below summarises the licences and approvals required for the proposal.

Table 4: Summary of approvals

Agency	Requirements	Reference	Timing	Responsible entity
NSW DCCEEW – Water Group	Determination of the proposal	Part 5, Division 5.1 EP&A Act 1979	Prior to construction	Water Group NSW DCCEEW
Landholder	Access approval		Prior to assessment phase	Water Group NSW DCCEEW
Water NSW	Water supply works approval – bore drilling	Division 1 Section 52(2)(b) of WM Act 2000	Prior to construction	Water Group NSW DCCEEW
Crown Lands	Licence for construction of pipelines on Crown Lands	Division 5.6 CLM Act 2016	Prior to construction	Water Group NSW DCCEEW
Heritage NSW	Aboriginal Heritage Impact Permit	Section 90 NPW Act 1974	Prior to construction	Water Group NSW DCCEEW
Brewarrina Shire Council	Permit to trench along/across Bora Whyman Road	Part 9 Division 3 138 (1)(b) of Roads Act 1993 No 33	Prior to construction	Contractor

3.5 Consultation

3.5.1 T&I SEPP

Chapter 2 Part 2.2, Division 1 of the T&I SEPP contains provisions for consultation with public authorities prior to the commencement of certain types of development. Tables 5-7 list the consultation requirements under the T&I SEPP.

Consideration of Clauses 2.10-2.12 and 2.14 of the T&I SEPP dictates whether or not consultation with councils is required.

This assessment is shown in Table 5 below and concludes that statutory consultation with Brewarrina Plains Shire Council is required.

Table 5: Assessment of Clauses 2.10-2.12 and 2.14 of the T&I SEPP

Clause	Response
Clause 2.10 – Developments with impacts on council-related infrastructures or services	
Substantial impact on stormwater management services provided by a council	The proposal will not have a substantial impact on stormwater management services provided by the Brewarrina Shire Council.
Likely to generate traffic to an extent that will strain the capacity of the road system in a local government area	The proposal will not generate substantial traffic.
Involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council	The proposal does not involve connection to, or substantial impact on any part of a sewerage system owned by the Brewarrina Shire Council.
Involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council	The proposal does not involve connection to or use of water from a water supply owned by Brewarrina Shire Council.
Involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential	The proposal does not involve any works that would cause a disruption that is not minor or inconsequential disruption to pedestrian or vehicular traffic.

Clause	Response
Involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which council is the roads authority under the *Roads Act 1993*.	The proposal requires the excavation of a road for which Brewarrina Shire Council is the roads authority under the *Roads Act 1993*.
Clause 2.11 – Consultation with councils – development with impacts on local heritage	
Is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area	The proposal will not significantly impact on any item of local heritage
Clause 2.12 – Consultation with councils – development with impacts on flood liable land	
Involves development on flood liable land that will change flood patterns other than to a minor extent.	The proposal will not change flood patterns other than to a minor extent.
Clause 2.14 – Consultation with councils – development with impacts on certain land within the coastal zone	
Involves development on land that is within a coastal vulnerability area and is inconsistent with a certified coastal management program that applies to that land.	The proposal is not located within a coastal vulnerability area.

Consideration of clause 2.13 dictates whether consultation with the SES is required (see Table 6).

Table 6: Assessment of Clause 2.13 of the T&I SEPP

Clause	Response
Clause 2.13 – Consultation with SES - development with impacts on flood liable land	

Clause	Response
Involves development on flood liable land that may be carried out without development consent under a relevant provision	The proposal does not meet the definition of a relevant provision as shown in clause 2.13 (2) (a)-(i). Consultation with the SES is not required.

Consideration of clause 2.15 dictates whether consultation with public authorities other than councils is required (see Table 7).

Table 7: Assessment of Clause 2.15 of the T&I SEPP

Clause	Response
Clause 2.15 – Consultation with public authorities other than councils – specified development	
Involves development adjacent to land reserved under the *National Parks and Wildlife Act 1974* or to land acquired under Part 11 of that Act.	The proposed works do not involve development adjacent to land reserved under the *National Parks and Wildlife Act 1974* or to land acquired under Part 11 of that Act. Consultation with NPWS is not required.
Involves development on land in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone	The proposed works do not involve development on land in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone. Consultation with NPWS is not required.
Involves development comprising a fixed or floating structure in or over navigable waters	The proposed works do not comprise a fixed or floating structure in or over navigable waters. Consultation with Transport for NSW is not required.
Involves development that may increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map	The proposed works do not involve development that may increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map. Consultation with the Director of the Siding Spring Observatory is not required.

Clause	Response
Involves development on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument	The proposed works do not involve development on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument. Consultation with the Secretary of the Commonwealth Department of Defence is not required.
Involves development on land in a mine subsidence district within the meaning of the Mine Subsidence Compensation Act 1961	The proposed works do not involve development on land in a mine subsidence district within the meaning of the Mine Subsidence Compensation Act 1961. Consultation with the Mine Subsidence Board is not required.

As part of the REF preparation, the following authorities were notified of the development via email:

- Crown Lands
- Brewarrina Shire Council
- DPI Fisheries
- DPE – Water Science
- DPE – Environment, Energy & Sciences
- Local Land Services – Western

Written responses received in reply to this notification are provided in Appendix D.

3.5.2 Aboriginal cultural heritage

The proposed scheme is within the Weilmoringle Local Aboriginal Land Council (LALC) area. Guy Gibbs, Western LSS participated in initial discussions regarding the proposal, and also accompanied the landholder and NSW DCCEEW staff, along with Kevin Knight, Elder during a site inspection on 26-27 August 2020 to provide advice on cultural heritage issues along the proposed pipeline route and identify areas of cultural heritage that need to be avoided during construction.

A Due Diligence assessment in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* has been carried out for the proposal by archaeologist Brendan Fisher, OzArk Environmental and Heritage in March 2022. The assessment included desktop research, site inspections and the completion of an Aboriginal Cultural Heritage Due Diligence Report, the results of which are summarised in Sections 4.5.1 and 5.7 of this report. The complete report is provided in Appendix B.

Consultation with the Aboriginal community as part of an Aboriginal Heritage Impact Permit (AHIP) has commenced. An Aboriginal Cultural Heritage Assessment Report (ACHAR) and Archaeological Report are being prepared for an AHIP application.

3.5.3 Community consultation

The proposed Wilga bore scheme is located on Bora and Paisley Stations. Based on the limited extent of the proposed works and the proposed scheme being located on private property, no community consultation was necessary.

4 Description of existing environment

4.1 Climate and air quality

The proposed project area straddles the Mulga Lands and Darling Riverine Plains Bioregions.

The majority of the proposed project area is within the Mulga Lands Bioregion, which is dominated by hot, persistently dry, semi-arid climate in the Warrego catchment. The western part of the bioregion has a more arid, desert climate. Climate information for the bioregion is summarised in Table 8 below (NPWS, 2003):

Table 8: Climate statistics for the Mulga Lands Bioregion

Mean annual temperature	10 – 18oC
Minimum average monthly temperature	-3.5 – 3.6oC
Maximum average monthly temperature	22.9 – 34.7oC
Mean annual rainfall	556 – 1270 mm
Minimum average monthly rainfall	31 – 83 mm
Maximum average monthly rainfall	76 – 137 mm

Air quality in the area of proposed works would be typical of the surrounding rural region, and generally of a high quality. Raised dust during the drier months would contribute to a significant reduction in air quality.

4.2 Bioregion, land systems, landscapes and soils

The proposed works fall within the Mulga Lands Bioregion, Nebine Plains sub-region and the Darling Riverine Plains Bioregion, Culgoa Bokhara sub-region. Topographic, geology and soil summaries for the bioregions are shown in Table 9 and Table 10 below (NPWS, 2003). Figure 4 shows the relative location of the scheme within the IBRA regions and sub-regions (DEWNR 2015 and DoE 2012).

Table 9: Mulga Lands Bioregion topography, geology and soils

Bioregion	Mulga Lands – Nebine Plains sub-region
Topography	Low ridges, partly overlain by dunes or sandplains. Channels and clay plains.
Geology	Cretaceous sandstones and claystones, partly silicified. Quaternary aeolian sands and alluvial clays.
Soils	Red earths, brown loams on bedrock, red earths and red texture contrast soils on sandplains and cracking grey clays on fine alluvial sediment.

Table 10: Darling Riverine Plains Bioregion topography, geology and soils

Bioregion	Darling Riverine Plains – Culgoa Bokhara sub-region
Topography	Channels, floodplains and swamps of past and present river systems.
Geology	Clay plains of the alluvial fans of the Culgoa and Bokhara Rivers. All fine sediments of Quaternary age.
Soils	Grey clays on almost all landscapes.

The Wilga scheme falls within the Land Systems of Western NSW. Land System descriptions for those within the scheme footprint are detailed in Table 11 and shown in Figure 5 (Walker, 1991).

Table 11: Land systems and geomorphology

Scheme	Land System	Range Type	Geomorphology	Summary
Wilga	Pirillie	Mulga – hard red ridges and flats	Rolling downs and lowland	Low rounded ridges of silicified sandstone and conglomerate with aeolian accumulations and terminal pans
	Myuna	Sandplains and alluvial plains with gidgee and/or brigalow	Plains	Plains with dense brigalow and/or gidgee along the Culgoa River
	Cartlands	Sandplains and alluvial plains with gidgee and/or brigalow	Plains	Extensive floodplain and stony plains for brown clays

The Wilga scheme falls within six Mitchell Landscapes. Descriptions of each Mitchell Landscape are detailed in Table 12 (DECC 2002) and shown Figure 6 (DECCW 2011).

Table 12: Mitchell Landscapes within the scheme

Mitchell Landscape	Description	Vegetation
Paroo-Warrego Tablelands and Downs	Rounded low hills and rides, stony plains of Cretaceous and Tertiary silicified shale, sandstone, conglomerate and quartzite with sand dunes, hummocks, pans and incised drainage lines. Relief 5-50 m. Defined dendritic drainage, small lakes and occasional overlying sand dune. Shallow, stony loamy soils grading into red earths in drainage tracts and grey and brown clays in depressions. Contour banding of stony red desert loams and self-mulching clays. Red siliceous sands and sandy earths in dunes, grey self-mulching clays in depressions.	Rocky slopes support supplejack (*Ventilago viminalis*), whitewood (*Atalaya hemiglauca*), western bloodwood (*Corymbia terminalis*), bimble box (*Eucalyptus populnea*), beefwood (*Grevillea striata*), mulga (*Acacia aneura*), umbrella mulga (*Acacia brachystachya*), leopardwood (*Flindersia maculosa*), thorny saltbush (*Rhagodia spinescens*), shrubby rice flower (*Pimelea microcephala*), warrior bush (Apophyllum anomalum), green hopbush (*Dodonaea petiolaris*), silver cassia (*Senna artemisiodes*), budda (*Eremophila mitchellii*), climbing saltbush (*Einadia nutans*), silky bluebush (*Maireana villosa*), turpentine (*Eremophila sturtii*), prickly wattle (*Acacia victoriae*), harlequin fuschia bush (*Eremophila duttonii*), with bottlewashers (*Enneapogon* sp.), copperburr (*Sclerolaena* sp.) and grasses. Low dunes with silver-leaved ironbark (*Eucalyptus melanophloia*), coolabah apple (*Angophora melanoxylon*) and quinine bush (*Alstonia constricta*). Bimble box, cotton bush (*Maireana aphylla*), black bluebush (*Maireana pyramidata*), copperburr and grasses in swampy depressions.

Mitchell Landscape	Description	Vegetation
Paroo-Warrego Plains	Plains of Quaternary alluvium in poorly defied drainage lines; small drainage sinks and swamps, relief to 5 m. Landscape also includes floodouts and low dunes, relief to 2 m. Calcareous sandy to loamy red earths, red and brown texture-contrast soils with cracking or plastic grey to brown clays in swamps.	Scattered to dense belah (*Casuarina cristata*), ironwood (*Acacia excelsa*), bimble box (*Eucalyptus populnea*), mulga (*A aneura*), coolibah (*E microtheca*), some gidgee (*A cambagei*), turpentine (*Eremophila sturtii*), budda (*E mitchellii*), warrior bush (*Apophyllum anomalum*), narrow-leaf hopbush (*Dodonaea attenuata*) on plains. Bimble box, coolibah, bluebush (*Maireana* sp.), cotton bush (*Maireana aphylla*), neverfail (*Eragrostis setifolia*), copperburr (*Sclerolaena* sp.), galvanised burr (*Sclerolaena birchii*) and turpentine with isolated leafless cherry (*Exocarpus aphyllus*).
Paroo-Warrego Alluvial Plains	Level floodplains and broad alluvial plains of Quaternary age with regular, small depressions away from the channel zone, patches of stony plains and low sandy accumulations. Relief 1 to 5 m. Brown non-cracking and cracking clays with areas of grey cracking clays and red-brown and yellow texture-contrast soils on plains. Deep sandy red earths with earthy pans, locally scalded on slightly higher ground. Sands and sandy earths on dunes. Depressions of sandy red earths, sometimes with gilgai in grey cracking clays.	Dense clumps of gidgee (*Acacia cambagei*), with mulga (*Acacia aneura*), leopardwood (*Flindersia maculosa*), rosewood (*Alectryon oleifolius*), belah (*Casuarina cristata*) and myall (*Acacia pendula*); scattered warrior bush (*Apophyllum anomalum*), nepine (*Capparis lasiantha*), wild orange (*Capparis mitchellii*), flowering lignum (*Eremophila polyclada*), neverfail (*Eragrostis setifolia*), annual saltbushes (*Atriplex* sp.), rigid panic (*Panicum prolutum*), copperburr (*Sclerolaena* sp.), other grasses and forbs. Coolibah (*Eucalyptus microtheca*), black box (*Eucalyptus largiflorens*), lignum (*Muehlenbeckia cunninghamii*) and annual saltbush on grey clays in channels and channelled floodplain. Depressions rimmed with bimble box (*Eucalyptus populnea*), over tall grasses.

Table 13 details the Australian Soil Order Classifications and erosion hazards present within the proposed scheme footprint (OEH 2017; Walker, 1991). These classifications are shown in Figure 7 (OEH 2017).

Table 13: Australian Soil Order Classification and Erosion Potential

Australian Soil Order Classification	Land system	Description	Erosion hazard
Rudosols and Tenosols	Pirillie	Red earths, lithosols and sands	Minor to severe water sheeting with minor rilling and gullying of the lower slopes; minor water sheeting and rilling of drainage tracts. Moderate to severe wind sheeting of sand accumulations.
Sodosols	Myuna	Red and brown texture-contrast soils, brown and grey cracking clays, minor red earths and sandy soils.	Minor to moderate wind sheeting, water sheeting and localised scalding of texture-contrast soils.
Vertosols	Cartlands	Brown cracking and non-cracking clays, grey cracking clays and texture-contrast soils.	Negligible apart from isolated scalding.

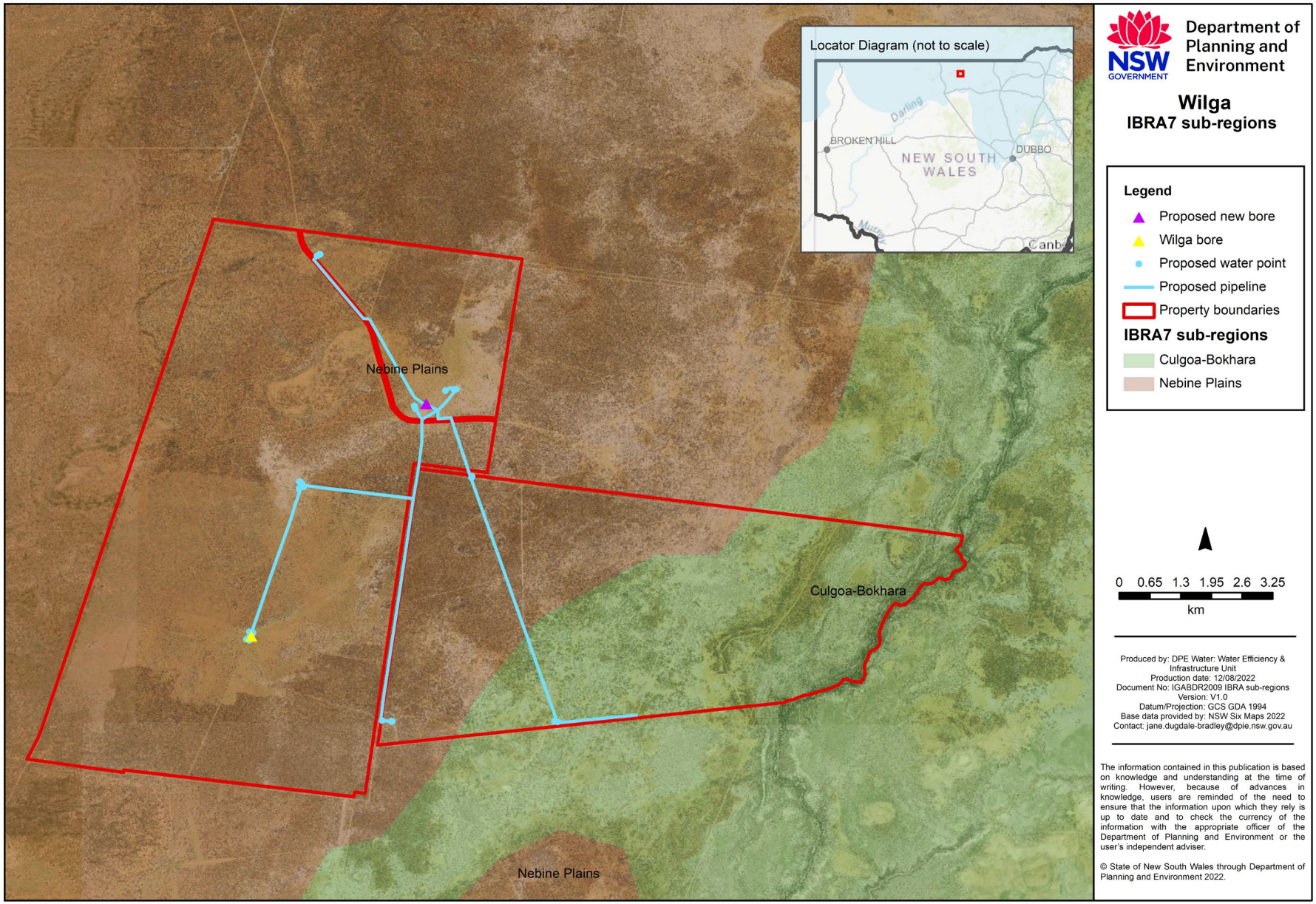

Figure 4: IBRA sub-regions

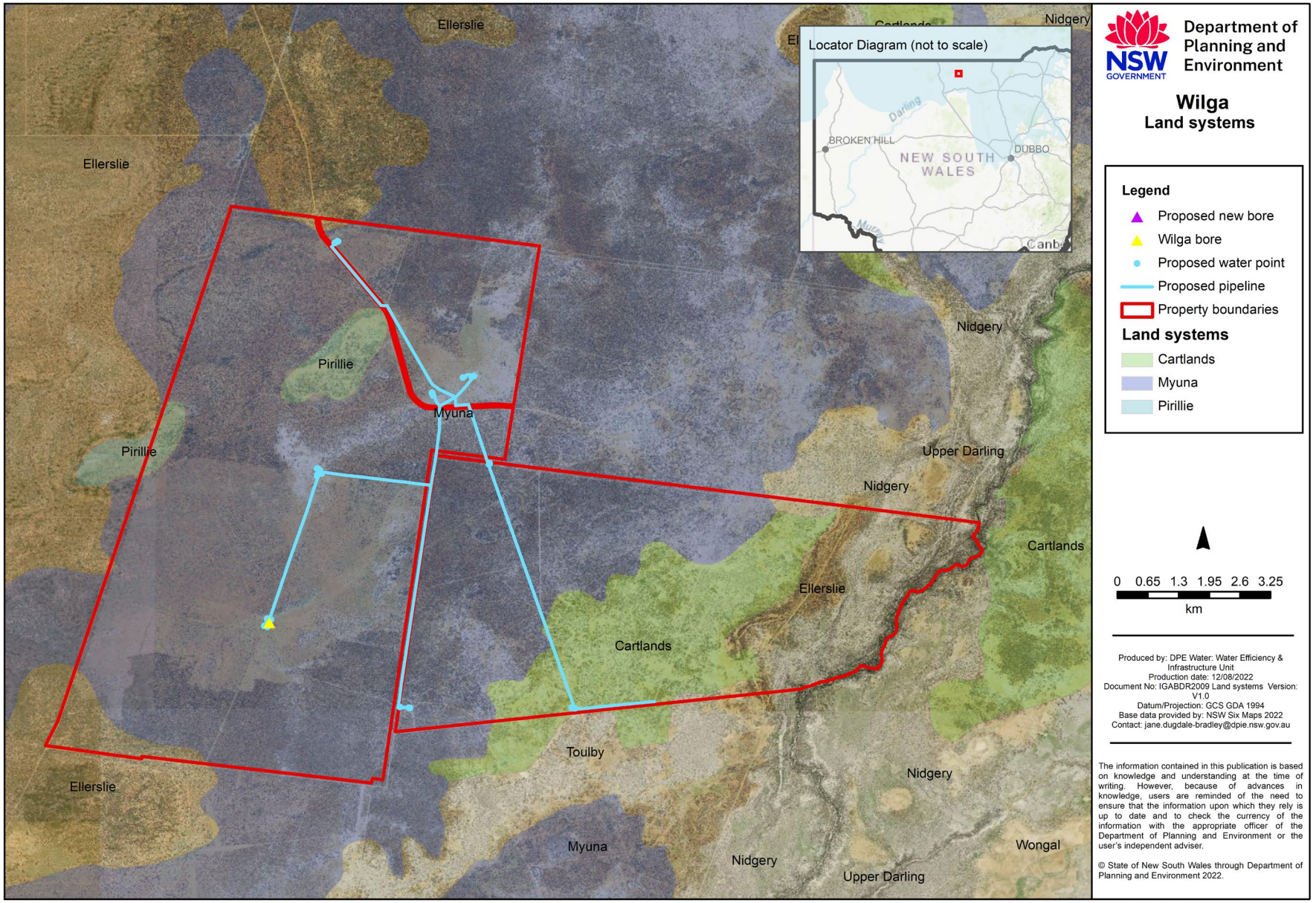

Figure 5: Land systems

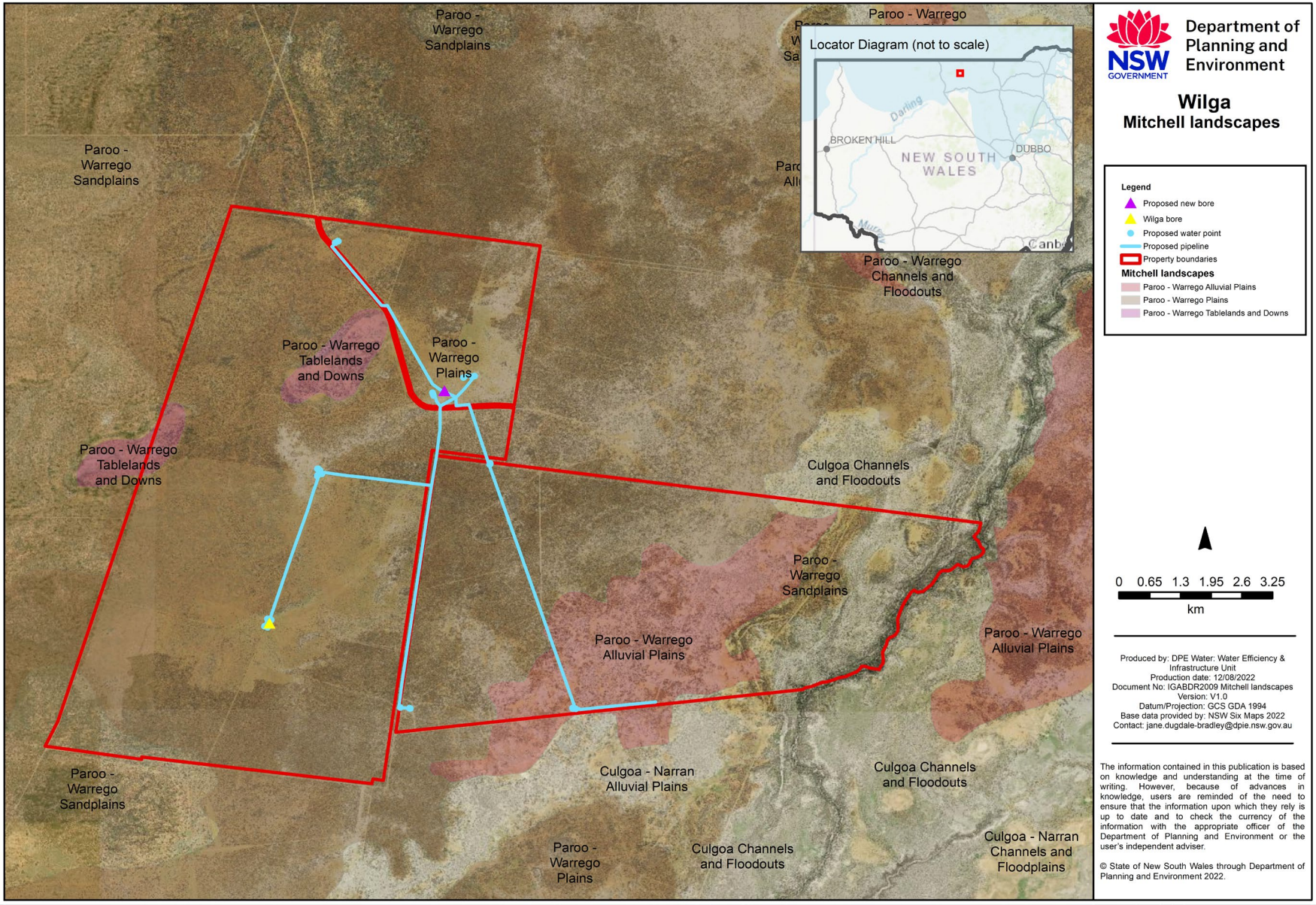

Figure 6: Mitchell landscapes

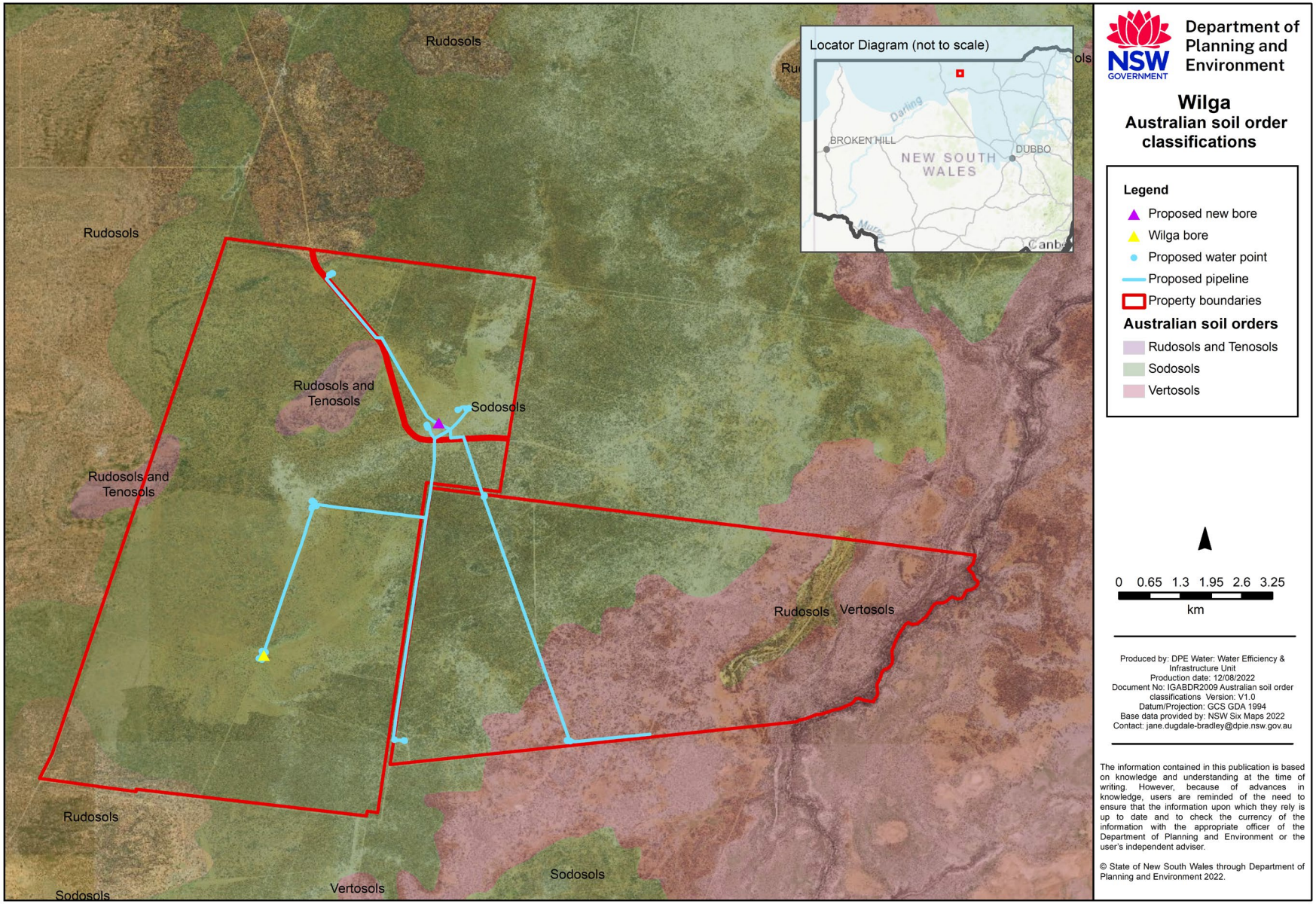

Figure 7: Australian soil order classifications

4.3 Hydrology, catchment values and water quality

The proposed scheme is surrounded by several perennial water sources:

- the headwaters of the Ledknapper Creek ~24 km west-south-west
- the Culgoa River forms part of the eastern boundary of the proposed scheme
- the Birrie River ~29 km south east
- the Barwon River ~70 km due south
- the Warrego River ~89 km west-south-west (see Figure 8)

A number of wetlands listed in the Directory of Important Wetlands of Australia are within 100 km of the proposed scheme. These include:

- the Culgoa River Floodplain is ~50 km north east of the proposed scheme
- Tom's Lake ~72 km west-south-west of the proposed scheme
- Racecourse Swamp ~72 km west-south-west of the proposed scheme
- Bottom Lila Lake ~ 82 km south west
- Dry Lake ~ 61 km south west of the proposed scheme
- the Narran Lakes ~84 km south east of the proposed scheme.

Listed under the Ramsar Convention on Wetlands of International Importance, the Narran Lake Nature Reserve is approximately 85 km east-south-east of the proposed scheme (DAWE 2018).

A line of artesian springs from the Bourke Super Group (Powell et al 2015) runs south west to north east of the proposed scheme, at its closest approximately 25 km north west of Wilga bore.

Figure 8 shows the perennial water sources around the proposed Wilga scheme.

The existing Wilga bore (GW003859) was drilled in 1945, is approximately 535 m deep and authorised for stock and domestic use. Water is drawn from the Warrego Groundwater Management Zone within the GAB and feeds approximately 1 km of bore drains. Water from the Wilga bore is piped across the property through old, failing agricultural pipe to ground tanks.

The unrestricted bore has a surface flow rate of 5.69 L/s recorded during logging in October 2016. The proposed works are anticipated to generate water savings of approximately 158 ML/year and have a positive impact on the artesian pressure and ecological health of 18 artesian springs, all of which are identified as having high priority groundwater dependent ecosystems under Schedule 2 of the *Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources* (NSW Government 2020). Figure 8 shows the location of artesian springs in relation to Wilga bore.

A salinity reading obtained from bore survey works in 2014 was 501-1,000 microseimens. This result shows relatively low levels of salinity in the bore water, which should not present any serious health or productivity impacts to livestock (DPI 2014).

A surface discharge temperature of 41.64 ^{0}C was recorded during logging in October 2016.

There are no high ecological value aquatic ecosystems (HEVAEs) within the proposed Wilga scheme area. High quality HEVAEs can be found to the north east of the scheme, closer to the Culgoa River (see Figure 9).

There are no streams classified under RiverStyles within the proposed Wilga scheme area. The closest watercourses classified under RiverStyles are the Culgoa River, approximately 3 km to the east of the scheme area, and Bow Creek, approximately 9 km north east of the scheme area (see Figure 10). Both the Culgoa River and Bow Creek are classified as Laterally Unconfined Valley, Continuous Channel under the RiverStyles naming convention.

The proposed Wilga scheme sits within the Lowland Darling River aquatic ecological community (DPI 2007), and all mapped waterways within the scheme are considered part of the community (Biosis 2022).

A number of first and second order streams that are associated with the Culgoa River run along the eastern boundary of the proposed Wilga scheme area (see Figure 11). A series of long disused bore drains are present within the proposed scheme area (see Figure 11).

The Wilga scheme is not covered by a Floodplain Management Plan.

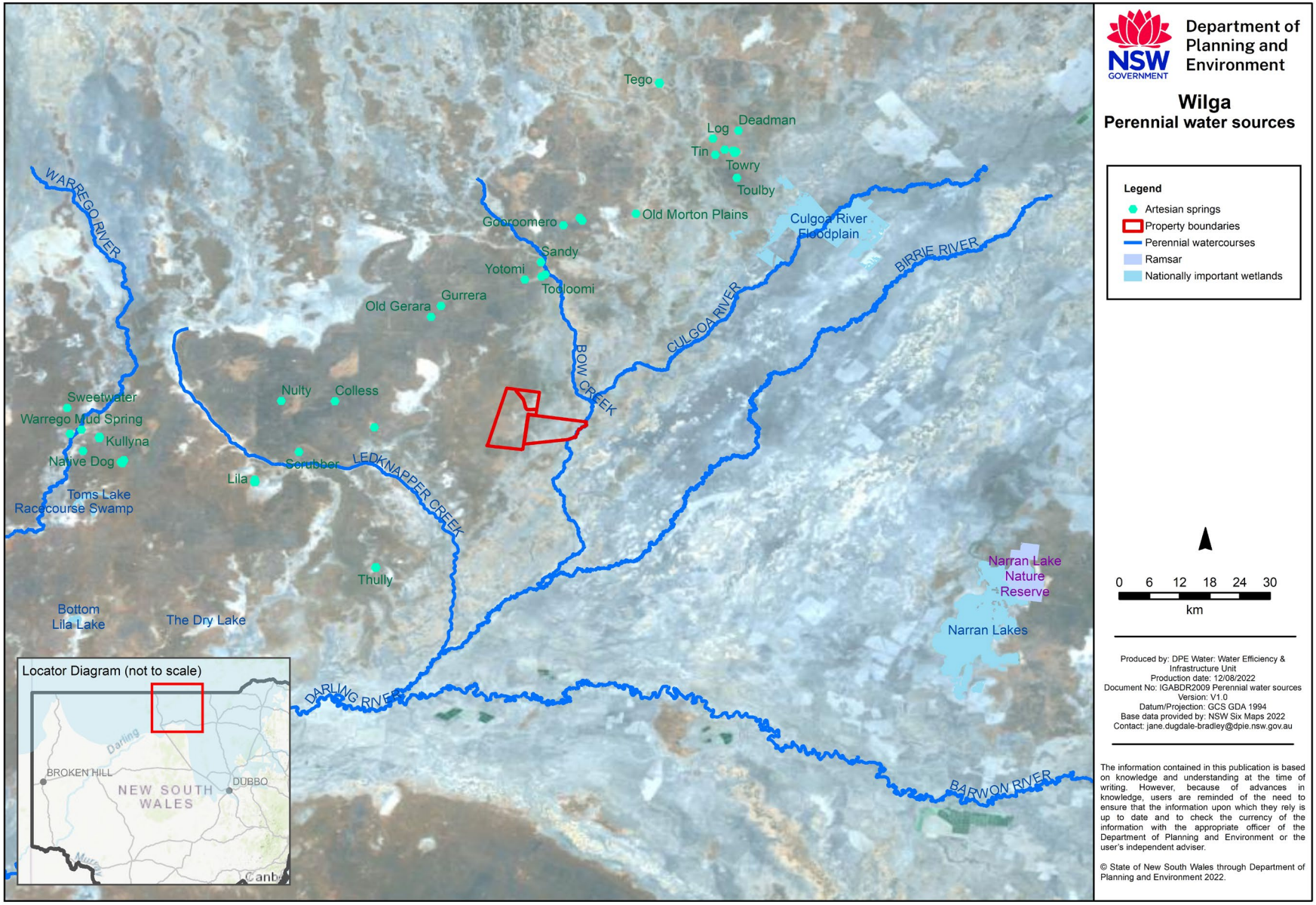

Figure 8: Perennial water sources

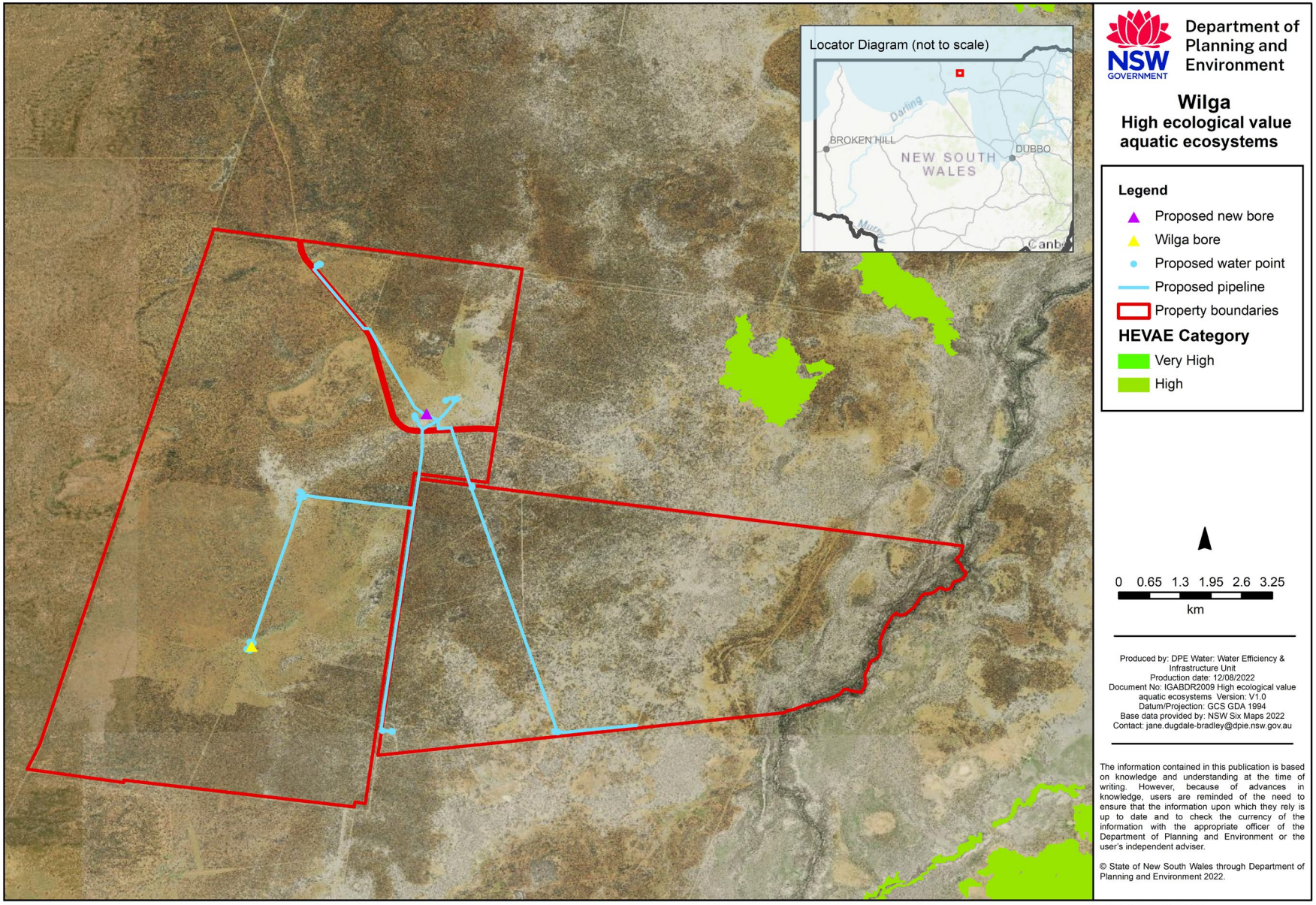

Figure 9: High ecological value aquatic ecosystems (HEVAE)

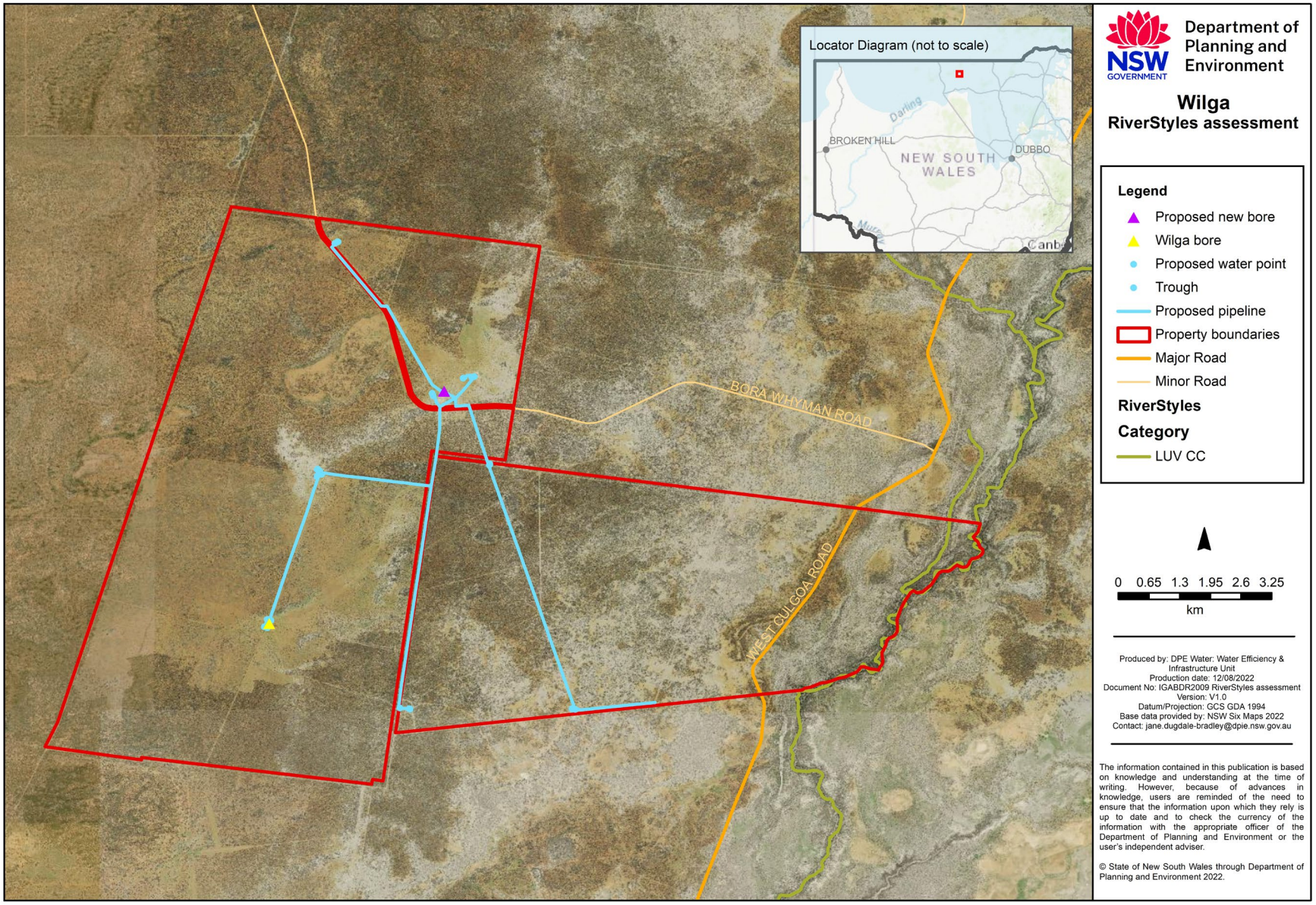

Figure 10: RiverStyles assessment

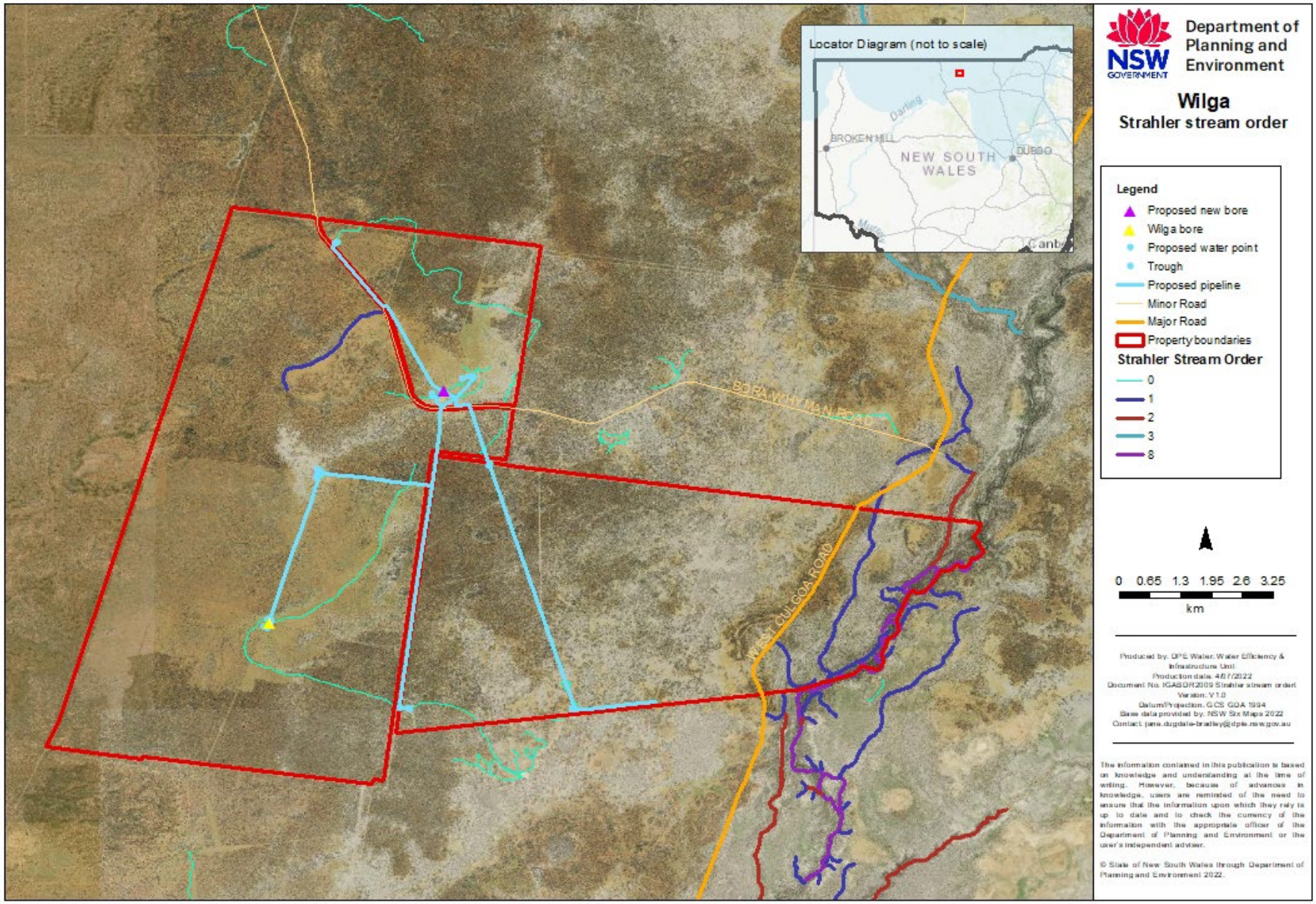

Figure 11: Strahler stream order

4.4 Biodiversity

4.4.1 Matters of National Environmental Significance

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for Commonwealth involvement in development assessment and approval in circumstances where there exist 'matters of national environmental significance'.

The Australian Government's Protected Matters Search Tool was accessed on 21 June 2022. (https://www.environment.gov.au/epbc/protected-matters-search-tool) and a search undertaken:

A buffer of 10 km around the area digitised was mandated within the search protocols. The list of co-ordinates provided is available in the full MNES report (see Appendix A).

Table 14 summarises the Matters of Environmental Significance identified as a result of the search:

Table 14: Matters of Environmental Significance

World Heritage Properties	None
National Heritage Places	None
Wetlands of International Importance	3
Great Barrier Reef Marine Park	None
Commonwealth Marine Area	None
Listed Threatened Ecological Communities	4
Listed Threatened Species	10
Listed Migratory Species	7

Table 15 lists other matters protected by the EPBC Act.

Table 15: Other matters protected by the EPBC Act

Commonwealth Land	None
Commonwealth Heritage Places	None
Listed Marine Species	13
Whales and Other Cetaceans	None
Critical Habitats	None
Commonwealth Reserves Terrestrial	None
Australian Marine Parks	None

The full MNES report is provided in Appendix A.

4.4.2 Biodiversity assessment

There are no Areas of Outstanding Biodiversity Value as described under the BC Act 2016 within the proposed scheme. The proposal will not have any direct or indirect impacts on Areas of Outstanding Biodiversity Value.

Plant Community Types (PCTs) potentially within the scheme can be found in Table 16 and Figure 12 (DPIE 2019)

There is no vulnerable regulated land or sensitive regulated land within the proposed Wilga scheme area (see Figure 13).

The proposed Wilga scheme works sit within the extent of the Lowland Darling River aquatic ecological community (DPI 2007).

Biosis Pty Ltd prepared a Biodiversity Assessment Report for the proposal. The report is summarised below, and the full report is provided in Appendix A.

Five PCTs were recorded within or directly adjacent to the Wilga scheme works area:

- PCT 29 - Brigalow open woodland on clay soils in the Nyngan-Bourke-Enngonia regions of the NSW north-western plains occurs on the clay plains west of the Culgoa River.
- PCT 40 - Coolabah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains occurs as a woodland on floodplains and a derived grassland where the canopy and shrub layer has been previously removed.
- PCT 109 - Poplar Box - Mulga - Ironwood woodland on red loam soils on plains in the Cobar Peneplain Bioregion and north-eastern Mulga Lands Bioregion occurs on the red soils rising slightly from the adjacent floodplains.
- PCT 118 - Gidgee chenopod woodland on red-brown clays in the semi-arid (hot) climate zone mainly in the Mulga Lands Bioregion is a predominantly Gidgee dominated community occurring on the red soils rising slightly from the adjacent floodplains.
- PCT 168 – Derived Copperburr shrubland of the NSW northern inland alluvial floodplain occurs as a derived low shrubland on the clay floodplain (Biosis 2022).

Brigalow Woodlands are present within the works footprint and correspond to intact examples of PCT 29. Derived examples of these PCTs did not qualify as the EPBC Act listed community, however this community is synonymous with the BC Act listed *Brigalow-Gidgee woodland/shrubland in the Mulga Lands and Darling Riverine Plains Bioregions*, and this community is defined as present if the associated PCTs are considered present, as such 0.73 hectares of the BC Act listed community is considered present within the works footprint (Biosis 2022).

The *Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions* EEC occurs surrounding the proposed works area. This community is synonymous with the BC Act listed *Coolibah - Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South,*

Cobar Peneplain and Mulga Lands Bioregions and this community is defined as present if the associated PCTs are considered present. No areas of representative PCTs defined under the EPBC Act or BC Act are present within the works footprint (Biosis 2022).

Woodlands throughout the Wilga area provide habitat for Painted Honeyeater Grantiella picta (Vulnerable under the EPBC and BC Act respectively). Bore drains and ground tanks provide potential habitat for Australasian Bittern Botaurus poiciloptilus (Endangered, EPBC Act and BC Act) and Australian Painted Snipe Rostratula australis (Vulnerable, EPBC Act and BC Act) (Biosis 2022).

A range of BC Act listed birds and bats have a medium or greater likelihood of utilising habitats within the Wilga area (Biosis 2022).

The following have been identified as having a medium or greater likelihood of occurrence within the works area where there is a possibility of an impact/effect.

Threatened ecological communities

- Coolibah-Black Box Woodland of the Darling Riverine Plains and Brigalow Belt South Regions (Endangered EPBC Act and BC Act)
- Brigalow (*Acacia harpophylla* dominant and co-dominant) (Endangered EPBC Act and BC Act) (Biosis 2022)

Threatened flora species

- Narrow-leafed Bumble *Capparis loranthifolia* var *loranthifolia* (Endangered BC Act) (Biosis 2022)

Threatened waterbirds

- Australasian Bitter *Botaurus pociloptilus* (Endangered EPBC Act and BC Act)
- Australian Painted Snipe *Rostratula australis* (Endangered EPBC Act and BC Act)
- Brolga *Grus rubicunda* (Vulnerable BC Act) (Biosis 2022)

Threatened woodland birds

- Painted Honeyeater *Grantiella picta* (Vulnerable EPBC Act and BC Act)
- Bush Stone-curlew *Burhinus grllarius* (Endangered BC Act)
- Pied Honeyeater *Certhionyx variegatus* (Vulnerable BC Act)
- Brown Treecreeper (eastern subspecies) *Climacteris picumnus victoriae* (Vulnerable BC Act)
- Varied Sittella *Daphoenositta chrysoptera* (Vulnerable BC Act)
- Major Mitchell's Cockatoo *Lophochroa leadbeateri* (Vulnerable BC Act)
- Hooded Robin *Melanodryas cucullata* (Vulnerable BC Act)
- Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis temporalis* (Vulnerable BC Act)
- Diamond Firetail *Stagonopleura guttata* (Vulnerable BC Act) (Biosis 2022)

Threatened bat species

- Little Pied Bat *Chalinolobus picatus* (Vulnerable BC Act)
- Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* (Vulnerable BC Act)
- Inland Forest Bat *Vespadelus baverstocki* (Vulnerable BC Act) (Biosis 2022)

Threatened fauna species

- Forrest's Mouse *Leggadina forresti* (Vulnerable BC Act)
- Sandy Inland Mouse (*Pseudomys hermannsburgensis*) (Vulnerable BC Act)
- Stripe-faced Dunnart (*Sminthopsis macroura*) (Vulnerable BC Act) (Biosis 2022)

Table 16: PCTs potentially present along proposed Wilga pipeline route

Vegetation Formation (Keith)	Vegetation Class (Keith)	PCT	Summarised Name	Name
Sem-Arid Woodlands (Grassy Sub-Formation)	Brigalow Clay Plan Woodlands	29	Brigalow Open Woodland	Brigalow Open Woodland on clay soils in the Nyngan-Bourke-Enngonia regions of the NSW north-western plains
Semi-Arid Woodlands (Grassy Sub-Formation	Brigalow Clay Plain Woodlands	31	Brigalow-Gidgee Open Woodland	Brigalow-Gidgee Open Woodland on clay plains west of the Culgoa River in the Mulga Lands Bioregion
Semi-Arid Woodlands (Grassy Sub-Formation)	North-west Floodplain Woodlands	37	Black Box Woodland Wetland	Black Box Woodland Wetland on NSW central and northern floodplains including the Darling Riverine Plains and Brigalow Belt South Bioregions
Arid Shrublands (Acacia Sub-Formation)	Gibber Transition Shrublands	118	Gidgee Chenopod Woodland	Gidgee Chenopod Woodland on red-brown clays in the semi-arid (hot) climate zone mainly in the Mulga Lands Bioregion
Arid Shrublands (Chenopod Sub-Formation)	Riverine Chenopod Shrublands	168	Derived Copperburr Shrubland	Derived Copperburr Shrubland of the NSW northern inland alluvial floodplains
Arid Shrublands (Chenopod Sub-Formation)	Riverine Chenopod Shrublands	212	Chenopod Low Open Shrubland	Chenopod Low Open Shrubland – ephemeral partly derived from forbland saline wetland on occasionally flooded pale clay scales in the NSW north-western plains

Vegetation Formation (Keith)	Vegetation Class (Keith)	PCT	Summarised Name	Name
Semi-Arid Woodlands (Shrubby Sub-Formation)	North-west Alluvial Sand Woodlands	376	Mixed Scrub Open Woodland	Mixed Scrub Open Woodland on sand rises and dunes on floodplains in the Darling Riverine Plains and Brigalow Belt South Bioregions

Source: DPIE, 2019. State Vegetation Type Map Western Region.

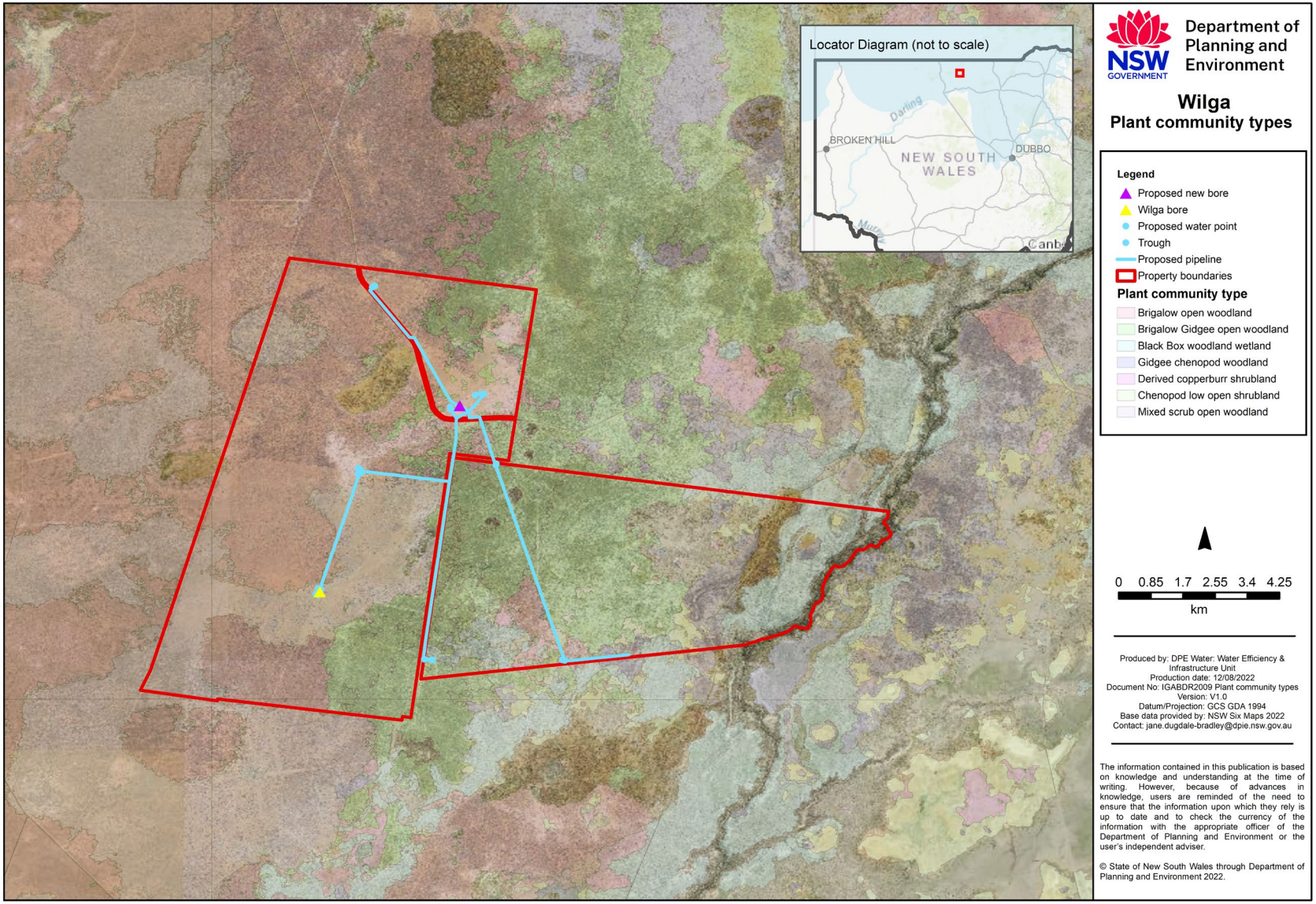

Figure 12: Plant community types

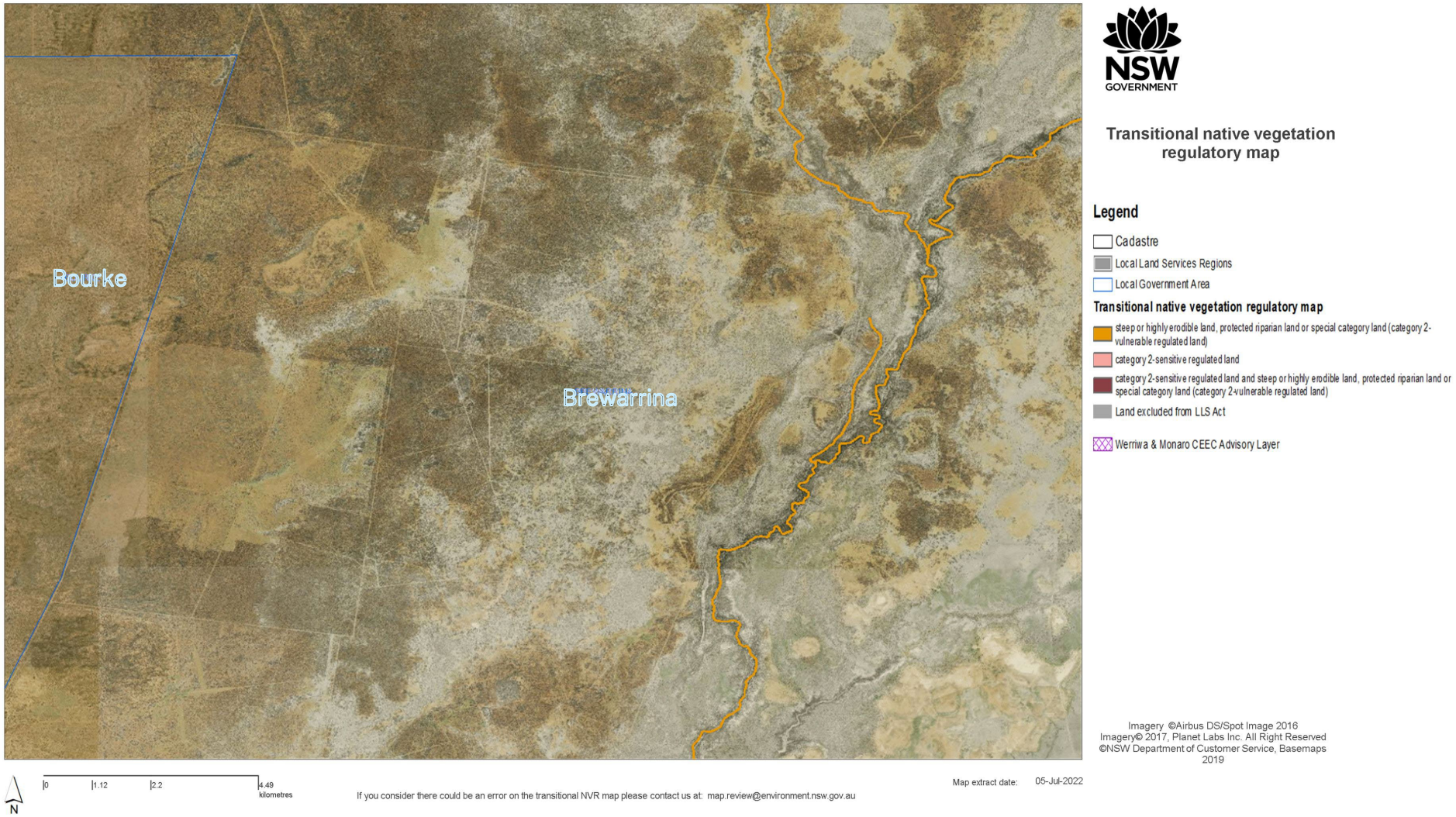

Figure 13: Transitional native vegetation regulatory map

4.5 Cultural heritage

4.5.1 Aboriginal cultural heritage

Ozark Environmental and Heritage undertook a Due Diligence Assessment for Aboriginal cultural heritage sites for the proposal in March 2022. The results of the Due Diligence Assessment are summarised here, with the full report provided in Appendix B. .

The visual inspection of the study area was undertaken by OzArk Project Archaeologist, Brendan Fisher, on 15 and 16 March 2022. Four additional Aboriginal sites (Bora Station IF-1, Paisley Station IF-1, Bora Station OS-1, and Paisley Station OS-1) were recorded during the field inspection and all landforms were assessed as having low potential to contain Aboriginal objects in subsurface (OzArk 2022).

The undertaking of the Due Diligence process resulted in the conclusion that the proposed works will have an impact on the ground surface, however, no Aboriginal objects or intact archaeological deposits will be harmed by the proposal if the proposed works remain within the assessed impact area and if Paisley Station OS-1 is underbored or avoided by other options (OzArk 2022).

As underboring has been investigated and determined not to be an option, an Aboriginal Heritage Impact Permit (AHIP) will be obtained.

AHIMS registered sites and sites identified during the due diligence assessment are shown in Figure 14.

4.5.2 Historic heritage

A search of the on-line Australian Heritage database was undertaken on 5 July 2022 for the areas of Collerina, Talawanta and Weilmoringle. No sites were found around Talawanta. One indicative place was found around Collerina and Weilmoringle in the National Estate.

Table 17 below details the search results.

Table 17: Records from Australian Heritage Database for Collerina and Weilmoringle

Item	Location	Area search	Status
Indigenous Place	Brewarrina	Collerina	Interim list
Indigenous Place	Weilmoringle	Weilmoringle	Indicative place

A search of the on-line NSW Heritage database was undertaken on 5 July 2022 for the Wilga area.

One record was returned for Aboriginal Places listed under the NPW Act. Table 18 shows an extract of details for the site.

Table 18: Aboriginal Place listed under the NPW Act

Aboriginal place name	Local government area	LALC
Old Gerara Springs	Bourke	Murrawarr

No records were returned for items under the NSW Heritage Act.

One record was returned for items listed by Local Government and State Agencies. Table 19 shows an extract of details for the site.

Table 19: Item listed by Local Government and State Agencies

Item name	Instrument name	LGA
Ancient quarry site	Brewarrina Local Environmental Plan 2012	Brewarrina

The full search reports are included in Appendix C.

4.6 Land tenure, zoning and land use

The proposed works are located on Bora and Paisley Stations which are held under perpetual Western Lands Lease granted under the *Western Lands Act 1901*.

The proposed works intersect the following crown land parcels – Bora (Lot 110 DP 760481 and Lot 111 DP 760482) and Paisley (Lot 5886 DP 768778).

A travelling stock reserve (TSR) runs north south along the eastern boundary of Paisley Station (see Figure 15). It does not intersect the proposed Wilga scheme.

The proposed works are located on land zoned RU1 Primary Production under the Brewarrina Local Environmental Plan 2013.

The primary land use is extensive grazing, with opportunistic water trapping of feral goats.

4.6.1 Aboriginal land claims

Search requests were sent to NSW DCCEEW's Aboriginal Land Claim Assessment Team on 6 June 2022 to determine whether any Aboriginal Land Claims existed within the proposed works area.

The response received on 9 June 2022 noted that there were two parcels that had Aboriginal Land Claims linked to them. One claim has been refused. The other claim, over Lot 110 DP 760481, made by the NSW Aboriginal Land Council on 12 October 2018 is incomplete.

The search results are included in Appendix B.

4.6.2 Native Title

The National Native Title Tribunal Native Title Vision https://nntt.maps.arcgis.com/apps/webappviewer/index.html?id=b221c006ae5d4cabaa1e18099bc11bb9 was accessed on 7 June 2022.

The web map shows the proposed works area do not sit within a Native Title Application area.

The proposed works area is not covered by any ILUAs.

The search request results are included in Appendix B.

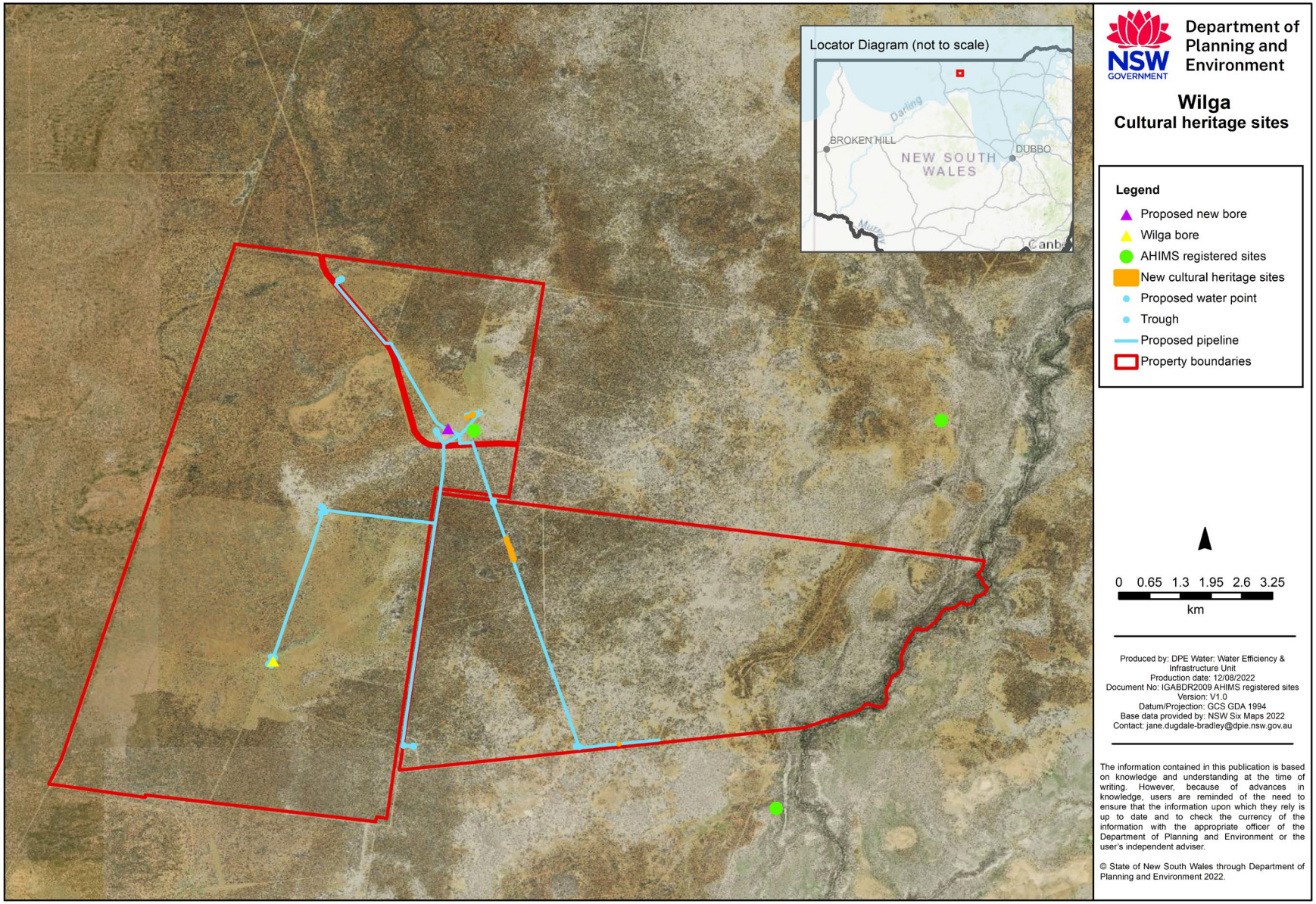

Figure 14: Cultural heritage sites

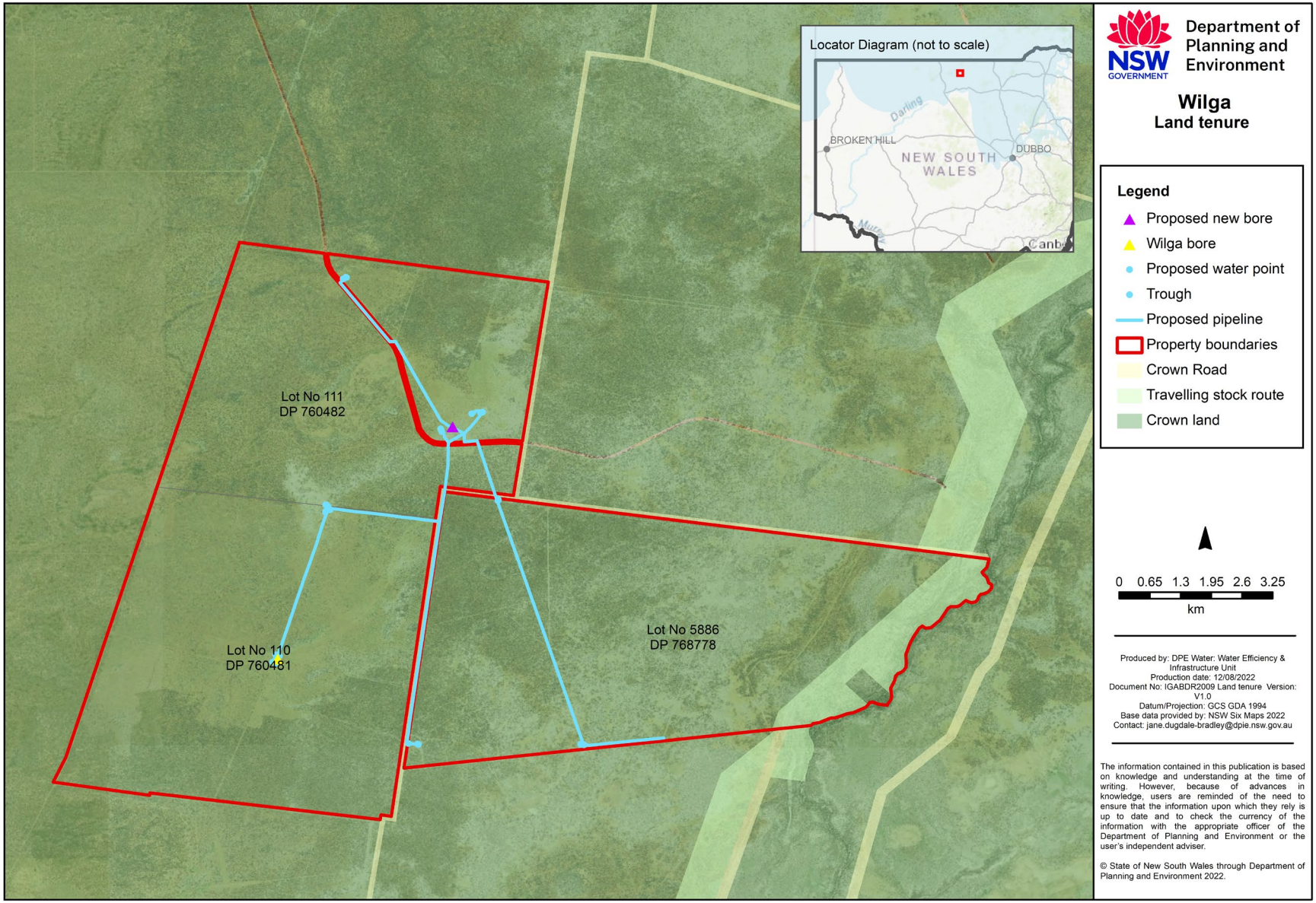

Figure 15: Land tenure

5 Environmental assessment

5.1 Air quality

5.1.1 Impact assessment

Air quality is expected to be good due to the rural environment and extensive farming activity on and adjacent to the site. The main factors influencing local air quality are:

- Movement of vehicles and trucks;
- Raised dust during dry periods, particularly from bare areas in the surrounding landscape;
- Seasonal pollen from native vegetation.

The main impact on air quality during construction will come from the generation of localised dust associated with earthworks and trucks transporting materials to and around the work sites on unsealed roads. This is not anticipated to cause notable adverse environmental impacts unless the weather is particularly windy.

Dust emissions can be minimised by restricting the construction footprint, ensuring vehicle speeds are kept to the minimum necessary on unsealed roads, and the area of vegetation removed during construction is kept to a minimum.

Local air quality may be affected by emissions from construction traffic. These emissions would, however, occur only intermittently, and would be minor and temporary. It would be unlikely that they would contribute to a permanent detectable reduction in local air quality.

With implementation of the recommended mitigation measures, potential air quality impacts during construction are considered minor and unlikely to be significant.

5.1.2 Mitigation measures

- Construction vehicles and equipment are to be suitably serviced within the six-month period prior to commencement of construction activities and all necessary maintenance undertaken during the construction period to meet EPA air quality requirements.
- The excessive use of vehicles and powered construction equipment is to be avoided.
- Vehicles speeds on unsealed roads are to be kept to a minimum.
- All construction machinery is to be turned off when not in use to minimise emissions.
- The Contractor is to monitor dust generation potential.
- Any stockpiled spoil/fill is to be protected to minimise dust generation and avoid sediment movement offsite.
- Vehicles transporting spoil to and from the sites are to be covered.

5.2 Soils

5.2.1 Impact assessment

The proposed works will not have any major impact to landform or geology; however, the pipe laying will involve trenching to an approximate depth of 700-800 mm and 500 mm wide. The area of disturbance will be kept to a minimum in relation to soils.

The anticipated maximum direct disturbance area is anticipated to be around 13.73 ha, 12.84 ha of which will be in existing previously disturbed areas and 0.89 ha across three plant community types, one of which is an EEC (0.7 ha). This is a minimal amount when considering the total project area of approximately 10,945 ha across the two properties, and the estimated area of EEC (PCT29) across the property (3,800 ha).

The actual disturbance area will most likely not vary from that described in the Wilga REF. Most of this area will be rehabilitated, with the long-term disturbance to soils confined to the area around the new bore, holding tanks and trough areas which are estimated to require approximately 0.82 ha of land (Biosis 2022) to be used. The area subject to long-term disturbance is comprised of 0.65 ha in existing previously disturbed areas, and 0.17 ha across two plant community types, one of which is an EEC.

Some minor soil disturbances will occur around vehicle and plant access tracks, including any temporary hardstand areas. Minor erosion and scouring could occur if there is a substantial flood event during or soon after construction, before the areas have been restabilised.

5.2.2 Mitigation measures

- Stockpiled spoil/fill is to be located away from drainage lines and be protected to minimise dust generation and avoid sediment movement offsite.
- Windrowed topsoil is to be managed so that it can be re-spread to ensure effective and efficient seed germination and assist with stabilising disturbed soil.
- Appropriate erosion and sediment controls are to be installed prior to the commencement of works in accordance with the technical document, Landcom (2006) Edition 4 Managing Urban Stormwater, Soils & Construction (the Blue Book), and where applicable the NSW Guidelines for Laying Pipes and Cables in Watercourses on Waterfront Land and the Code of Practice for Minor Works in NSW Waterways.
- All erosion and sediment controls are to be regularly inspected, especially when rain is expected, directly after any rain events, or when flood flows (if relevant) are moving through the scheme area.
- Erosion and sediment control measures are to remain in place until the area is stabilised to reduce potential surface water impacts on the site.

5.3 Water – Surface

5.3.1 Impact assessment

5.3.1.1 RiverStyles

There are no direct flow paths between the works and either the Bow Creek or the Culgoa River.

Given the low relief of the proposed Wilga works area, the potential impacts to either Bow Creek or the Culgoa River from the works is considered negligible.

5.3.1.2 Lowland Darling River aquatic ecological community

The proposed Wilga scheme sits within the Lowland Darling River aquatic ecological community (DPI 2007), and all mapped waterways within the scheme are considered part of the community (Biosis 2022).

Perennial streams, including the Culgoa and Bow Creek, occur along the eastern boundary of the project area; however, it is considered the works will have no impact on the ecological health of the community (see Section 5.3.1.1 above).

5.3.1.3 Key fish habitat

The field assessment undertaken by Biosis did not identify any evidence (surface water expression or channel form) of these waterways. It is considered that these mapped waterways are in fact simply low points in the landscape that would potentially fill with water temporarily under high rainfall conditions, but not provide any permanent or semi-permanent habitat in connected or disconnected pools following that rainfall. These mapped waterways are not considered to be Key Fish Habitat.

The waterbodies identified during the field assessment would be described as farm dams or agriculture drains and as such would also not be considered Key Fish Habitat according to Fairfull (2013) (Biosis 2022).

As such, there is no potential for impacts on key fish habitats as a result of the Wilga works.

5.3.1.4 Flooding

The Wilga scheme does not sit within the boundaries of any floodplain management plan.

The landscape within which the proposed Wilga scheme works will occur is one of low relief.

Proposed pipeline works will mostly follow existing fence lines and farm tracks, and generally follow the direction of overland flow. While there will be sections of pipeline which run across the direction of overland flow, these are not considered significant.

Post pipeline installation, trenches will be backfilled and mounded to <=10 cm in height, and cross drains installed to facilitate overland flow (see 2.2.5 and 2.2.9).

The potential for the proposed Wilga scheme works to change flood patterns or overland flow to any extent is considered negligible.

5.3.1.5 Construction works

The proposed works will result in ground disturbance due to the drilling works and excavation required for the installation of the pipeline and construction of associated infrastructure (poly tanks, troughs and pump (if required)).

There is potential for erosion and movements of excavated materials off-site. Erosion and sediment controls will be required during construction works as outlined in the Environmental Management Plan (EMP).

Appropriate erosion and sediment controls are to be installed prior to the commencement of works in accordance with the technical document, Landcom (2008) Edition 4 *Managing Urban Stormwater, Soils & Construction* (the Blue Book), and where applicable the *NSW Guidelines for Laying Pipes and Cables in Watercourses on Waterfront Land* and the *Code of Practice for Minor Works in NSW Waterways*.

Stabilisation must be undertaken following the works to prevent any impacts off-site, such as sedimentation of drainage lines and waterbodies. It should be noted that although a number of mitigation measures to protect water quality have been listed in this REF, further construction details should be included in the EMP for the works when further detail regarding the construction methodology is known.

The other potential source of erosion and sedimentation will be through traffic accessing the site during adverse (wet) conditions. Provided the Contractor implements appropriate protocols and management measures (see Section 5.2 and Section 5.10) the risk will be low.

5.3.2 Mitigation measures

The EMP is to address the following issues to prevent sediment movement and water quality impacts:

- Prior to works commencing environmental safeguards (eg sediment fences, booms etc.) are installed consistent with Landcom (2008) Edition 4 Managing Urban Stormwater, Soils & Construction (the Blue Book) and where applicable the NSW Guidelines for Laying Pipes and Cables in Watercourses on Waterfront Land and the Code of Practice for Minor Works in NSW Waterways to ensure minimisation of turbid plumes into the adjacent aquatic environment.

- Flow diversion measures are to be installed where construction of trenched watercourse crossings during no flow conditions is not feasible. Flow diversion measures may include pumps to ensure that water can be moved from one side of trench to the other, screened inlets to prevent the entrapment of aquatic fauna and outlet structures that are designed to avoid scouring of the channel.
- Where watercourses are trenched, all obstructions to flow will be removed as soon as practicable after the pipe has been laid and backfilled.
- Watercourse bed material excavated during construction from watercourses will be stockpiled outside of the active channel and avoid riparian vegetation, wherever practicable.
- Trenches between watercourse banks are to be backfilled within five days of excavation.
- Watercourses will be reinstated such that bank stability at the crossing location is the same or better than prior to construction. Stabilising materials such as rock armouring, hydro mulch, jute matting or other suitable geotextile materials may be applied to watercourse banks if necessary.
- Any large woody debris located within the construction footprint of watercourses to be trenched are to be temporarily relocated during construction and be reintroduced so as to mimic the natural pattern of large wood in the channel pre disturbance, or a more natural area in the system.
- Vegetation clearing is to be kept to a minimum and no more than defined in the Wilga REF.
- Backfilling and stabilising of trenches once pipelines are installed.
- Disturbed areas are to be stabilised and rehabilitated as soon as possible to reduce erosion potential (ie. exposure period of bare earth)
- Minimisation of restriction of or changes to overland flows.

5.4 Water – Groundwater and water quality

5.4.1 Impact Assessment

The main potential for water quality impacts is through the movement of spoil material offsite during the pipe laying activities. Runoff from the earthworks has the potential to increase turbidity and nutrients entering waterways, which when present in large volumes may have some ecological impacts. However, given the proximity of the work site to any permanent water source, this risk is assessed to be low.

The proposed pipeline trenches will be up to 900 mm deep and therefore unlikely to encounter groundwater (groundwater interception where there is no take does not currently require a license or approval). However, runoff may collect or seep into the trench following a rainfall event. Erosion and sediment controls are required during construction works for activities in these areas to prevent any impacts off-site, (see 5.2.2 and 5.3.2). Identification of water quality protection measures should be a key component of the EMP to be submitted by the Contractor.

Should groundwater (or seepage) be encountered during trenching activity it will need to be managed to avoid pollution. Groundwater may need to be filtered prior to being dispersed over vegetated ground surfaces. Groundwater devoid of sediment should be disposed of in a way that does not cause erosion. No intercepted groundwater should be discharged to a waterway.

The bore construction will require drilling fluid which is likely to consist of a bentonite slurry. The slurry is required to transport the cuttings, cool the drill bit and to seal and support the drilled hole. Bentonite is a naturally occurring clay which is self-sealing and therefore used as a lining material to seal any cracks which may result from the drilling process.

The use of drilling fluid could potentially result in soil erosion and waterway contamination if it is not contained onsite. Drilling fluid should be recirculated and therefore any loss of fluid will adversely affect drilling operations and will be immediately apparent to the drilling rig operators via a loss in pressure and fluid ceasing to be pumped to the drill-head. Appropriate management measures should be implemented to ensure drill waters are appropriately recycled and contained onsite such as through the use of holding tanks. Clean (non-contaminated) surplus slurry should be dried and distributed within cleared areas on the site.

The construction of the new bore and plugging of the existing Wilga bore will be compliant with the Principal's Drilling Specifications.

5.4.2 Mitigation Measures

Adequate procedures must be established and detailed in the EMP, including notification requirements to the EPA, for incidents that cause material harm to the environment.

An EMP is to be prepared and include the following requirements:

- Emergency spill kits are to be kept at the site (vehicle kits).
- Refuelling of machinery is to be undertaken in accordance with the EMP and at least 50 m away from drainage lines.
- Any chemicals and fuels are to be stored in a bunded area to the relevant Australian Standard, at least 50 m from any waterway or drainage line.
- Any hazardous materials stored on site are to be stored in the compounds and within impervious and bunded enclosures capable of storing 120% of the volume of material stored there.
- Workers are to be trained in the EMP and the use of the spill kits.
- A drilling management plan/procedure is to be developed as part of the EMP to detail the appropriate management of drilling slurry to avoid off site impacts.
- Any disposal of drilling fluids and slurry is to be undertaken in a manner that does not cause water pollution as per Section 120 of the POEO Act.

- Mitigation measures to manage groundwater (should it be encountered during construction) are to be incorporated into the EMP which is to address the following issues in relation to groundwater:
    - Measures to ensure groundwater quality is not impacted during construction;
    - Techniques to settle, treat or filter trench water encountered during excavation works such as diverting water through filter socks; and
    - Appropriate treatment and monitoring regimes should groundwater flows come to the surface, including disposal of groundwater in such a way as to prevent adverse impacts (such as erosion and water pollution).
    - Groundwater is not to be discharged to a waterway during construction.

5.5 Biodiversity

5.5.1 Impact assessment

The project is likely to result in the following adverse impacts:

- Removal and temporary disturbance of approximately 0.89 hectares of remnant and derived native vegetation representative of Plant Community Types (PCTs) 29 and 109for pipeline, bore, troughs and tank installation. PCTs 40, 118 and 168 are present surrounding the proposed works area but are not expected to be impacted by the works.
- Removal and temporary disturbance of approximately 0.70 hectares of vegetation within EEC Brigalow Woodlands (this vegetation corresponds to intact examples of PCT 29 above), remaining areas were considered derived and did not qualify as the EPBC Act listed community. This community is synonymous with the BC Act listed EEC *Brigalow-Gidgee woodland/shrubland in the Mulga Lands and Darling Riverine Plains Bioregions*, and this community is defined as present if the associated PCTs are considered present, as such 0.73 hectares of the BC Act listed community is considered present within the works footprint.
- Presence of Coolibah Black Box Woodlands surrounding the proposed works area. This community is synonymous with the BC Act listed *Coolibah - Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions*, and this community is defined as present if the associated PCTs are considered present. None of the PCTs that represent the EPBC Act or BC Act listed community are present within the works footprint.
- Disturbance to 0.89 hectares of potential habitat for Painted Honeyeater *Grantiella picta* (Vulnerable EPBC Act and BC Act).
- Disturbance to 0.89 hectares of potential habitat for BC Act threatened fauna; Bush Stone-curlew *Burhinus grallarius*, Brown Treecreeper (eastern sub-species) *Climacteris picumnus victoriae*, Varied Sittella *Daphoenositta chrysoptera*, Major Mitchell's Cockatoo *Lophochroa leadbeateri*, Hooded Robin *Melanodryas cucullata*, Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis temporalis*, Pied Honeyeater *Certhionyx variegatus,* Diamond Firetail *Stagonopleura guttata,* Little Pied Bat *Chalinolobus picatus* and Yellow-

bellied Sheathtail-bat *Saccolaimus flaviventris,* Inland Forest Bat *Vespadelus baverstocki*, Forest's Mouse *Leggadina forresti*, Sandy Inland Mouse *Pseudomys hermannsburgensis* and Stripe-faced Dunnart *Sminthopsis macroura*.

- Disturbance to potential habitat or removal of individual threatened flora including Narrow-leaved Bumble *Capparis loranthifolia* var. *loranthifolia* and *Phyllanthus maderaspatensis* (both Endangered, BC Act).
- Potential secondary impacts to threatened waterbirds; Australasian Bittern *Botaurus poiciloptilus* (Endangered, EPBC Act and BC Act), Australian Painted Snipe *Rostratula australis* (Endangered, EPBC Act and BC Act) and Brolga *Grus rubicunda* (Vulnerable, BC Act) that may occasionally utilise created wetland habitats in bore drains and ground tanks that will be decommissioned as part of the project. Secondary impacts to native vegetation, such as increased grazing pressure and trampling, resulting from concentrating livestock around new trough points.
- Reduction in the availability of permanent water within the Wilga area that may be used by a range of threatened and locally common wildlife species (Biosis 2022).

The following legislative considerations have been identified:

- The works have been assessed as unlikely to have a significant impact on a Matter of NES listed under the EPBC Act, as such a referral to the Minister for the Environment for determination under the EPBC Act is not considered necessary.
- As the project is unlikely to result in a significant effect on BC Act or FM Act listed threatened species or communities, a Species Impact Statement or opting into the Biodiversity Offset Scheme and production of a Biodiversity Development Assessment Report is not considered necessary.
- Under Section 199 of the FM Act the Minister (DPI) is required to be consulted over dredging or reclamation works. Given the works are being undertaken by a public authority, Section 199 of the FM Act applies and NSW DCCEEW – Water Group is required to give the Minister written notice of the proposed work, and consider any matters raised by the Minister within 21 days (Biosis 2022).

5.5.2 Mitigation measures

A range of mitigation measures are provided that underpin avoiding and minimising impacts on biodiversity. These mitigation measures will need to be considered in the detailed design and construction phases of the project (Biosis 2022).

Existing impact avoidance and minimisation steps

NSW DCCEEW – Water Group has worked closely with Biosis ecologists through combined field visits to design and locate the pipeline alignment and associated works to avoid and minimise direct impacts on native vegetation and fauna habitat as far as is practical. Key steps have included:

- In areas of threatened ecological communities, pipeline and infrastructure installation will use low impact methods to reduce the clearing footprint.

- Pipeline installation will utilise existing farm tracks, fence lines or service corridors to avoid intact woodland as far as is possible.
- Tree removal (especially large hollow bearing trees) will be avoided by micro-siting during construction, as far as is possible.
- The network of existing farm tracks and existing hard stand areas will be used for contractor access, storage and machinery movements (Biosis 2022).

Additional mitigation measures

The following detailed design, pre-construction and construction measures are to be implemented:

- The location of trenching and ripping works, and siting of tanks and troughs must avoid native vegetation unless quantified and detailed in the Wilga REF.
- The works areas must be clearly delineated and areas outside of the works area marked as no go zones prior to construction.
- The above measures, and other actions are to be included in a detailed Environmental Management Plan (CEMP) (see 6.1) (Biosis 2022).

5.6 Biosecurity

5.6.1 Impact assessment

No priority weeds have been identified near or within the proposed Wilga scheme.

Mitigation measures have been described below to minimise the potential of the introduction of weeds to the Wilga works area.

5.6.2 Mitigation measures

- Contractor vehicles and plant must be washed down and swept out prior to entering the site
- Vehicles and plant must stay on internal roads and tracks wherever possible
- Contractor vehicles and plant should be washed down and swept out prior leaving the site

5.7 Aboriginal cultural heritage

5.7.1 Impact assessment

Four additional Aboriginal sites (Bora Station IF-1, Paisley Station IF-1, Bora Station OS-1, and Paisley Station OS-1) were recorded during the field inspection in March 2022 (OzArk 2022).

Impacts to Bora Station IF-1, Paisley Station IF-1, Bora Station OS-1 have been avoided by amending the location of pipeline and waterpoint infrastructure.

Impacts to Paisley Station OS-1 cannot be avoided.

The visual inspection determined all landforms assessed have a low potential to contain Aboriginal objects in the subsurface (OzArk 2022).

5.7.2 Mitigation measures

- An Aboriginal heritage impact permit (AHIP) will be obtained from Heritage NSW prior to potential impacts generated during construction works. Once received, the requirements and conditions of the AHIP must be followed.
- The AHIP application will be accompanied by an archaeological research design that outlines specific mitigation measures (including artefact collection of Paisley Station OS-1) and developed in consultation with the Registered Aboriginal Parties (RAPs).
- No ground disturbance activities are permitted within 10 m of identified Aboriginal objects and sites, Paisley Station OS-1 inclusive, without having obtained an AHIP to allow their harm from Heritage NSW.
- No ground disturbance to any areas outside of those assessed in the ACHA or approved by the AHIP is permitted. Any activities that extend from this approved boundary must immediately stop, and the heritage consultant contacted to provide further advice.
- Inductions for work crews must include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts and are aware of the legislative protection of Aboriginal objects under the *National Parks and Wildlife Act 1974.*
- Contractors must be provided with the location of Bora Station IF-1, Paisley Station IF-1, Bora Station OS-1, and the sites must be clearly marked out with flagging tape and avoided.
- If during works, Aboriginal artefacts or skeletal material are noted, all work must cease and the procedures in the OzArk *Unanticipated Finds Protocol* (see Appendix B) must be followed.

5.8 Historic heritage

5.8.1 Impact assessment

There are no known Historic heritage items located at any of the proposed works areas (see Section 4.5.2). The desktop assessment did not reveal any items which could be of Historic heritage significance.

Given the predominant land use has been extensive agriculture, there is unlikely to be any impact to Historic heritage items as part of the proposed works.

5.8.2 Mitigation measures

- No Historic heritage sites or items are recorded within the proposed scheme area, and no landforms are assessed as having historic archaeological potential, therefore no further assessment is required.
- There is a low probability of ground disturbing work impacting on Historic heritage within the proposed scheme area, therefore there are no historic heritage constraints for the proposed work to proceed.
- All ground disturbing activities must be confined within the proposed scheme area. Additional assessment may be required if the location of the proposed works is amended to impact areas outside of the proposed scheme area where there is known Historic heritage.

5.9 Noise and vibration

5.9.1 Impact assessment

Noise monitoring was not undertaken as part of the REF. Based on information from previous Great Artesian Basin Cap & Pipe projects, predicted noise levels will be around 35 dB(A).

The nearest domestic residence is <1 km west from the bore. This residence is only intermittently occupied when the landholder comes up from town. Close consultation with the landholder will be required to mitigate any noise impacts associated with drilling the bore.

The nearest permanently occupied domestic residence is approximately 7 km east of the new bore site.

No other noise sensitive land uses have been identified in the vicinity.

The typical sound power levels for equipment that may be required to undertake construction works are listed in Table 20 below (this list is not definitive, and these levels are taken from the *Australian Standard AS 2436-2010 Guide to Noise Control on Construction, Maintenance and Demolition Sites*).

Table 20: Construction Equipment Sound Power Level

Equipment	Typical sound power levels (dB)	Sound pressure level at 500 m distance (dB(A))	Sound pressure level at 1 km distance (dB(A))	Sound pressure level at 2 km distance (dB(A))
Drill rig	108	46	40	33
Trench digger	107	45	39	32
Bobcat	104	42	36	29
Concrete pump truck	108	46	40	33
Light vehicles	106	44	38	31

Equipment	Typical sound power levels (dB)	Sound pressure level at 500 m distance (dB(A))	Sound pressure level at 1 km distance (dB(A))	Sound pressure level at 2 km distance (dB(A))
Hand-held tools	102	40	34	27
Compressor	101	39	33	26
Generator	99	37	31	24
Total (cumulative)		51	45	39

Note: The method specified in AS 2436 suggests that errors are introduced for distances greater than 100 m from the sound source.

Construction management levels for noise at residences are listed in Chapter 4 (Table 2) of the *Interim Construction Noise Guideline* (DECCW, 2009). The guideline states that construction works with a duration of more than three weeks should be subject to a quantitative assessment of noise impacts. The works are predicted to take up to fifteen weeks to complete – five weeks for bore drilling works, two weeks for bore decommissioning and eight weeks for reticulation works.

Due to the isolated nature of the site, standard construction hours as listed in the *Interim Construction Noise Guideline* (DECCW, 2009) are unlikely to be strictly adhered to.

Continuous drilling is likely to occur over 24 hours for approximately five weeks and all other construction work will generally occur in normal daytime hours (7.00 am to 6.00 pm Monday to Saturday). Noise impacts resulting from the works are not expected to be significant given there are no permanently occupied residences or other noise sensitive land uses within 2 km of the worksite and the temporary nature of the works.

Noise levels during the construction period will vary depending on the nature of the activities being undertaken. The use of several items of power equipment simultaneously is only expected to occur intermittently.

5.9.2 Mitigation measures

- The Contractor is to liaise with the landholder and any other landholder potentially affected by the proposed works to address any concerns prior to commencing work.
- If, during consultation, landholder/community concerns cannot be readily resolved, the Contractor is to contact the Principal's Authorised Person, who will assist in resolving any outstanding issues.

5.10 Traffic and access

Impact assessment

During the proposed works there will be a minor increase in vehicle movements on the local road networks for the delivery of materials and equipment, the arrival and departure of construction workers and the removal of waste.

There is a risk of damage to local roads and access tracks if site access is not managed appropriately. The Contractor must establish strict conditions for access to prevent damage to existing roads, tracks and the surrounding landscape and ensure all workers and sub-contractors adhere to these conditions.

The Contractor is to contact the landholder in advance of the proposed construction program to arrange access to the site and discuss any potential access issues that may arise. Whilst the landholder may experience some inconvenience during the construction period, this can be minimised by the Contractor working with the landholder to address any potential issues before they arise.

5.10.1 Mitigation measures

- The Contractor is to consult with the affected landholder regarding traffic volumes and timing of vehicle movement, to minimise any inconvenience that may arise.
- Any temporary compounds and access roads required for the works are to be located to minimise disturbance to the existing environment.
- All construction vehicles must keep to designated access tracks.
- The Contractor is to monitor weather conditions prior to and during the construction period.
- In the event of wet weather, site access is to be made only with the prior permission of the Brewarrina Shire Council in respect of council roads, and the landholder in respect of property access roads.
- Vehicles must not be driven along unsealed access roads and tracks after rain to the extent of causing damage to those access routes unless with the express permission of the Brewarrina Shire Council and/or the landholder.

5.11 Utilities and infrastructure

5.11.1 Impact assessment

The works could possibly impact upon utilities and infrastructure. There is a telecommunications line near the proposed new bore site on Bora Station and a powerline that runs parallel with the proposed pipeline on Paisley Station.

5.11.2 Mitigation Measures

- Utilities and services which may be impacted by the proposal are to be accurately located prior to commencement of works (eg Dial Before You Dig).
- Utility and service providers are to be consulted prior to the commencement of works and during construction works if impacts on any utilities and services by the proposal are likely.

5.12 Hazardous substance management

5.12.1 Impact assessment

Diesel fuel and lubricating oils will be used in the machinery constructing the scheme. There is always a potential for an oil spill to contaminate the environment, however, the quantities of fuel and oil to be used on site are relatively small and normal standard operating procedures for refuelling will minimise any risk associated with an oil or fuel spill.

The contamination control mitigation measures listed below should be implemented for the proposed works.

5.12.2 Mitigation measures

- Bunding of fuel and oil containers is to be in accordance with Australian Standards.
- Fuelling and greasing operations are to be undertaken at least 50 m away from waterways.
- The Contractor is to have a spill kit on site appropriate for the types of hazardous substances being used during construction.
- If any contaminated material is encountered during earthworks, work must cease, the site secured, and a safe work method statement(s) and appropriate practices are to be implemented. Any contaminated material must be classified first and then stored, transported and disposed of in accordance with EPA requirements at an EPA-licensed waste facility.

5.13 Waste minimisation and management

5.13.1 Impact assessment

Waste generated by the proposed works is anticipated to be minimal.

The construction of the proposed works will result in waste in the form of excess spoil, cleared vegetation, redundant infrastructure and general building wastes such as packaging, off cuts, excess materials and workers' waste such as drinks containers and perishable food scraps. Portable toilets will be provided for workers at the construction site.

The new bore will be approximately 550 m deep and therefore approximately 17 m^3 of surplus spoil will be generated. The surplus spoil can be reused on site within cleared areas in consultation with the landholder. Reuse options include backfilling redundant drainage channels or gullies where erosion has occurred. Spoil used as backfill material should be compacted to minimise potential erosion.

To ensure that environmental harm does not occur as a result of uncontrolled or inappropriate collection, transport and disposal of waste, the relevant provisions of the following Acts would be implemented:

- *Waste Avoidance and Resource Recovery Act 2001*
- *Protection of the Environment Operations Act 1997*
- *Protection of the Environment Operations (Waste) Regulation 2014*

The waste management and contamination control procedures and/or measures listed below should be implemented for the proposed works. It is assessed that waste can be adequately managed to avoid impact.

5.13.2 Mitigation measures

- The Contractor is to consult with the property owners regarding options for reuse of surplus spoil onsite. Spoil reused as backfill material is to be compacted to minimise potential erosion.
- The Contractor undertaking the works is to detail waste management procedures in the EMP. The Contractor is to assume responsibility for the appropriate disposal of any waste generated. Adequate procedures must be established and detailed in the EMP, including notification requirements for incidents that cause material harm to the environment.

  The EMP must also follow the resource management hierarchy principles embodied in the *Waste Avoidance and Resource Recovery Act 2001*, namely, to:

  - avoid unnecessary resource consumption;
  - recover resources (including reuse, reprocessing, recycling and energy recovery); and

    - dispose (as a last resort).
- Following completion of the works, excess concrete must be removed off-site for recycling or if agreed with the landowner can be reused onsite.
- All waste removed from the site is to be classified and disposed of appropriately, and all non-recyclable waste is to be disposed of at an appropriate licensed waste disposal facility.
- Cleared vegetation (devoid of weeds) is to be left on site.
- If practicable, surplus excavated materials/fill are to be reused onsite as part of rehabilitation and restoration works.
- Food scraps and kitchen waste are to be temporarily stored onsite in such a way that access by native and feral animals is not possible.

5.14 Socio-economic impacts

5.14.1 Impact assessment

The proposed works are located in a remote rural area of northern NSW. The nearest townships to the proposed works are as follows:

- Enngonia approximately 69 km
- Brewarrina approximately 65 km

The proposed works have the potential to impact on adjacent landholders as a result of the following:

- Noise and vibration (see Section 5.9)
- Traffic and access (see Section 10)
- Visual amenity (see Section 5.15)

These impacts will be temporary and minor. Furthermore, public access to the proposed works will remain restricted as the works are located on private property.

The proposal will have a positive socio-economic impact on the property involved, with improved water efficiency and security associated with the proposed works.

Additional income will be injected into regional towns and businesses through the purchase of supplies, accommodation, equipment and services.

5.14.2 Mitigation measures

- The Contractor is to inform local road users of any expected traffic or access changes and delays prior to construction commencing.
- Complaints are to be communicated to the Principal's Authorised Person, recorded and addressed promptly.

5.15 Visual amenity

5.15.1 Impact assessment

The proposed works are located in a remote rural landscape. The nearest permanently occupied dwellings are approximately 7 km from the location of the proposed new bore.

There will be minor visual impacts during the construction period due to the presence of vehicles and construction equipment. This impact is not expected to be significant given the remoteness of the work site, lack of visibility from a public road, and the short-term nature of the works.

There will be minor visual impact post works due to the capping of the old bore, construction of the new bore headworks, and installation of 9 poly tanks, 16 troughs, 8 valve assemblies and vegetation removal along the pipeline. The infrastructure associated with the proposed works is typical of what might be expected in an agricultural setting.

5.15.2 Mitigation measures

- The clearing of vegetation is to be kept to the minimum required for the works, and no more than defined in this Wilga REF. All native vegetation removed during the laying of the pipeline is to be replaced over the pipeline to assist with site regeneration.
- Construction camps, stockpiles, vehicle parking areas and equipment storage areas are to be remediated to a pre-construction condition upon the completion of works, as per the Principal's Specification.

5.16 Cumulative impacts

5.16.1 Impact assessment

Cumulative environmental impacts of the proposed work include the combined effect of multiple individual impacts associated with the proposed works, in addition to the impacts of other activities in the locality. The locality is characterised as agricultural land with extensive grazing being the dominant land use.

The anticipated maximum direct disturbance area is anticipated to be around 13.73 ha, 12.84 ha of which will be in existing previously disturbed areas and 0.89 ha across three plant community types, one of which is an EEC (0.7 ha). This is a minimal amount when considering the total project area of approximately 10,945 ha across the two properties, and the estimated area of EEC (PCT29) across the property (3,800 ha).

The proposed work would not have a foreseeable cumulative impact on the locality. On a larger scale, the proposal will contribute to water savings and environmental outcomes.

The impacts described above are considered consistent with the objectives of the IGABDR and other NSW Cap & Pipe Program works.

No additional works are anticipated to occur in this area at the same time.

5.16.2 Mitigation measures

No additional mitigation measures are proposed.

6 Environmental management

6.1 Environmental management plan

The Contractor must develop and implement an Environmental Management Plan (EMP) that complies with the current NSW Government Environmental Management Guidelines for Construction (edition 4) (the Guidelines). The Guidelines are available on the Buy.NSW website.

The EMP must address the following risks:

- Site environmental inductions that specifically address ecological and cultural heritage risks and mitigations for all personnel prior to set out, vegetation clearing or soil disturbance commencing.
- Erosion, sediment control and water quality
- Flooding / high flow events
- Management of vegetation outside the immediate works area
- Salvage of wildlife during any vegetation clearing i.e. a fauna salvage protocol and an unexpected finds protocol for biota that may be uncovered during the removal of non-native vegetation
- A fauna entrapment protocol for any areas of open trenching
- Pollution control and protection
- Waste minimisation and safe disposal of wastes
- Containment and management of spills (oil, fuel, or other products)
- Procedures against introduction of weeds, pests, livestock and crop diseases, and soil and wildlife pathogens (eg Chytrid fungus) to / from site
- Identification and management of site hazards
- Rehabilitation of temporarily disturbed soil and vegetation
- A process for defining roles and responsibilities in the EMP and undertaking monitoring, review and adaptive management of EMP practices
- Responsibilities for the provision and maintenance of all environmental protection measures (Biosis 2022).
- Bushfire prevention
- Extreme weather events (winds, rain, heat, cold)
- Protection of Aboriginal cultural heritage and Historic heritage sites

This list of risks is not exhaustive and must not be relied upon by the Contractor. The Contractor must undertake its own detailed analysis of all environmental risks related to the proposed works.

The EMP will be a working document that will be updated a necessary to respond to site specific developments and outcomes of construction activities.

6.2 Summary of mitigation measures

Table 21 below summarises the mitigations measures required to minimise the impact of the proposed works.

Table 21: Summary of mitigation measures

Aspect	Mitigation measures	Responsibility	Timing
Air quality	• Construction vehicles and equipment are to be suitably serviced within the six-month period prior to commencement of construction activities and all necessary maintenance undertaken during the construction period to meet EPA air quality requirements. • The excessive use of vehicles and powered construction equipment is to be avoided. • Vehicles speeds on unsealed roads are to be kept to a minimum. • All construction machinery is to be turned off when not in use to minimise emissions. • The Contractor is to monitor dust generation potential. • Any stockpiled spoil/fill is to be protected to minimise dust generation and avoid sediment movement offsite. • Vehicles transporting spoil to and from the sites are to be covered.	Contractor	Pre construction During construction

Aspect	Mitigation measures	Responsibility	Timing
Soils	• Stockpiled spoil/fill is to be located away from drainage lines and be protected to minimise dust generation and avoid sediment movement offsite. • Windrowed topsoil is to be managed so that it can be re-spread to ensure effective and efficient seed germination and assist with stabilising disturbed soil. • Appropriate erosion and sediment controls are to be installed prior to the commencement of works in accordance with the technical document, Landcom (2006) Edition 4 *Managing Urban Stormwater, Soils & Construction* (the Blue Book), and where applicable the NSW Guidelines for *Laying Pipes and Cables in Watercourses on Waterfront Land* and the *Code of Practice for Minor Works in NSW Waterways*. • All erosion and sediment controls are to be regularly inspected, especially when rain is expected, directly after any rain events, or when flood flows (if relevant) are moving through the scheme area. • Erosion and sediment control measures are to remain in place until the area is stabilised to reduce potential surface water impacts on the site.	Contractor	Pre construction During construction Post construction

Water – surface and water quality	The EMP is to address the following issues to prevent sediment movement and water quality impacts: • Prior to works commencing environmental safeguards (eg sediment fences, booms etc.) are installed consistent with Landcom (2008) Edition 4 *Managing Urban Stormwater, Soils & Construction* (the Blue Book) and where applicable the *NSW Guidelines for Laying Pipes and Cables in Watercourses on Waterfront Land* and the *Code of Practice for Minor Works in NSW Waterways* to ensure minimisation of turbid plumes into the adjacent aquatic environment. • Flow diversion measures are to be installed where construction of trenched watercourse crossings during no flow conditions is not feasible. Flow diversion measures may include pumps to ensure that water can be moved from one side of trench to the other, screened inlets to prevent the entrapment of aquatic fauna and outlet structures that are designed to avoid scouring of the channel. • Where watercourses are trenched, all obstructions to flow will be removed as soon as practicable after the pipe has been laid and backfilled. • Watercourse bed material excavated during construction from watercourses will be stockpiled outside of the active channel and avoid riparian vegetation, wherever practicable. • Trenches between watercourse banks are to be backfilled within five days of excavation. • Watercourses will be reinstated such that bank stability at the crossing location is the same or better than prior to construction. Stabilising materials such as rock armouring, hydro mulch, jute matting or other suitable geotextile materials may be applied to watercourse banks if necessary. • Any large woody debris located within the construction footprint of watercourses to be trenched are to be temporarily relocated during construction and be reintroduced so as to mimic the natural pattern of large wood in the channel pre disturbance, or a more natural area in the system. • Vegetation clearing is to be kept to a minimum and no more than defined in the Wilga REF.	Contractor	Pre construction During construction Post construction

Aspect	Mitigation measures	Responsibility	Timing
	• Backfilling and stabilising of trenches once pipelines are installed. • Disturbed areas are to be stabilised and rehabilitated as soon as possible to reduce erosion potential (ie. exposure period of bare earth) • Minimisation of restriction of or changes to overland flows.		

Aspect	Mitigation measures	Responsibility	Timing

Water – groundwater and water quality	Adequate procedures must be established and detailed in the EMP, including notification requirements to the EPA, for incidents that cause material harm to the environment.
	
	An EMP is to be prepared and include the following requirements:
	• Emergency spill kits are to be kept at the site (vehicle kits).
	• Refuelling of machinery is to be undertaken in accordance with the EMP and at least 50 m away from drainage lines.
	• Any chemicals and fuels are to be stored in a bunded area to the relevant Australian Standard, at least 50 m from any waterway or drainage line.
	• Any hazardous materials stored on site are to be stored in the compounds and within impervious and bunded enclosures capable of storing 120% of the volume of material stored there.
	• Workers are to be trained in the EMP and the use of the spill kits.
	• A drilling management plan/procedure is to be developed as part of the EMP to detail the appropriate management of drilling slurry to avoid off site impacts.
	• Any disposal of drilling fluids and slurry is to be undertaken in a manner that does not cause water pollution as per Section 120 of the POEO Act.
	• Mitigation measures to manage groundwater (should it be encountered during construction) are to be incorporated into the EMP which is to address the following issues in relation to groundwater:
	  ○ Measures to ensure groundwater quality is not impacted during construction;
	  ○ Techniques to settle, treat or filter trench water encountered during excavation works such as diverting water through filter socks; and
	  ○ Appropriate treatment and monitoring regimes should groundwater flows come to the surface, including disposal of groundwater in such a way as to prevent adverse impacts (such as erosion and water pollution).
	  ○ Groundwater is not to be discharged to a waterway during construction.
		Contractor	Pre construction
			
			During construction

Aspect	Mitigation measures	Responsibility	Timing
Biodiversity	*Existing impact avoidance and minimisation steps* NSW DCCEEW – Water Group has worked closely with Biosis ecologists through combined field visits to design and locate the pipeline alignment and associated works to avoid and minimise direct impacts on native vegetation and fauna habitat as far as is practical. Key steps have included: • In areas of threatened ecological communities, pipeline and infrastructure installation will use low impact methods to reduce the clearing footprint. • Pipeline installation will utilise existing farm tracks, fence lines or service corridors to avoid intact woodland as far as is possible. • Tree removal (especially large hollow bearing trees) will be avoided by micro-siting during construction, as far as is possible. • The network of existing farm tracks and existing hard stand areas will be used for contractor access, storage and machinery movements (Biosis 2022). *Additional mitigation measures* The following detailed design, pre-construction and construction measures are to be implemented: • The location of trenching and ripping works, and siting of tanks and troughs must avoid native vegetation unless quantified and detailed in the Wilga REF. • The works areas must be clearly delineated and areas outside of the works area marked as no go zones prior to construction. • The above measures, and other actions are to be included in a detailed Environmental Management Plan (CEMP) (see 6.1) (Biosis 2022).	Contractor	Pre construction During construction Post construction

Aspect	Mitigation measures	Responsibility	Timing
Biosecurity	• Contractor vehicles and plant must be washed down and swept out prior to entering the site • Vehicles and plant must stay on internal roads and tracks wherever possible • Contractor vehicles and plant should be washed down and swept out prior leaving the site	Contractor	Pre construction During construction Post construction
Aboriginal cultural heritage	• An Aboriginal heritage impact permit (AHIP) will be obtained from Heritage NSW prior to potential impacts generated during construction works. Once received, the requirements and conditions of the AHIP must be followed. • The AHIP application will be accompanied by an archaeological research design that outlines specific mitigation measures (including artefact collection of Paisley Station OS-1) and developed in consultation with the Registered Aboriginal Parties (RAPs). • No ground disturbance activities are permitted within 10 m of identified Aboriginal objects and sites, Paisley Station OS-1 inclusive, without having obtained an AHIP) to allow their harm from Heritage NSW. • No ground disturbance to any areas outside of those approved assessed in the ACHA or approved by the AHIP is permitted. Any activities that extend from this approved boundary must immediately stop, and the heritage consultant contacted to provide further advice. • Inductions for work crews must include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts and are aware of the legislative protection of Aboriginal objects under the *National Parks and Wildlife Act 1974*. • Contractors must be provided with the location of Bora Station IF-1, Paisley Station IF-1, Bora Station OS-1, and the sites must be clearly marked out with flagging tape and avoided. • If during works, Aboriginal artefacts or skeletal material are noted, all work must cease and the procedures in the OzArk *Unanticipated Finds Protocol* must be followed.	NSW DCCEEW – Water Group Contractor	Pre construction During construction

Aspect	Mitigation measures	Responsibility	Timing
Historic heritage	• No Historic heritage sites or items are recorded within the proposed scheme area, and no landforms are assessed as having historic archaeological potential, therefore no further assessment is required. • There is a low probability of ground disturbing work impacting on Historic heritage within the proposed scheme area, therefore there are no historic heritage constraints for the proposed work to proceed. • All ground disturbing activities must be confined within the proposed scheme area. Additional assessment may be required if the location of the proposed works is amended to impact areas outside of the proposed scheme area where there is known Historic heritage.	Contractor	Pre construction During construction
Noise and vibration	• The Contractor is to liaise with the landholder and any other landholder potentially affected by the proposed works to address any concerns prior to commencing work. • If, during consultation, landholder/community concerns cannot be readily resolved, the Contractor is to contact the Principal's Authorised Person, who will assist in resolving any outstanding issues.	Contractor	Pre construction During construction

Aspect	Mitigation measures	Responsibility	Timing
Traffic and access	• The Contractor is to consult with the affected landholder regarding traffic volumes and timing of vehicle movement, to minimise any inconvenience that may arise. • Any temporary compounds and access roads required for the works are to be located to minimise disturbance to the existing environment. • All construction vehicles must keep to designated access tracks. • The Contractor is to monitor weather conditions prior to and during the construction period. • In the event of wet weather, site access is to be made only with the prior permission of the Brewarrina Shire Council in respect of council roads, and the landholder in respect of property access roads. • Vehicles must not be driven along unsealed access roads and tracks after rain to the extent of causing damage to those access routes unless with the express permission of the Brewarrina Shire Council and/or the landholder.	Contractor	Pre construction During construction
Utilities and infrastructure	• Utilities and services which may be impacted by the proposal are to be accurately located prior to commencement of works (eg Dial Before You Dig). • Utility and service providers are to be consulted prior to the commencement of works and during construction works if impacts on any utilities and services by the proposal are likely.	Contractor	Pre construction During construction

Aspect	Mitigation measures	Responsibility	Timing
Hazardous substance management	• Bunding of fuel and oil containers is to be in accordance with Australian Standards. • Fuelling and greasing operations are to be undertaken at least 50 m away from waterways. • The Contractor is to have a spill kit on site appropriate for the types of hazardous substances being used during construction. • If any contaminated material is encountered during earthworks, work must cease, the site secured, and a safe work method statement(s) and appropriate practices are to be implemented. Any contaminated material must be classified first and then stored, transported and disposed of in accordance with EPA requirements at an EPA-licensed waste facility.	Contractor	Pre construction During construction

Aspect	Mitigation measures	Responsibility	Timing

Waste minimisation and management	• The Contractor is to consult with the property owners regarding options for reuse of surplus spoil onsite. Spoil reused as backfill material is to be compacted to minimise potential erosion.
	• The Contractor undertaking the works is to detail waste management procedures in the EMP. The Contractor is to assume responsibility for the appropriate disposal of any waste generated. Adequate procedures must be established and detailed in the EMP, including notification requirements for incidents that cause material harm to the environment.
	The EMP must also follow the resource management hierarchy principles embodied in the *Waste Avoidance and Resource Recovery Act 2001*, namely, to:
	  ○ avoid unnecessary resource consumption;
	  ○ recover resources (including reuse, reprocessing, recycling and energy recovery); and
	  ○ dispose (as a last resort).
	• Following completion of the works, excess concrete must be removed off-site for recycling or if agreed with the landowner can be reused onsite.
	• All waste removed from the site is to be classified and disposed of appropriately, and all non-recyclable waste is to be disposed of at an appropriate licensed waste disposal facility.
	• Cleared vegetation (devoid of weeds) is to be left on site.
	• If practicable, surplus excavated materials/fill are to be reused onsite as part of rehabilitation and restoration works.
	• Food scraps and kitchen waste are to be temporarily stored onsite in such a way that access by native and feral animals is not possible.
		Contractor	Pre construction
			During construction

Aspect	Mitigation measures	Responsibility	Timing
Socio-economic impacts	• The Contractor is to inform local road users of any expected traffic or access changes and delays prior to construction commencing. • Complaints are to be communicated to the Principal's Authorised Person, recorded and addressed promptly.	Contractor	Pre construction During construction Post construction
Visual amenity	• The clearing of vegetation is to be kept to the minimum required for the works, and no more than defined in this Wilga REF. All native vegetation removed during the laying of the pipeline is to be replaced over the pipeline to assist with site regeneration. • Construction camps, stockpiles, vehicle parking areas and equipment storage areas are to be remediated to a pre-construction condition upon the completion of works, as per the Principal's Specification.	Contractor	Pre construction During construction Post construction
Cumulative impacts	No additional mitigation measures required.		

7 Consideration of clause 171 of the Environmental Planning & Assessment Regulations 2021

A checklist of factors that should be considered in the assessment of impacts prior to its determination is included in Clause 171 of the EP&A Regs. This clause identifies sixteen issues that need to be addressed.

Table 22 provides a summary of each of the factors to be considered, the majority of which have been addressed within the body of this report.

Table 22: Factors considered under clause 171 of the EP&A Regs

Factor	Comment
any environmental impact on a community	The proposal will have minor impacts on the community during construction, including temporary air quality, noise, soil and water and traffic impacts. These impacts can be managed via the mitigation measures outlined in Section 6.2.
any transformation of a locality	The proposal will not result in any transformation of a locality.
any environmental impact on the ecosystems of the locality	The capping and piping of the Wilga bore will see the removal of permanent surface water in ground tanks throughout the scheme area. While this will have a lasting impact on the ecosystems of the locality, the ground tanks are not natural features and contribute to significant evaporation losses from the Wilga scheme. With the implementation of the proposed mitigation measures in Section 6.2, the impacts on the ecosystems of the locality will be minimised.
any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality	The proposal will not result in any reduction of the aesthetic, recreational, scientific or other environmental quality or value.

Factor	Comment
any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations	The proposal will have an impact on Aboriginal cultural heritage. An AHIP will be obtained prior to reticulation works commencing. The mitigation measures detailed in Section 6.2 will ensure that these impacts are minimised.

Factor	Comment
any impact on the habitat of protected animals (within the meaning of the Biodiversity Conservation Act 2016)	The project involves: Disturbance to 0.89 hectares of potential habitat for Painted Honeyeater *Grantiella picta* (Vulnerable EPBC Act and BC Act). Disturbance to 0.89 hectares of potential habitat for BC Act threatened fauna; Bush Stone-curlew *Burhinus grallarius*, Brown Treecreeper (eastern sub-species) *Climacteris picumnus victoriae*, Varied Sittella *Daphoenositta chrysoptera*, Major Mitchell's Cockatoo *Lophochroa leadbeateri*, Hooded Robin *Melanodryas cucullata*, Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis temporalis*, Pied Honeyeater *Certhionyx variegatus,* Diamond Firetail *Stagonopleura guttata,* Little Pied Bat *Chalinolobus picatus* and Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris,* Inland Forest Bat *Vespadelus baverstocki*, Forest's Mouse *Leggadina forresti*, Sandy Inland Mouse *Pseudomys hermannsburgensis* and Stripe-faced Dunnart *Sminthopsis macroura*. Disturbance to potential habitat or removal of individual threatened flora including Narrow-leaved Bumble *Capparis loranthifolia* var. *loranthifolia* and *Phyllanthus maderaspatensis* (both Endangered, BC Act). Potential secondary impacts to threatened waterbirds Australasian Bittern *Botaurus poiciloptilus* (Endangered, EPBC and BC Acts), Australian Painted Snipe *Rostratula australis* (Endangered, EPBC and BC Acts) and Brolga *Grus rubicunda* (Vulnerable, BC Act) that may occasionally utilise created wetland habitats in bore drains and ground tanks that will be decommissioned as part of the project. Secondary impacts to native vegetation, such as increased grazing pressure and trampling, resulting from concentrating livestock around new trough points. Reduction in the availability of permanent surface water within the Wilga area that may be used by a range of threatened and locally common wildlife species. The mitigation measures detailed in Section 6.2 will ensure that these impacts are minimised.

Factor	Comment
any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air	The proposal involves the removal or disturbance of PCTs 29 and 109, disturbance of potential habitat or removal of individual Narrow-leaved Bumble and *Phyllanthus maderaspatensis*, disturbance of woodland habitat for Painted Honeyeaster *Grantiella picta,* Bush Stone-curlew *Burhinus grallarius*, Brown Treecreeper (eastern sub-species) *Climacteris picumnus victoriae*, Varied Sittella *Daphoenositta chrysoptera*, Major Mitchell's Cockatoo *Lophochroa leadbeateri*, Hooded Robin *Melanodryas cucullata*, Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis* *temporalis*, Pied Honeyeater *Certhionyx variegatus,* Diamond Firetail *Stagonopleura guttata,* Little Pied Bat *Chalinolobus picatus* and Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris,* Inland Forest Bat *Vespadelus baverstocki*, Forrest's Mouse *Leggadina forresti*, Sandy Inland Mouse *Pseudomys hermannsburgensis* and Stripe-faced Dunnart *Sminthopsis macroura*. Potential secondary impacts may occur to threatened waterbirds Australasian Bittern *Botaurus poiciloptilu*, Australian Painted Snipe *Rostratula australis* and Brolga *Grus rubicunda* that may occasionally utilise created wetland habitats in bore drains and ground tanks that will be decommissioned as part of the project. Significant impact assessments for EPBC Act listed species and communities undertaken as part of this REF have determined it is unlikely that a significant impact will result from the proposed works (Biosis 2022). Tests of significance for BC Act listed species and communities undertaken as part of this REF have determined the proposed works are unlikely to significantly affect threated species or communities (Biosis 2022).

Factor	Comment
any long-term effects on the environment	The capping and piping of the Wilga bore will see the removal of permanent surface water in ground tanks throughout the scheme area. While this will have long-term effects on the local environment, the ground tanks are not natural features and contribute to significant evaporation losses from the Wilga scheme. With the implementation of the proposed mitigation measures in Section 6.2, the proposal will not have any long-term effects on the environment.
any degradation of the quality of the environment	The proposal will cause minor biodiversity, soil, water air and noise impacts to the environment during construction. The mitigation measures detailed in Section 6.2 will ensure that these impacts are limited.
any risk to the safety of the environment	There is a potential risk of establishment and spread of weeds and pathogens during construction and maintenance of infrastructure under the proposal. Implementation of the mitigation measures in Section 6.2 will ensure that the risk is minimised.
any reduction in the range of beneficial uses of the environment	There will be no reduction in the range of beneficial uses of the environment as a result of the proposal.
any pollution of the environment	Construction equipment and plant are potential sources of pollution, which may have an impact on water, air and environmental quality. The adoption of the mitigation measures in Section 6.2 will ensure that the risk of these impacts is minimised.
any environmental problems associated with the disposal of waste	The proposal will result in the production of general construction waste. The implementation of the mitigation measures noted in Section 6.2 will ensure that the risk of environmental impacts associated with waste disposal is minimised.
any increased demands on resources (natural or otherwise) that are, or are likely to become in short supply	The proposal will not result in any demands on resources that are or are likely to become in short supply.

Factor	Comment
any cumulative environmental effect with other existing or likely future activities	No negative cumulative environmental effect with other existing or likely future activities is expected as a result of the proposal.
any impact on coastal processes and coastal hazards, including those under projected climate change conditions	The proposal is not in a coastal area. As such there will be no impact on coastal processes or hazards as a result of works carried out.

8 Conclusion

8.1 Principles of ecologically sustainable development (ESD)

The proposed works have been considered against the principles of ecologically sustainable development (Environmental Defenders Office, accessed 2 September 2022)

8.1.1 The precautionary principle

If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. If risk to the environment is high, but scientific certainty of the risk eventuating is low, the precautionary principle can fill the gap and essentially requires decision-makers to act as though the risk to the environment is real.

This approach has been adopted in relation to the recommendations outlined in Sections 5 and 6 above.

8.1.2 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 proposed works will not impact on natural or cultural heritage features to an extent that would compromise the health, diversity and productivity of the environment and impact on future generations.

8.1.3 Conservation of biological diversity and ecological integrity

Conservation of biological diversity and ecological integrity should be a fundamental consideration in environmental planning and decision-making processes. Biodiversity refers to the variety of all life.

The proposed works will disturb a small area of habitat. The biodiversity assessments undertaken as part of this REF have identified that the works will not impact significantly on biological diversity and ecological integrity of the locality.

Mitigation measures have been developed that will assist in protecting aquatic habitats.

8.1.4 Improving valuation, pricing and incentive mechanisms

Environmental factors should be included in the valuation of assets and services, such as:

- *polluter pays – those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
- *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
- *environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

The proposed works will increase water supply efficiency, reduce water loss/waste, improve artesian pressure in the GAB and contribute to an improvement in ecological health of groundwater dependent ecosystems associated with the works.

8.2 Justification for the proposed works

The capping of the existing free flowing Wilga bore will result in considerable water savings, arrest artesian pressure decline, increase pressure at nearby artesian springs and alleviate some of the environmental implications of uncontrolled bores.

Through the proposal there is the potential for short term impacts such as increased noise and dust and a reduction in amenity for the landholders during the construction phase of the pipeline. However, these impacts will be minor and of a temporary nature.

Long term impacts to the environment will result from the removal of the permanent surface water in ground tanks. It should be noted, however, that the ground tanks are not natural features in the landscape and contribute to significant water losses through evaporation.

The environmental and socio-economic benefits gained from the project outweigh the short and long-term impacts.

Vegetation clearing will be kept to a minimum, and no more than defined in the Wilga REF.

The proposal will be unlikely to significantly affect any listed threatened species, fauna populations or communities.

Four additional Aboriginal sites were recorded during the field survey undertaken as part of the due diligence assessment, which consisted of Bora Station IF-1, Paisley Station IF-1, Bora Station OS-1, and Paisley Station OS-1. Three of these sites will not be disturbed as the proposed pipeline route and water point infrastructure has been realigned to avoid disturbance of Bora Station IF-1, Paisley Station IF-1, Bora Station OS-1. Harm to Paisley Station OS-1 cannot be avoided.

The Aboriginal Cultural Heritage due diligence assessment therefore concluded that an AHIP will be required if under-boring was not an option at Paisley Station OS-1. Under-boring was investigated and found to not be a viable construction method, therefore an AHIP is required.

Given that the works are predominantly comprised of an underground pipeline with a few above ground structures in a remote rural locality, adverse impacts to the land during the operation phase of the proposal are considered to be minimal. Potential operational impacts have generally been mitigated as part of the design of the works.

The proposal will result in a positive environmental impact post construction through:

- increase in artesian pressure;
- increase in water savings;
- recovery of high priority groundwater-dependent springs
- reduction in CO_2 emissions
- reduction of feral, pest and weed species;
- reduction in salinity

This REF has been prepared in accordance with Division 5.1 of the EP&A Act and Clause 171 of the EP&A Regs.

Subject to implementation of the measures to avoid, minimise or manage environmental and cultural heritage impacts listed in this REF, the proposed activity is recommended for approval.

9 References

Australian Standard AS2436-1981 *Guide to Noise Control on Construction, Maintenance and Demolition Sites*.

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10 Terms and abbreviations

Term	Description
ACHAR	Aboriginal Cultural Heritage Assessment Report
AHIP	Aboriginal Heritage Impact Permit
AHIMS	Aboriginal Heritage Information Management System
B&C SEPP	State Environmental Planning Policy (Biodiversity and Conservation) 2021
BC Act	Biodiversity Conservation Act 2016
EMP	Environmental Management Plan
CLM Act	Crown Land Management Act 2019
DIPNR	Department of Infrastructure, Planning and Natural Resources
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
NSW DCCEEW – Water Group	NSW Department of Climate Change, Energy, the Environment and Water – Water Group
DPC	Department of Premier and Cabinet
DPE	Department of Planning and Environment
DPE - EES	Department of Planning and Environment – Environment, Energy & Science
DPIE	Department of Planning, Industry and Environment
EEC	Endangered ecological community
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESD	Ecologically sustainable development
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Regs	Environmental Planning and Assessment Regulations 2021
FM Act	Fisheries Management Act 1994
GAB	Great Artesian Basin

HEVAE	High ecological value aquatic ecosystems
IGABDR	Improving Great Artesian Basin Drought Resilience
T&I SEPP	State Environmental Planning Policy (Transport and Infrastructure) 2021
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LLS Act	Local Land Services Act 2013
MNES	Matters of National Environmental Significance
NPW Act	National Parks and Wildlife Act 1974
NPW Reg	National Parks and Wildlife Regulation 2009
NPWS	National Parks and Wildlife Service
NRAR	Natural Resource Access Regulator
NSW	New South Wales
NT Act	Commonwealth Native Title Act 1993
PCT	Plant community type
POEO Act	Protection of Environment Operations Act 1997
RAP	Registered Aboriginal Party
REF	Review of Environmental Factors
Koala SEPP	State Environmental Planning Policy (Koala Habitat Protection) 2020
TSR	Travelling Stock Reserve
WM Act	Water Management Act 2000

Appendix A Biodiversity Assessment

Appendix B Aboriginal Cultural Heritage Due Diligence

Appendix C Historic Heritage Search Results

Australian Heritage Database Search Results

Australian Government
Department of Climate Change, Energy, the Environment and Water

Heritage
Australian Heritage Database

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Search Results

new search edit search

1 result found.

Indigenous Place	Brewarrina, NSW, Australia	(Interim List) Register of the National Estate (Non-statutory archive)

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Search Results

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Enter at least one search criterion.
Search Hints

Search Reset form

Place name

Street name

Town or suburb: Talawanta

State: New South Wales

Country

Australian Government
Department of Climate Change, Energy, the Environment and Water

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Search Results

new search edit search

1 result found.

Indigenous Place	Weilmoringle, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)

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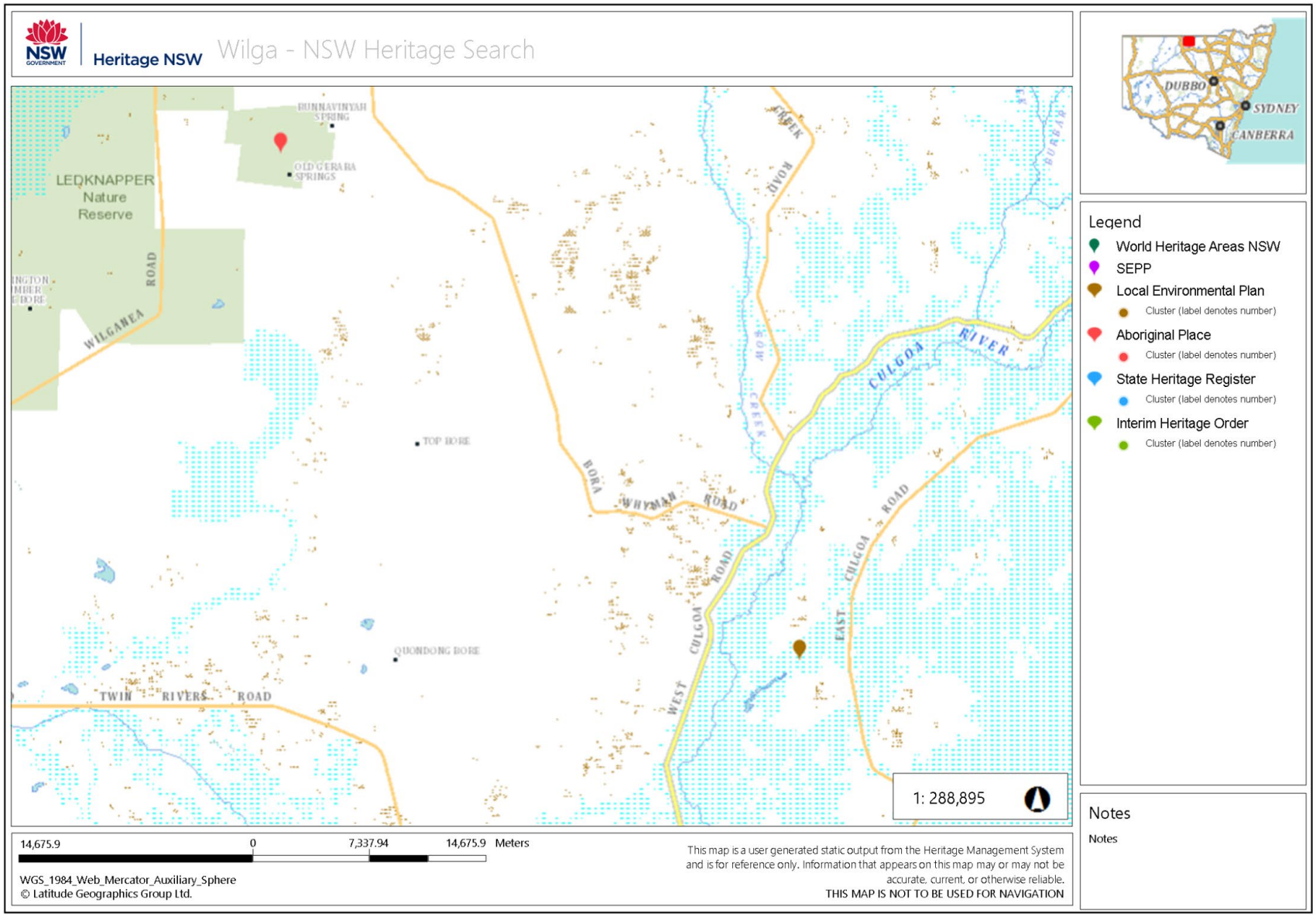
NSW GOVERNMENT
Heritage NSW
Wilga - NSW Heritage Search
LEDKNAPPER Nature Reserve
BUNNAVINYAH SPRING
OLD GERARA SPRINGS
WILGANEA ROAD
TOP BORE
QUONDONG BORE
TWIN RIVERS ROAD
BORA WYMAN ROAD
CULGOA ROAD
EAST CULGOA ROAD
WEST CULGOA ROAD
CULGOA RIVER
DUBBO
SYDNEY
CANBERRA
Legend
World Heritage Areas NSW
SEPP
Local Environmental Plan
Cluster (label denotes number)
Aboriginal Place
Cluster (label denotes number)
State Heritage Register
Cluster (label denotes number)
Interim Heritage Order
Cluster (label denotes number)
1: 288,895
Notes
Notes
14,675.9 0 7,337.94 14,675.9 Meters
WGS_1984_Web_Mercator_Auxiliary_Sphere
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Appendix D Consultation Responses