

Department of Climate Change, Energy, the Environment and Water

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Improving Great Artesian Drought Resilience – Dunsandle No3 GW010371 - Reticulation

Review of Environmental Factors

March 2023



1 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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Review of Environmental Factors**

Revision	Date	Prepared by	Reviewed by
V1.0	15/03/2023	Jane Dugdale-Bradley	Shavaun Tasker
V1.1	30/03/2023	Jane Dugdale-Bradley	David Workman

2 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).

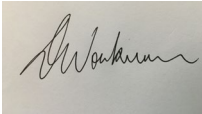
The REF provides a true and fair assessment of the proposed activity in relation to its likely effects on the environment. It examines and takes into account to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed activity.

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 there 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	NSW Department of Climate Change, Energy, the Environment and Water
Signature	
Date	30/03/2023

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1 Introduction

1.1 Project overview

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

The proposed works at Dunsandle No 3 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.

The reticulation work at the Dunsandle No 3 bore is the second stage of a two-stage project. The first stage – bore drilling and decommissioning – will see the drilling of a new artesian bore and the decommissioning of the existing Dunsandle No 3 bore. The bore drilling and decommissioning works will be covered under a separate REF.

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

Dunsandle No 3 bore is located on Dunsandle, a part of Ellerslie Station approximately 56 km east-north-east of Enngonia and approximately 100 km north-west of Brewarrina (see Figure 1) in the Warrego Groundwater Management Zone. Dunsandle No 3 bore supplies water to Dunsandle and Ellerslie.

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

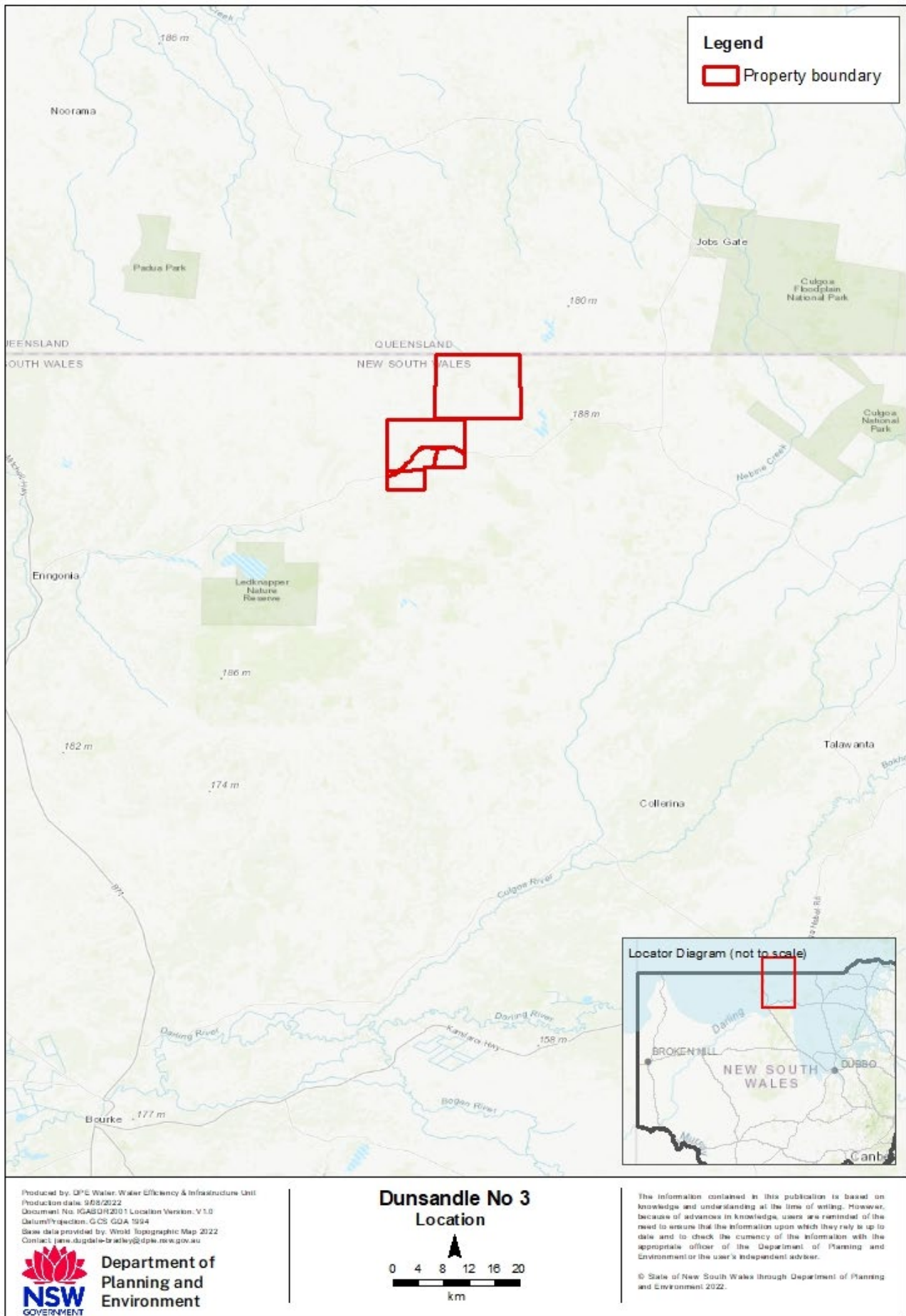


Figure 1: Location Map

1.4 Objectives of 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 Dunsandle No 3 bore on Dunsandle and Ellerslie.
- Minimise the environmental impacts of the proposed works during construction and operation

1.5 Consideration of options

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 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. 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.

1.6 Selection of the preferred option

Option 3 meets the objectives of the proposal and the IGABDR program and minimises wherever possible, the impact to Aboriginal cultural heritage. It 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.

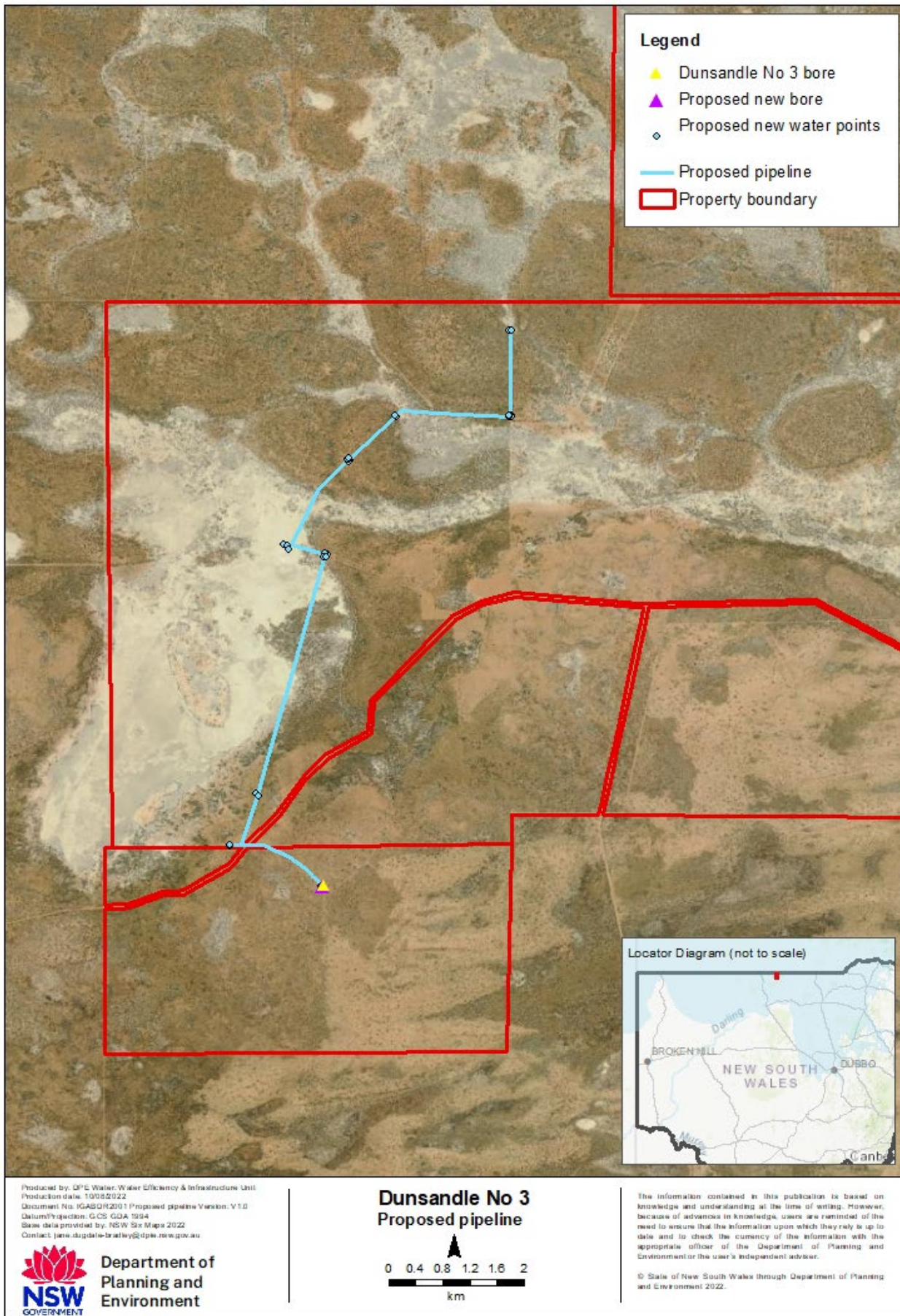


Figure 2 Proposed pipeline route (Option 2)

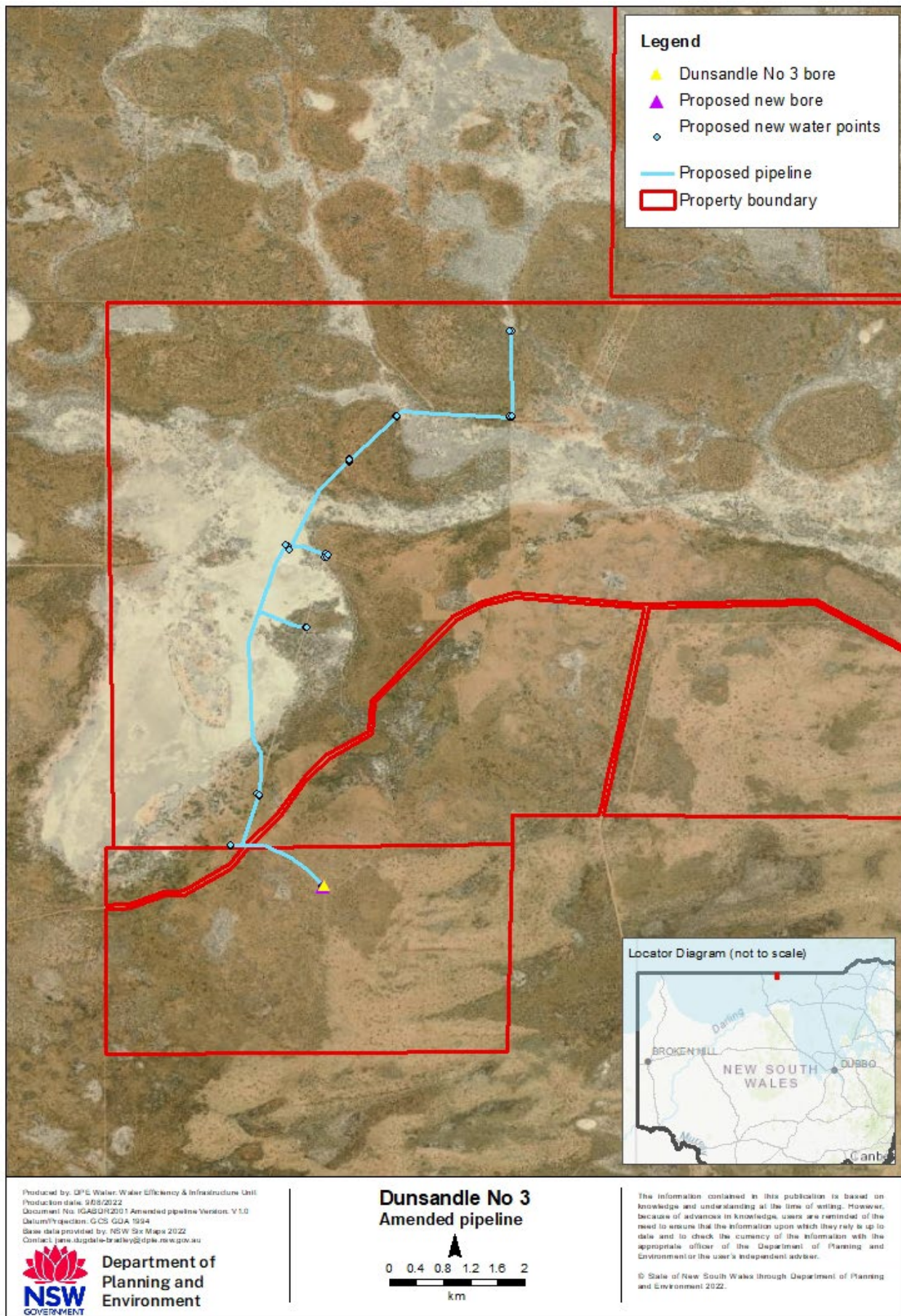


Figure 3 Amended pipeline route (Option 3)

2 Project description

2.1 Proposed works

The proposed works at Dunsandle No 3 bore consist of:

- Installation of approximately 12 km of polyethylene pipe to 10 new 22,500 L poly tanks.
- Installation of 20 new concrete troughs on concrete pads.
- Connection of the reticulation works to a newly drilled artesian bore (covered under a separate REF).

The proposed works are anticipated to generate water savings of approximately 725 ML/year and have a positive impact on the artesian pressure and ecological health of 34 artesian springs, all of which are identified as having high priority groundwater dependent ecosystems under Table A Schedule 2 of the Water Sharing Plan for the NSW Great Artesian Basin Shallow Groundwater Sources Order 2020 and 33 of which are identified as high priority geothermal spring GDEs in Table A Schedule 2 of the Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources 2020.

The above figures are based on Option 3 (Section 1.5) which are revised figures based on results from site investigations. Figure 3 shows the revised proposed scheme 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, pipeline routes and access tracks 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 Vegetation clearing

The pipeline route will follow existing tracks 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 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.

2.2.3 Trenching and pipe laying

The pipeline route is pegged and cleared as per the description in 2.2.2 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.

2.2.4 Water tank installation

Ten 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 m² with a maximum batter slope of 5:1 (horizontal:vertical). A circular impact area of no greater than 6 m radius (113 m²) is allowed in areas of TECs. Where tanks are to be installed in disturbed areas, a circular impact area of 8 m radius (201 m²) 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.

2.2.5 Water trough installation

Twenty 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 approximately 4.5 m x 6 m covering 27 m² 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 m²) is allowed in areas of high ecological sensitivity. Where troughs are to be installed in disturbed areas, a circular impact area of 10 m radius (314 m²) has been allowed.

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

2.2.6 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. The pump and controls would be solar powered.

2.2.7 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.

2.2.8 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.

2.2.9 Construction site restoration

Upon completion of the works, all construction sites are to be cleared of waste, debris and excess materials.

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.

2.2.10 Construction timeframe

Construction works are anticipated to begin in the middle of 2023 and are estimated to take approximately 16 weeks to complete - 15 weeks for reticulation installation and one week for connection to the new artesian bore.

2.2.11 Construction hours

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

All reticulation construction work will generally occur in normal daytime hours (7.00 am to 6.00 pm Monday to Saturday).

2.2.12 Operation and maintenance

On satisfactory connection to the new artesian bore and commissioning of the reticulation system, the scheme will be handed over to the landholder to operate and maintain into the future.

3 Statutory planning framework

3.1 Environmental Planning & 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
<i>Environmental Planning & Assessment Act 1979</i> (EP&A Act)	<p>NSW DCCEEW – Water Group is a public authority and determining authority as defined in Part 5 of the EP&A Act.</p> <p>The proposal satisfies the definition of an activity under the Act.</p> <p>As such, NSW DCCEEW – Water Group must assess and consider to the fullest extent possible all environmental impacts of the proposal before determining whether to proceed.</p> <p>This REF has been prepared with consideration of Section 171 of the EP&A Regs and Section 5.5 and 5.7 of the EP&A Act, and documents the potential environmental impacts of the proposal and necessary mitigation actions.</p>

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
<p><i>Crown Land Management Act 2019</i> (CLM Act)</p>	<p>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)</p> <p>As such, a licence must be acquired for works to be undertaken on Crown Land before construction begins.</p> <p>The proposed works do not cross any Crown roads, therefore a licence is not required.</p>
<p><i>Local Land Services Act 2013</i>(LLS Act)</p>	<p>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.</p>
<p><i>Biodiversity Conservation Act 2016</i>(BC Act)</p>	<p>A Biodiversity Assessment Report has been prepared for the Dunsandle No 3 scheme. Tests of significance (as per s7.3 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, one threatened flora species, nine threatened bird species, one threatened waterbird species, three threatened bat species and three threatened small mammal species.</p> <p>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 2023).</p> <p>The full report is provided in Appendix A.</p> <p>A summary of threatened species, populations, ecological communities and critical habitat is provided in Section 4.4</p> <p>An assessment of the potential impacts to threatened species, populations, ecological communities and critical habitat is provided in Section 5.5.</p>

Legislation, policy, regulation or plan	Requirement for the proposal
<p><i>Fisheries Management Act 1994 (FM Act)</i></p>	<p>Noorooma Creek is identified as Key Fish Habitat.</p> <p>No clearing of riparian vegetation, a key threatening process under the FM Act, will occur as part of the works.</p> <p>Key fish habitat and fish passage is discussed in Section 5.3.1.3 and in the Biodiversity Assessment Report in Appendix A..</p>
<p><i>National Parks & Wildlife Act 1974 (NPW Act)</i></p>	<p>Assessment of potential impacts to Aboriginal cultural heritage has been undertaken and these are discussed in Sections 4.5.1 and 5.6.</p> <p>As impact to Aboriginal cultural heritage could not be avoided, an AHIP will be submitted.</p>
<p><i>Aboriginal Land Rights Act 1983</i></p>	<p>Aboriginal land claims are discussed in Section 4.6.2.</p> <p>No Aboriginal Land Claims exist over the Dunsandle or Ellerslie parcels that are covered by the proposed Dunsandle reticulation works.</p>
<p><i>Native Title (New South Wales) Act 1994</i></p>	<p>The <i>Native Title (New South Wales) Act 1994</i> serves to implement the Commonwealth <i>Native Title Act 1993</i> in NSW and to ensure consistency with the standards set in the Commonwealth Act.</p> <p>The proposed Dunsandle No 3 scheme is not covered by a Native Title Application.</p>

Legislation, policy, regulation or plan	Requirement for the proposal
<p><i>Water Management Act 2000</i> (WM Act)</p>	<p><u>Controlled activity approval</u></p> <p>Under the WM Act regulations, a public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.</p> <p>A controlled activity approval is not required for the proposal.</p> <p><u>Water supply work approval - pipeline</u></p> <p>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.</p> <p>A water supply work approval for the reticulation works is not required for the proposal.</p> <p><u>Use of water</u></p> <p>The WM Act requires approval to be obtained for the taking and use of water.</p> <p>The extraction of water during construction and operation of the proposed pipeline must comply with allowable stock and domestic water use limits.</p>

Legislation, policy, regulation or plan	Requirement for the proposal
<i>Bioresecurity Act 2015</i>	<p>Under the Bioresecurity Act, all plants are regulated with a general bioresecurity duty to prevent, eliminate or minimise any bioresecurity 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 bioresecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised so far as is reasonably practicable.</p> <p>No priority weeds were identified during the site investigation.</p> <p>The Contractor is required to develop a site-specific environmental management plan (EMP) which addresses bioresecurity risk minimisation and mitigation.</p> <p>The Principal's Authorised Person will monitor and audit the Contractor's performance against the EMP.</p>
<i>Heritage Act 1977</i>	<p>Heritage impacts are addressed in Sections 4.5.2 and 5.9.2.</p> <p>The results of Heritage search reports are included in Appendix C.</p> <p>The proposal will not create any negative impacts on Historic heritage.</p>
<i>Roads Act 1993</i>	<p>The proposal is likely to generate a minor increase in local traffic; however, this increase will be temporary, and only occur during construction.</p> <p>During operation, the proposal is not expected to change road traffic movements.</p>

Legislation, policy, regulation or plan	Requirement for the proposal
<p><i>Protection of the Environment Operations Act 1997</i>(POEO Act)</p>	<p>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.</p> <p>Construction activities must comply with the requirements of the POEO Act, including but not limited to the following:</p> <ul style="list-style-type: none"> • 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.
<p><i>Waste Avoidance and Resource Recovery Act 2001</i></p>	<p>This Act encourages the most efficient use of resources in order to reduce environmental harm.</p> <p>The proposed Dunsandle No 3 scheme works will seek to minimise waste wherever feasible and implement strategies to reuse or reduce waste.</p>

3.3 Environmental planning instruments and strategic plans

Table 3 details the requirements for the proposal under relevant environmental planning instruments (EPIs) and strategic plans.

Table 3 Assessment of proposal against the requirements of EPIs and strategic plans

Legislation, policy, regulation or plan	Requirement for the proposal
<p><i>State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP)</i></p>	<p>The proposal is permissible without development consent under Chapter 2 Part 2.2 Division 24 s2.159 of the T&I SEPP.</p> <p>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.</p> <p>Consultation is discussed in Section 3.6 of this REF.</p>
<p><i>Brewarrina Local Environmental Plan 2012</i></p>	<p>The proposed Dunsandle No 3 scheme is zoned RU1 Primary Production under the Brewarrina LEP.</p> <p>Water reticulation systems are permissible without development consent in Zone RU1 Primary Production.</p> <p>Under Clause 1.9, the Brewarrina LEP is subject to the provisions of any SEPP that prevails over the LEP. The LEP is subject to the provisions of the T&I SEPP as outlined above, and therefore the permissibility provisions of the LEP do not apply.</p> <p>The project is consistent with the LEP land use objectives for the RU1 Primary Production Zone.</p>
<p><i>Brewarrina Shire Council Local Strategic Planning Statement 2020</i></p>	<p>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.</p> <p>The proposal to install reticulation as Stage 2 of the Dunsandle No 3 scheme works is compatible with the strategic vision and priority actions under the LSPS, specifically “deliver long-term water security” and “increase resilience to climate change”.</p>

Legislation, policy, regulation or plan	Requirement for the proposal
<i>State Environmental Planning Policy (Biodiversity and Conservation) 2021 (B&C SEPP)</i>	<p>Chapter 3 of the B&C SEPP applies to land zoned RU1 Primary Production.</p> <p>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).</p> <p>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.”</p> <p>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.</p>

3.4 Commonwealth legislation

Table 4 details the requirements for the proposal under the Commonwealth EPBC Act 1999.

Table 4 Assessment of proposal against the requirements of the EPBC Act 1999

Legislation, policy, regulation or plan	Requirement for the proposal
<i>Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>	<p>A Biodiversity Assessment has been undertaken as part of this REF.</p> <p>Section 4.4.1 summarises Matters of National Environmental Significance and Appendix A provides the full MNES report.</p> <p>Section 4.4.2 provide a summary of the biodiversity assessment, and Appendix A provides the full Biodiversity Assessment Report.</p> <p>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 (Biosis 2023).</p>
<i>Native Title Act 1993</i>	<p>The proposed Dunsandle No 3 scheme is not covered by a Native Title Application</p> <p>Native Title is discussed in Section 4.6.3</p>

3.5 Summary of licenses and approvals

Table 5 below summarises the licences and approvals required for the proposal.

Table 5 Summary of approvals

Agency	Requirements	Reference	Timing	Responsible entity
NSW DCCEEW – Water Group	Determination of the proposal	Part 5 of EP&A Act 1979	Prior to construction	NSW DCCEEW – Water Group
Landholder	Access approval		Prior to assessment phase	NSW DCCEEW – Water Group
Heritage NSW, DPE	Aboriginal Heritage Impact Permit	Section 90 NPW Act 1974	Prior to construction of reticulation works	NSW DCCEEW – Water Group
Brewarrina Shire Council	Consent for trenching works across Kahmoo Dunsandle Road	Part 9 Division 3 138 (1)(b) of Roads Act 1993 No 33	Prior to construction of reticulation works	Reticulation contractor

3.6 Consultation

3.6.1 T&ISEPP

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 6-8 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 6 below and concludes that statutory consultation with Brewarrina Shire Council is required due to the need to trench across the Kahmoo Dunsandle Road.

Table 6 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.

Clause	Response
<p>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</p>	<p>The proposal will involve works that would cause a disruption to pedestrian or vehicular traffic, being the requirement to trench across the Kahmoo Dunsandle Road. Consultation with Brewarrina Shire Council is required prior to commencing trenching works across the Kahmoo Dunsandle Road.</p>
<p>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 <i>Roads Act 1993</i>.</p>	<p>The proposal requires the excavation of trenches across the Kahmoo Dunsandle Road for which Brewarrina Shire Council is the roads authority under the <i>Roads Act 1993</i>. Consultation with the Brewarrina Shire Council is required prior to commencing trenching works across the Kahmoo Dunsandle Road.</p>
<p>Clause 2.11 – Consultation with councils – development with impacts on local heritage</p>	
<p>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</p>	<p>The proposal will not significantly impact on any item of local heritage.</p>
<p>Clause 2.12 – Consultation with councils – development with impacts on flood liable land</p>	
<p>Involves development on flood liable land that will change flood patterns other than to a minor extent.</p>	<p>The proposal will not change flood patterns other than to a minor extent.</p>
<p>Clause 2.14 – Consultation with councils – development with impacts on certain land within the coastal zone</p>	

Clause	Response
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 in a coastal area.

Consideration of clause 2.13 dictates whether or not consultation with the SES is required (see Table 7).

Table 7: 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	
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 15AA (2) (a)-(i). Consultation with the SES is not required.

Consideration of clause 2.15 dictates whether or not consultation with public authorities other than councils is required (see Table 8).

Table 8: 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 <i>National Parks and Wildlife Act 1974</i> (NPW Act) or to land acquired under Part 11 of that Act.	The proposed works involves development adjacent to land reserved under the <i>National Parks and Wildlife Act 1974</i> or to land acquired under Part 11 of that Act. Consultation with NPWS is 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.

Clause	Response
Involves development comprising a fixed or floating structure in or over navigable waters	The proposed works do not involve development comprising 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.
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
- NSW NPWS
- DPI – Fisheries
- DPE – Biodiversity, Conservation and Science Directorate
- DPE – Water Science

Comments received in response to this notification are provided in Appendix D.

3.6.2 Aboriginal cultural heritage

The Local Aboriginal Land Council (LALC)/Traditional Owner who speaks for the country on which the proposal is located is Weilmoringle Local Aboriginal Land Council. Guy Gibbs,

Western LLS participated in initial discussions regarding the proposal, and also accompanied the landholder and NSW DCCEEW – Water Group staff, along with Kevin Knight, Community Elder during the site inspections to provide advice on cultural heritage issues along the proposed pipeline route.

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. The assessment included desktop research, site inspections and the completion of an Aboriginal Cultural Heritage Due Diligence Report.

As a result of the Due Diligence assessment, and consideration of previous assessments undertaken along the proposed Dunsandle No 3 pipeline route, it was determined that an Aboriginal Heritage Impact Permit (AHIP) would be required for the reticulation works prior to construction commencing.

An Aboriginal Cultural Heritage Assessment Report and Archaeological Technical Report are being prepared as part of the AHIP application. An AHIP application will be submitted.

3.6.3 Community consultation

The proposed Dunsandle No 3 reticulation works are located on Dunsandle and Ellerslie Stations. Based on the limited extent of the proposed works and it being located on private property, no community consultation was necessary.

4 Description of existing environment

4.1 Climate and air quality

The Mulga Lands Bioregion 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 9 below (NPWS, 2003):

Table 9: Climate statistics for the Mulga Lands Bioregion

Mean annual temperature	10 – 18°C
Minimum average monthly temperature	-3.5 – 3.6°C
Maximum average monthly temperature	22.9 – 34.7°C
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 and Warrego Plains sub-regions. Topographic, geology and soil summaries for the bioregion are shown in Table 10 and Table 11 below (NPWS, 2003). Figure 4 shows the relative location of the IBRA region within the scheme area (DEWNR 2015).

Table 10: Bioregion topography, geology and soils

Bioregion	Mulga Lands- Nebine Plains sub-region
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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 sediments.

Table 11: Bioregion topography, geology and soils

Bioregion	Mulga Lands- Warrego Plains sub-region
Topography	Extensive alluvial plains with low sandy roses of the Warrego fans
Geology	Quaternary alluvium and aeolian sand.
Soils	Red earths and red siliceous sands with widespread cracking grey and brown clays.

The Dunsandle No 3 scheme falls within the Land Systems of Western NSW. Land System descriptions for those within the scheme footprint are detailed in Table 12 and shown in Figure 5 (Walker, 1991).

Table 12: Land systems and geomorphology

Scheme	Land System	Range Type	Geomorphology	Summary
Dunsandle No 3	Ledknapper	Floodplains with coolibah	Alluvial plains	Floodplain with extensive areas of low rises and plains, mainly the Ledknapper Channels
	Ellerslie	Sandplains and alluvial plains with gidgee and/or brigalow	Sandplain	Sandplains with clumps of brigalow and low dunes
	Glenmore	Mulga – sandplains and dunefields	Dunefields	Spinifex sandplains and dunefields

The Dunsandle No 3 scheme falls within two Mitchell Landscapes. Descriptions of each Mitchell Landscape are detailed in Table 13 (DECC 2002) and shown Figure 6 (DECCW 2011).

Table 13: Mitchell Landscapes within the scheme

Mitchell Landscape	Description	Vegetation
<p>Paroo-Warrego Sandplains</p>	<p>Level sandplains of Quaternary age with broad rises. Areas of longitudinal dunes with numerous blowouts, small lakes and few drainage tracts. Relief 3-8m. Deep calcareous sandy red earths, sandy red and yellow texture-contrast on plains and rises with loamy red earths, sandy texture-contrast soils and grey non-cracking clays in depressions and sinks. Dunes with deep red or brown siliceous sands and earthy sands, swales of loamy solonised brown soils with brown cracking clays in pans and swamps.</p>	<p>Dense mallee (<i>Eucalyptus</i> sp.) and/or belah (<i>Casuarina cristata</i>) and osewood (<i>Alectryon oleifolius</i>) with dense mulga (<i>Acacia aneura</i>), bimble box (<i>Eucalyptus populnea</i>), gidgee (<i>Acacia cambagei</i>), rosewood, white cypress pine (<i>Callitris glaucophylla</i>), silver-leaved ironbark (<i>Eucalyptus melanophloia</i>), wild lemon (<i>Canthium oleifolium</i>), wilga (<i>Geijera parviflora</i>), ironwood (<i>Acacia excelsa</i>), mulga, sandplain wattle (<i>Acacia murrayana</i>), bluebush (<i>Maireana</i> sp.), turpentine (<i>Eremophila sturtii</i>), narrow-leaf hopbush (<i>Dodonaea attenuata</i>), emu bush (<i>Eremophila longifolia</i>), budda (<i>Eremophila mitchellii</i>), and variable speargrass (<i>Austrostipa variabilis</i>) on sandplains and dunes. Swales with moderate to dense belah, rosewood with woollybutt (<i>Eragrostis eriopoda</i>), black bluebush (<i>Maireana pyramidata</i>), bottlewashers (<i>Enneapogon</i> sp.) and variable spear grass. Bimble box, coolabah (<i>Eucalyptus microtheca</i>) and black box (<i>Eucalyptus largiflorens</i>) with punty bush (<i>Senna eremophila</i>), turpentine, lignum (<i>Muehlenbeckia cunninghamii</i>), canegrass (<i>Eragrostis australasica</i>), eurah (<i>Eremophila bignoniiflora</i>), and wire grass (<i>Aristida</i> sp.) in depressions.</p>

Mitchell Landscape	Description	Vegetation
Paroo-Warrego Channels and Floodouts	Channels, floodplains and dune field islands of alluvium and aeolian sand of Quaternary age, with occasional salinas and extensive scalds along the Paroo and Warrego Rivers. Relief to 5m. Channels and floodplain of grey cracking, crab-hole clay. Reddish brown loamy sands on islands, yellow texture-contrast soils and sands on rises and hummocks.	Coolibah (<i>Eucalyptus microtheca</i>), black box (<i>Eucalyptus largiflorens</i>), yapunyah (<i>Eucalyptus ochrophloia</i>), myall (<i>Acacia pendula</i>), river cooba (<i>Acacia stenophylla</i>), lignum (<i>Muehlenbeckia cunninghamii</i>), canegrass (<i>Eragrostis australasica</i>), tall spike rush (<i>Eleocharis sphacelata</i>) along channels and fringing depressions. Some brigalow (<i>Acacia harpophylla</i>), with lignum, eurah (<i>Eremophila bignoniflora</i>), flowering lignum (<i>Eremophila polyclada</i>), and canegrass, nitre goosefoot (<i>Chenopodium nitrariaceum</i>), neverfail (<i>Eragrostis setifolia</i>), Warrego summer-grass (<i>Paspalidium jubiflorum</i>), copperburr (<i>Sclerolaena</i> sp.), fairy grass (<i>Sporobolus caroli</i>), and annual saltbushes (<i>Atriplex</i> sp.) on grey soils. Islands with open mulga (<i>Acacia aneura</i>), sandhill wattle (<i>Acacia ligulata</i>), narrow-leaf hopbush (<i>Dodonaea attenuata</i>), rosewood (<i>Alectryon oleifolius</i>) and bottlewashers (<i>Enneapogon</i> sp.). gidgee (<i>Acacia cambagei</i>), belah (<i>Casuarina cristata</i>), ironwood (<i>Acacia excelsa</i>), turpentine (<i>Eremophila sturtii</i>), warrior bush (<i>Apophyllum anomalum</i>), budda (<i>Eremophila mitchellii</i>), neverfail (<i>Eragrostis setifolia</i>), copperburr, and perennial grasses on elevated areas with white cypress pine (<i>Callitris glaucophylla</i>) and needlewood (<i>Hakea leucoptera</i>) on sandy rises.

Table 14 details the Australian Soil Order Classifications and erosion hazards present within the scheme footprint (OEH 2017; Walker, 1991). These classifications are shown in Figure 7 (OEH 2017).

Table 14: Australian Soil Order Classification and Erosion Potential

Australian Soil Order Classification	Land system	Description	Erosion hazard
Sodosol	Ledknapper	Mosaic of cracking and non-cracking clays and yellow texture-contrast soils, minor areas of sands.	Locally severe scalding; areas of windsheeting and watersheeting.
Rudosols	Ellerslie	Red sands and calcareous red earths	Minor drift; minor to moderate windsheeting and watersheeting/
	Glenmore	Deep sands	Minor windsheeting and drift

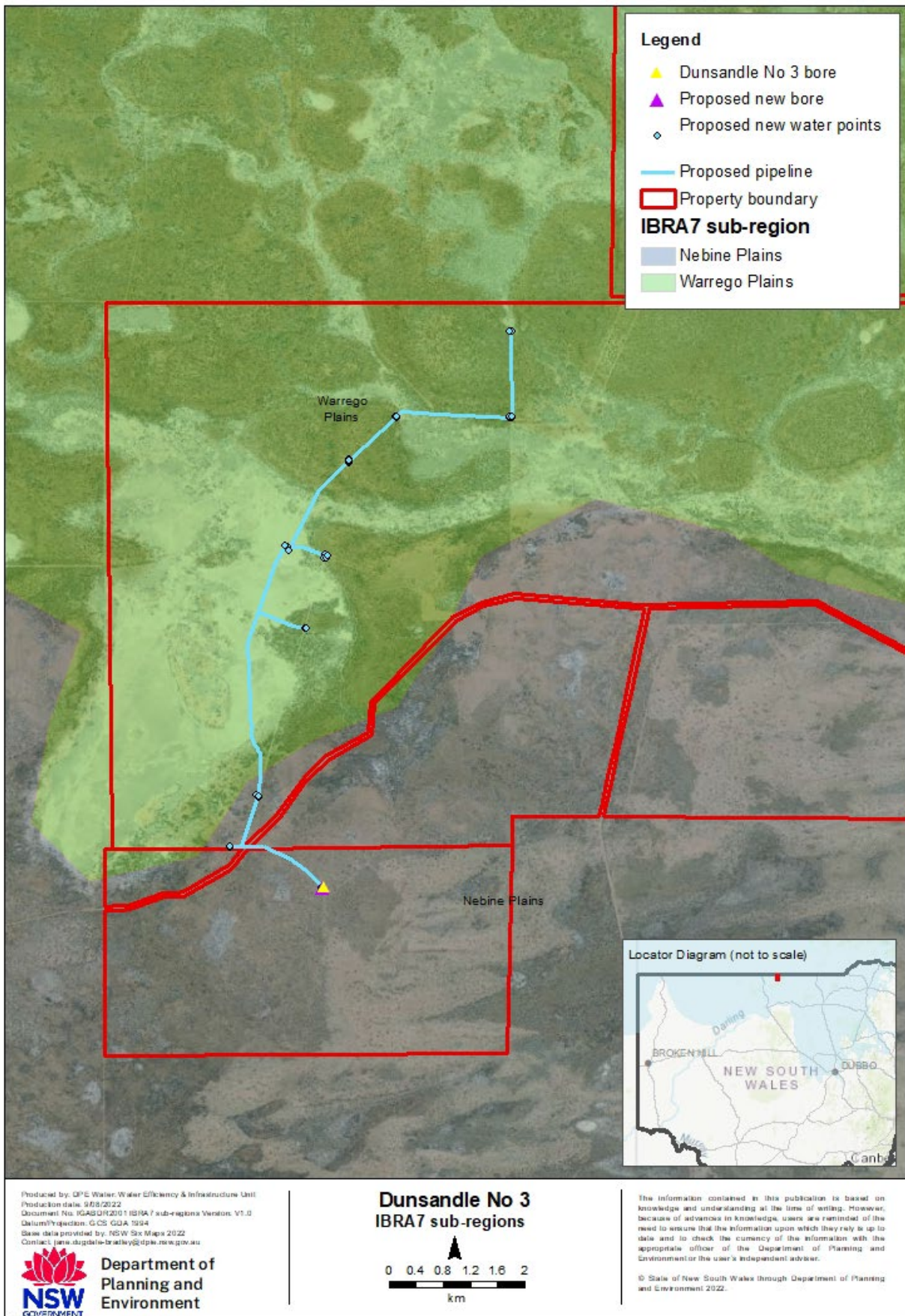


Figure 4: IBRA sub-regions

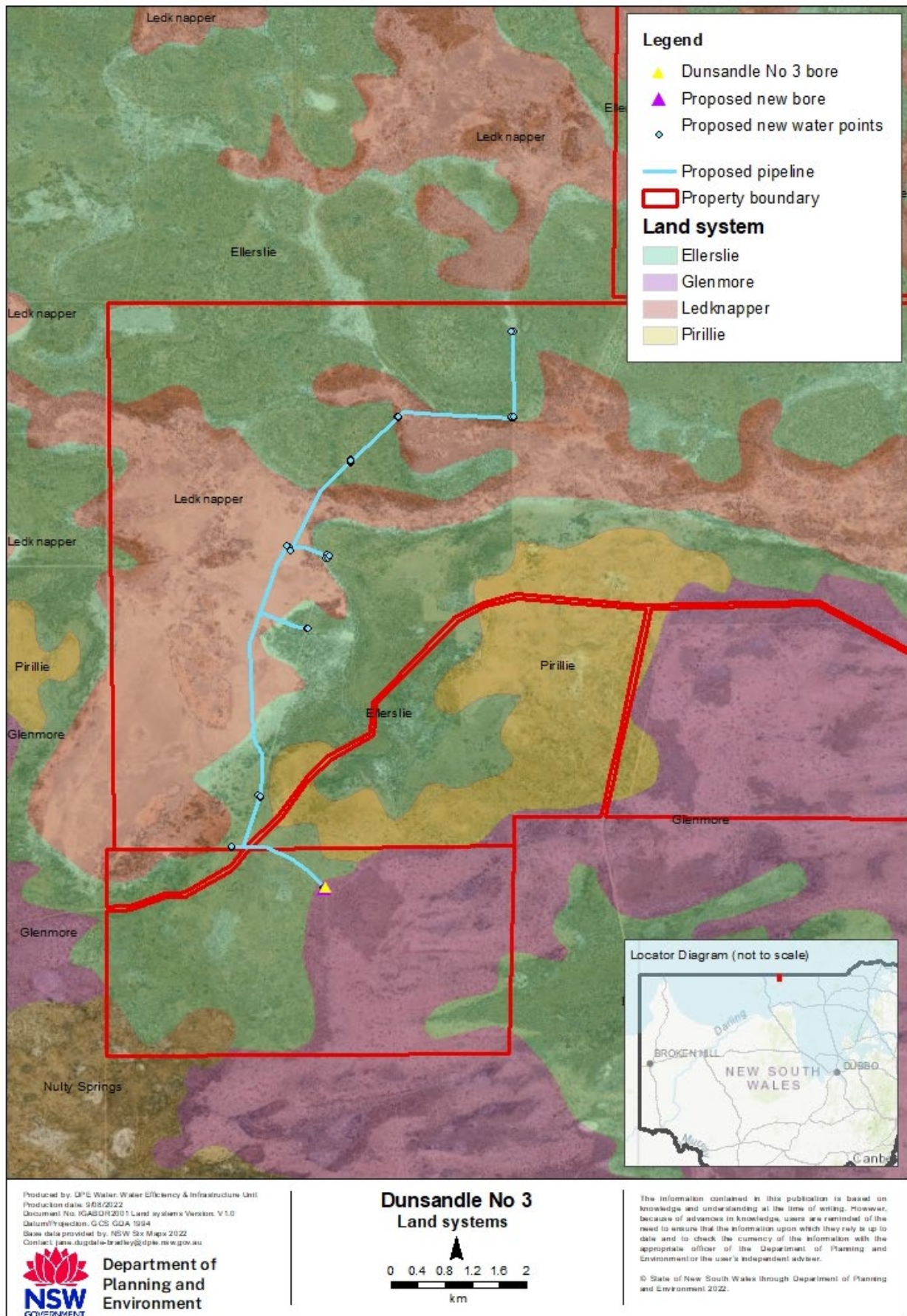


Figure 5: Land systems

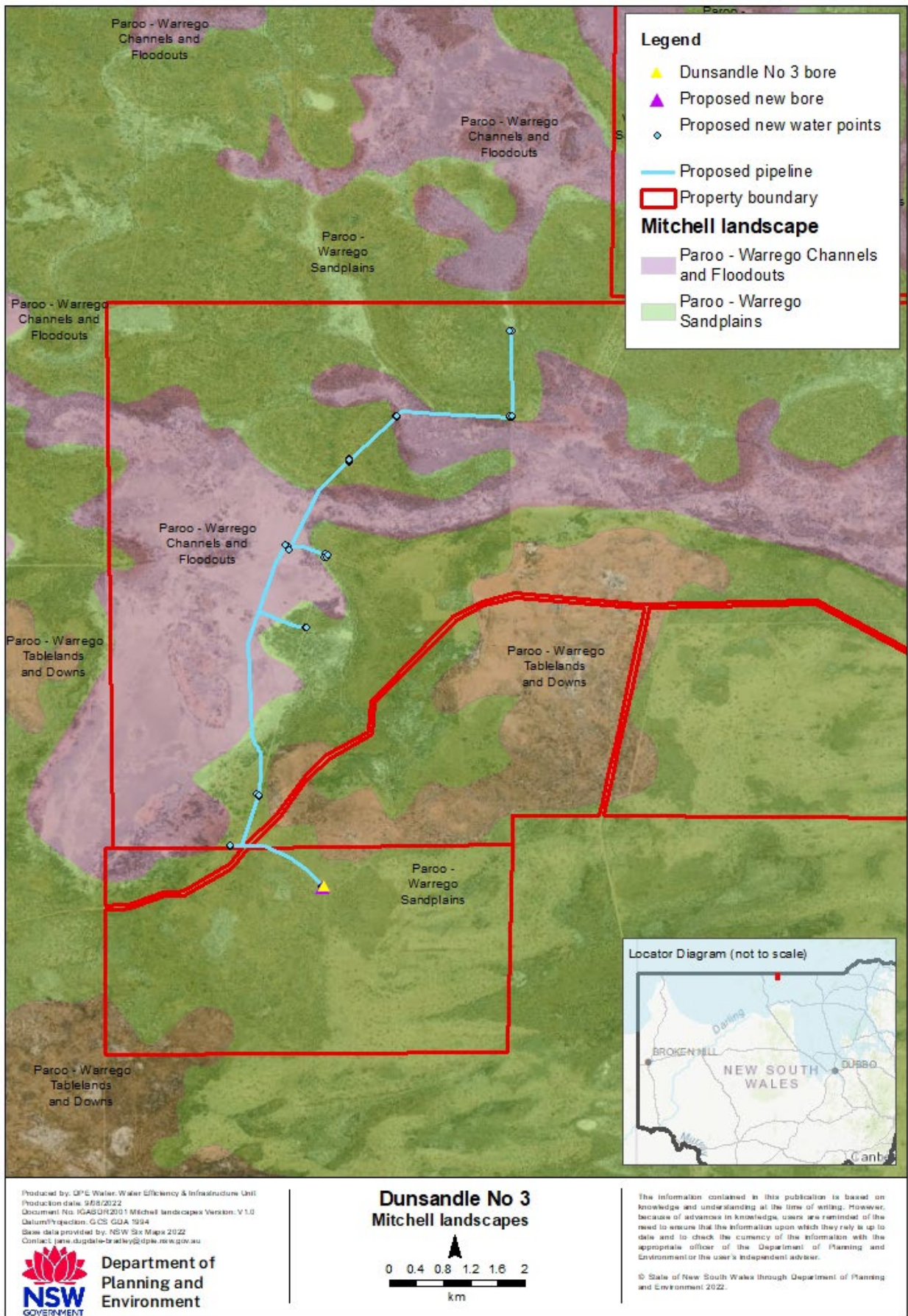


Figure 6: Mitchell landscapes

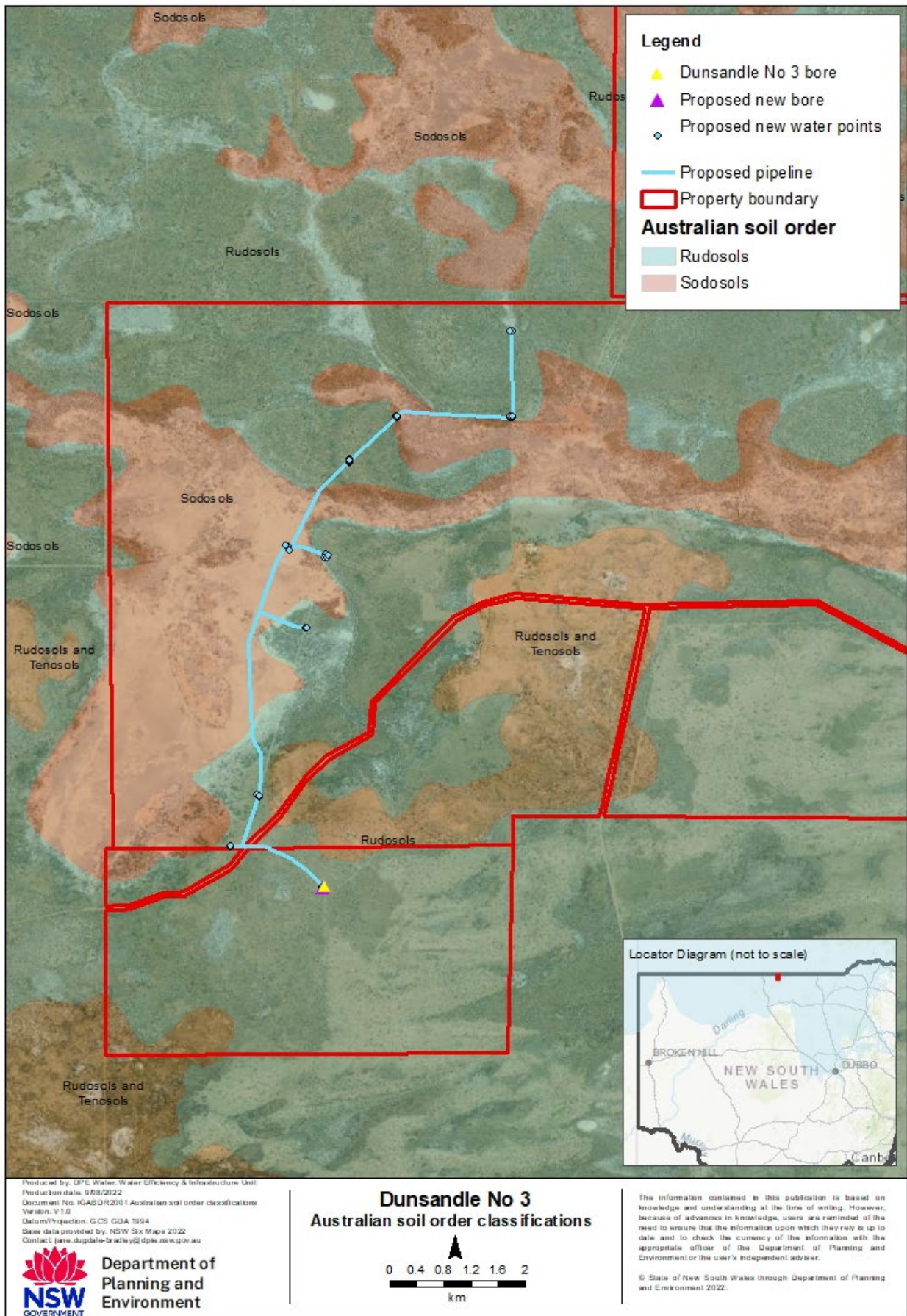


Figure 7: Australian soil order classifications

4.3 Hydrology, catchment values and water quality

The proposed scheme is surrounded by several perennial water sources:

- the headwaters of the Ledknapper Creek ~ 50 km south west
- Bow Creek ~15 km due east, which feeds into the Culgoa River, a tributary of the Barwon River.
- the Birrie River ~61 km south east
- the Barwon River ~89 km due south-south-east
- the Culgoa River ~40 km south east
- the Warrego River ~60 km due west

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 ~55 km east-north-east of the proposed scheme
- Tom's Lake ~76 km south west of the proposed scheme
- Birdsnest Swamp ~80 km south west of the proposed scheme
- Bottom Lila Lake ~96 km south west
- The Dry Lake ~83 km south west of the proposed scheme
- the Narran Lakes ~111 km south east of the proposed scheme.

Listed under the Ramsar Convention on Wetlands of International Importance, the Narran Lake Nature Reserve is approximately 115 km south east of the proposed scheme (DAWE 2018).

The proposed Dunsandle No 3 scheme sits to the north west of a line of artesian springs from the Bourke Super Group (Powell 2015) which runs south west to north east past Dunsandle Station, at its closest approximately 8 km south east of Dunsandle No 3 bore.

Figure 8 shows the perennial water sources and location of artesian springs around the proposed Dunsandle No 3 scheme.

The existing Dunsandle No 3 bore (GW010371) was drilled in 1952, is approximately 477 m deep and authorised for stock and domestic use. Water is drawn from the Warrego Groundwater Management Zone within the GAB and feeds approximately 12.6 km of bore drains.

The existing unrestricted Dunsandle No 3 bore has a recorded flow rate of 23.3 L/s. The proposed works are anticipated to generate water savings of approximately 725 ML/year and have a positive impact on the artesian pressure and ecological health of 34 artesian springs, all of which are identified as having high priority groundwater-dependent ecosystem springs listed under Schedule

2 of the Water Sharing Plan for the NSW Great Artesian Basin Shallow Groundwater Sources Order 2020. Figure 8 shows the location of artesian springs in relation to Dunsandle No 3 bore.

There are no high priority GDEs within the proposed Dunsandle scheme area.

A salinity reading obtained from bore logging works in 2010 was 1,324 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 45.050C was recorded during logging.

The nearest watercourse to the proposed Dunsandle No 3 scheme is the ephemeral Noorooma Creek. Two branches of McCarthy's Bore Drain connect to the Noorooma Creek in the northern area of the proposed scheme (see Figure 10). Noorooma Creek joins Bow Creek approximately 27 km south east of the proposed scheme. Bow Creek flows into the Culgoa River a further 18 km south south east.

Noorooma Creek is intersected by the proposed works (see Figure 9). This reach is classified as a discontinuous channel, with high fragility, good stream condition and conservation recovery potential under the RiverStyles framework.

The proposed works also intersect McCarthy's Bore Drain (East) (see Figure 9). This reach is classified as a continuous channel, with low fragility, good stream condition and conservation recovery potential under the RiverStyles framework.

The Noorooma Creek expresses as a first order stream within the proposed scheme area. A series of drains associated with the Dunsandle No 3 bore are present within the proposed scheme area (see Figure 10).

The Dunsandle No 3 scheme area is not covered by a Floodplain Management Plan.

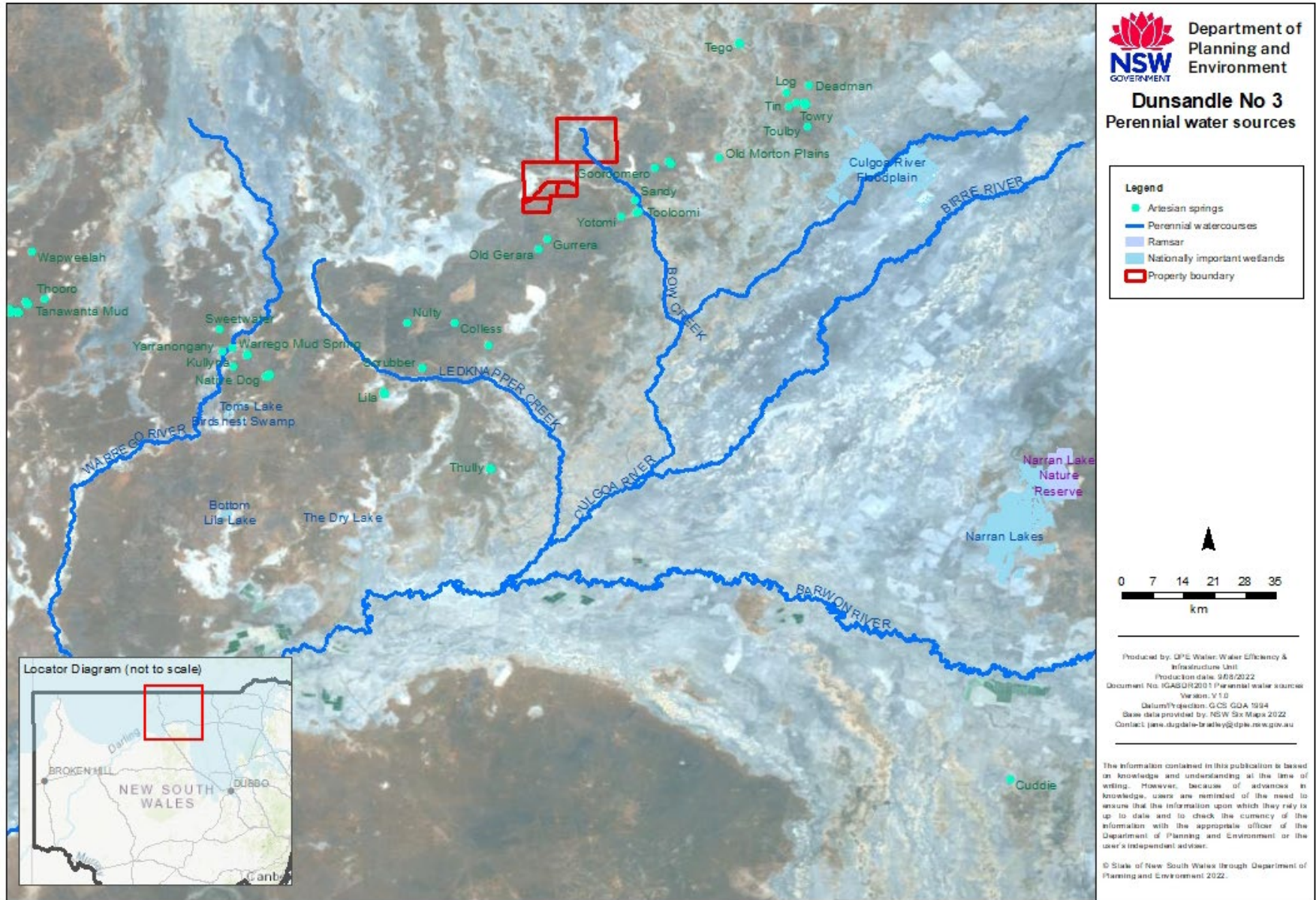


Figure 8: Perennial water sources

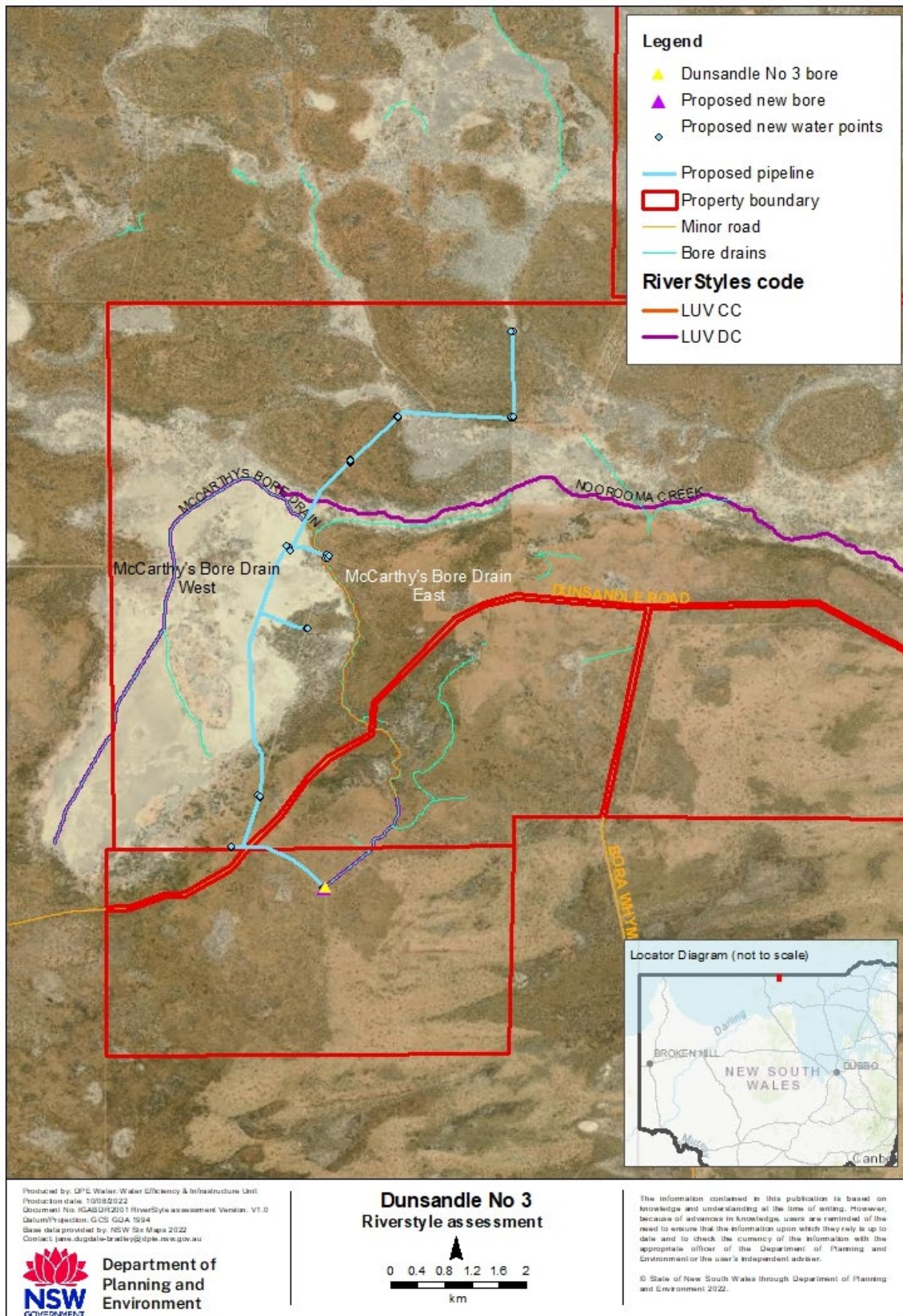


Figure 9: RiverStyles assessment

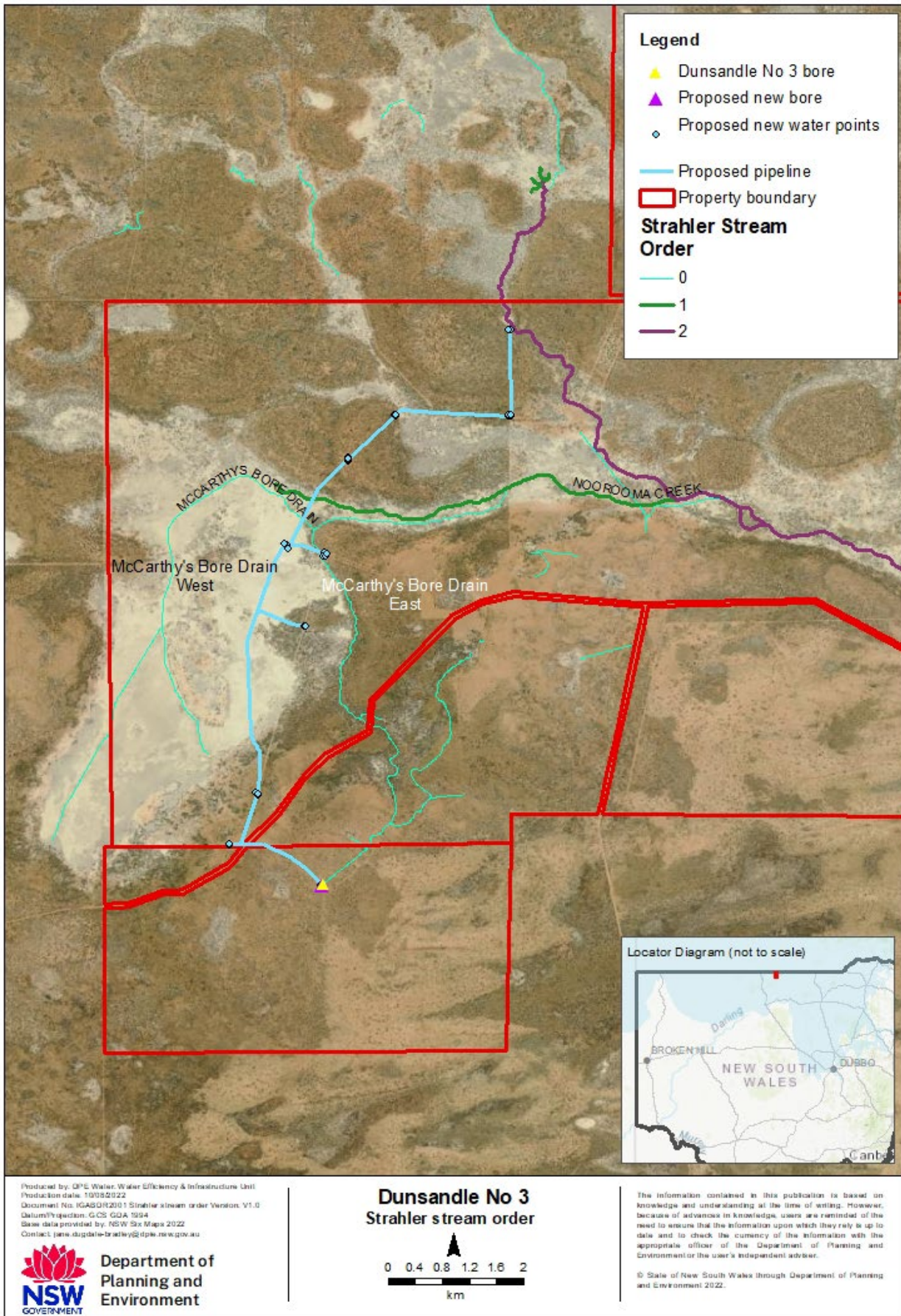


Figure 10: Strahler stream order

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 8 August 2022 (<https://www.environment.gov.au/epbc/protected-matters-search-tool>) and a search undertaken:

Table 15 summarises the Matters of Environmental Significance identified as a result of the search:

Table 15: 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	1
Listed Threatened Species	10
Listed Migratory Species	7

Table 16 lists other matters protected by the EPBC Act.

Table 16: 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

4.4.2.1 Aquatic

Small areas of HEVAE exist adjacent to the proposed scheme area. These HEVAE have been classified as medium or low value (see Figure 11). There are no high or very high value HEVAE within the proposed scheme area.

There is no key fish habitat within the proposed scheme area, although Noorooma Creek, downstream of the scheme is identified as key fish habitat.

The proposed Dunsandle No 3 scheme works sit within the extent of the Lowland Darling River aquatic ecological community (DPI 2007).

4.4.2.2 Terrestrial

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 potentially found within the scheme can be found in Table 17 and Figure 12 (DPE 2019).

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.

Six PCTs were recorded within or directly adjacent to the Dunsandle scheme works area:

- PCT 31 - *Brigalow - Gidgee open woodland on clay plains west of the Culgoa River, Mulga Lands Bioregion* occurs at lower elevations on clay derived soils and at slightly higher elevation on red sandy to rocky soils. The Brigalow PCT group could possibly warrant splitting in to multiple PCTs based on landscape position as the Brigalow community that occurs on red sandy to rocky soils appears to be a distinct assemblage and is floristically distinct from the Brigalow community that occurs on the grey clay soils and scalds. As only two Brigalow PCTs are described, we have included the two distinct assemblages into PCT 31, as both assemblages contained Gidgee throughout.

- PCT 98 - *Poplar Box - White Cypress Pine - Wilga - Ironwood shrubby woodland on red sandy-loam soils in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion* occurs on rocky rises at a higher elevation than the Poplar Box Grassy Woodland (TEC) that occurs lower down on the clay plains. This PCT has a distinctively dense shrubby understorey.
- PCT 118 - *Gidgee chenopod woodland on red-brown clays in the semi-arid (hot) climate zone mainly in the Mulga Lands Bioregion* occurs where Gidgee *Acacia cambagei* is the dominant canopy species on rocky soils at higher elevations.
- PCT 194 - *Heather Bush - Mulga - Umbrella Mulga open shrubland on gravelly rises mainly in the Mulga Lands Bioregion* occurs where canopy trees are absent and Heather Bush *Thryptomene hexandra* dominates.
- PCT 197 - *Black Box - Gidgee - chenopod low open woodland wetland on alluvial clay soils in the Culgoa River region of the Darling Riverine Plains Bioregion and Mulga Lands Bioregion* occurs on the outer edges of claypans. This community is not representative of the Coolibah - Black Box Woodland TEC as it does not contain Coolibah *Eucalyptus coolabah* as the dominant or co-dominant species.
- PCT 212 - *Chenopod low open shrubland - ephemeral partly derived forbland saline wetland on occasionally flooded pale clay scalds in the NSW North Western Plains* occurs on scalded claypans. (Biosis 2023).

PCT 31 within the works area also classifies as the Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community (TEC) and this community is synonymous with the BC Act listed Brigalow-Gidgee woodland/shrubland in the Mulga Lands and Darling Riverine Plains Bioregions. This community is referred to as Brigalow Woodlands and this definition includes its listing under both the BC and EPBC Acts. Where stands of pure Gidgee were present these areas were not considered to represent the TEC (Biosis 2023).

Painted Honeyeater *Grantiella picta* (Vulnerable under the EPBC and BC Act) was recorded at multiple locations in Gidgee and Brigalow dominated woodlands during the site assessment and a range of State listed threatened fauna species are known to utilise the above listed PCTs and have been recorded within the nearby Ledknapper Nature Reserve (Biosis 2023).

A range of BC Act listed birds and bats have a medium or greater likelihood of utilising habitats within the Dunsandle area (Biosis 2023).

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

- Aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River
- Brigalow (*Acacia harpophylla* dominant and co-dominant) (Endangered EPBC Act and BC Act) (Biosis 2023)

Threatened flora species

- Narrow-leafed Bumble *Capparis loranthifolia* var *loranthifolia* (Endangered BC Act) (Biosis 2023)

Threatened waterbirds

- Brolga *Grus rubicunda* (Vulnerable BC Act) (Biosis 2023)

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)
- Hall's Babbler *Pomatostomus halli* (Vulnerable BC Act)
- Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis temporalis* (Vulnerable BC Act) (Biosis 2023)

Threatened bat species

- Little Pied Bat *Chalinolobus picatus* (Vulnerable BC Act)
- Yellow-bellied Sheath-tail-bat *Saccolaimus flaviventris* (Vulnerable BC Act)
- Inland Forest Bat *Vespadelus baverstocki* (Vulnerable BC Act) (Biosis 2023)

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 2023)

Table 17: Plant community types potentially present along proposed Dunsandle No 3 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
Grasslands	Semi-Arid Floodplain Grasslands	43	Mitchell Grass Grassland – Chenopod Low Open Shrubland	Mitchell Grass Grassland – Chenopod Low Open Shrubland on floodplains in the semi-arid (hot) and arid zones
Freshwater Wetlands	Inland Floodplain Swamps	53	Shallow Freshwater Wetland Sedgeland	Shallow Freshwater Wetland Sedgeland in depressions on floodplains on inland alluvial plains and floodplains
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 (Acacia Formation)	Sandplain Mulga Shrublands	119	Sandplain Mulga Tall Shrubland	Sandplain Mulga Tall Shrubland – open shrubland of the semi-arid and arid climate zones
Arid Shrublands (Acacia Sub-Formation)	Sandplain Mulga Shrublands	143	Narrow-leaved Hopbush – Scrub Turpentine – Senna Shrubland	Narrow-leaved Hopbush – Scrub Turpentine – Senna Shrubland on semi-arid and arid sandplains and dunes

Vegetation Formation (Keith)	Vegetation Class (Keith)	PCT	Summarised Name	Name
Arid Shrublands (Acacia Sub-Formation)	Stony Desert Mulga Shrublands	194	Heather Bush-Mulga-Umbrella Mulga Open Shrubland	Heather Bush-Mulga-Umbrella Mulga Open Shrubland on gravelly rises mainly in the Mulga Lands Bioregion
Arid Shrublands (Acacia Sub-Formation)	Gibber Transition Shrublands	197	Black Box – Gidgee – Chenopod Low Open Woodland Wetland	Black Box – Gidgee – Chenopod Low Open Woodland Wetland on alluvial clay soils in the Culgoa River region of the Darling Riverine Plains Bioregion and Mulga Lands Bioregion

SOURCE: DPE, 2022. STATE VEGETATION TYPE MAP.

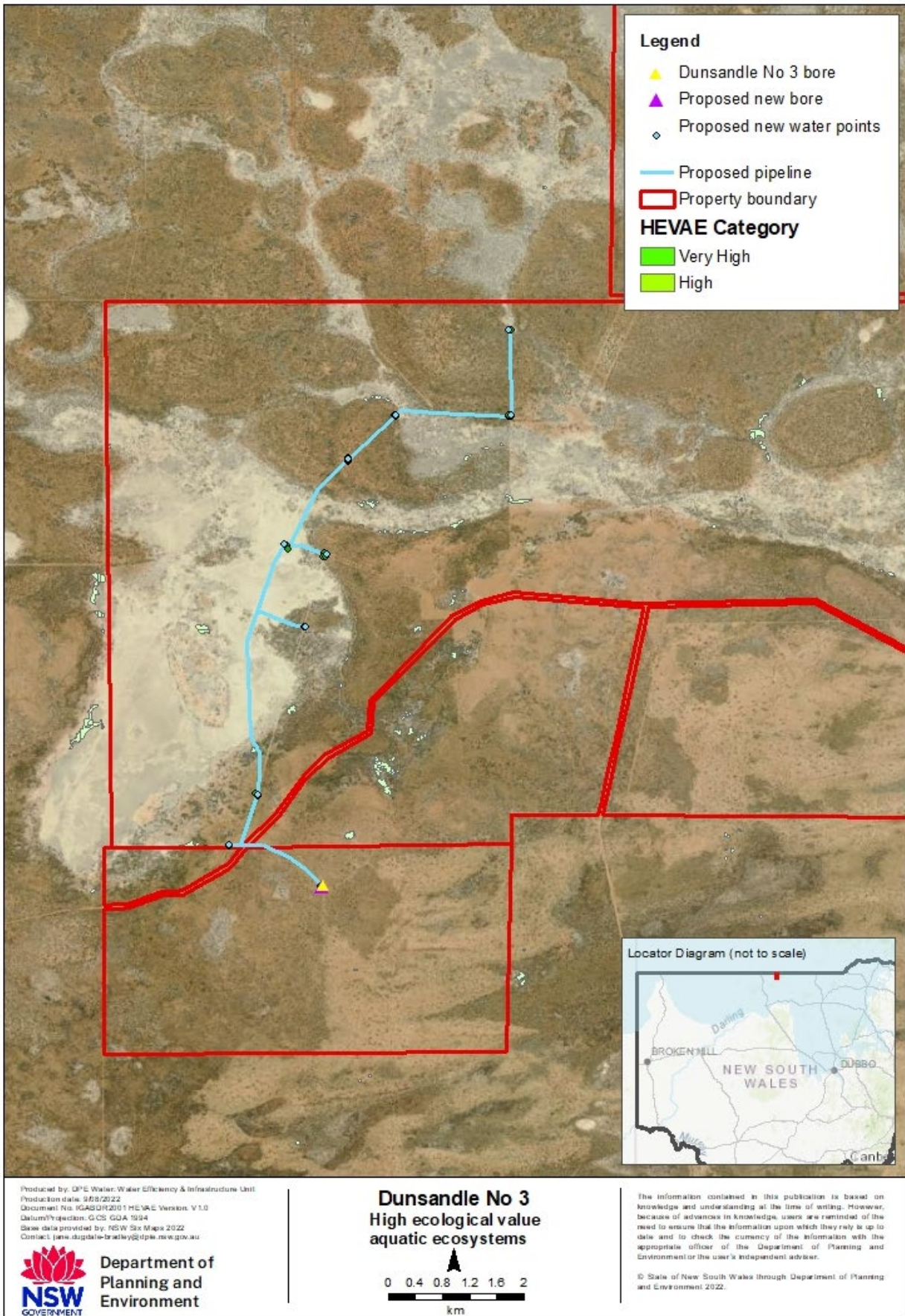


Figure 11: High ecological value aquatic ecosystems

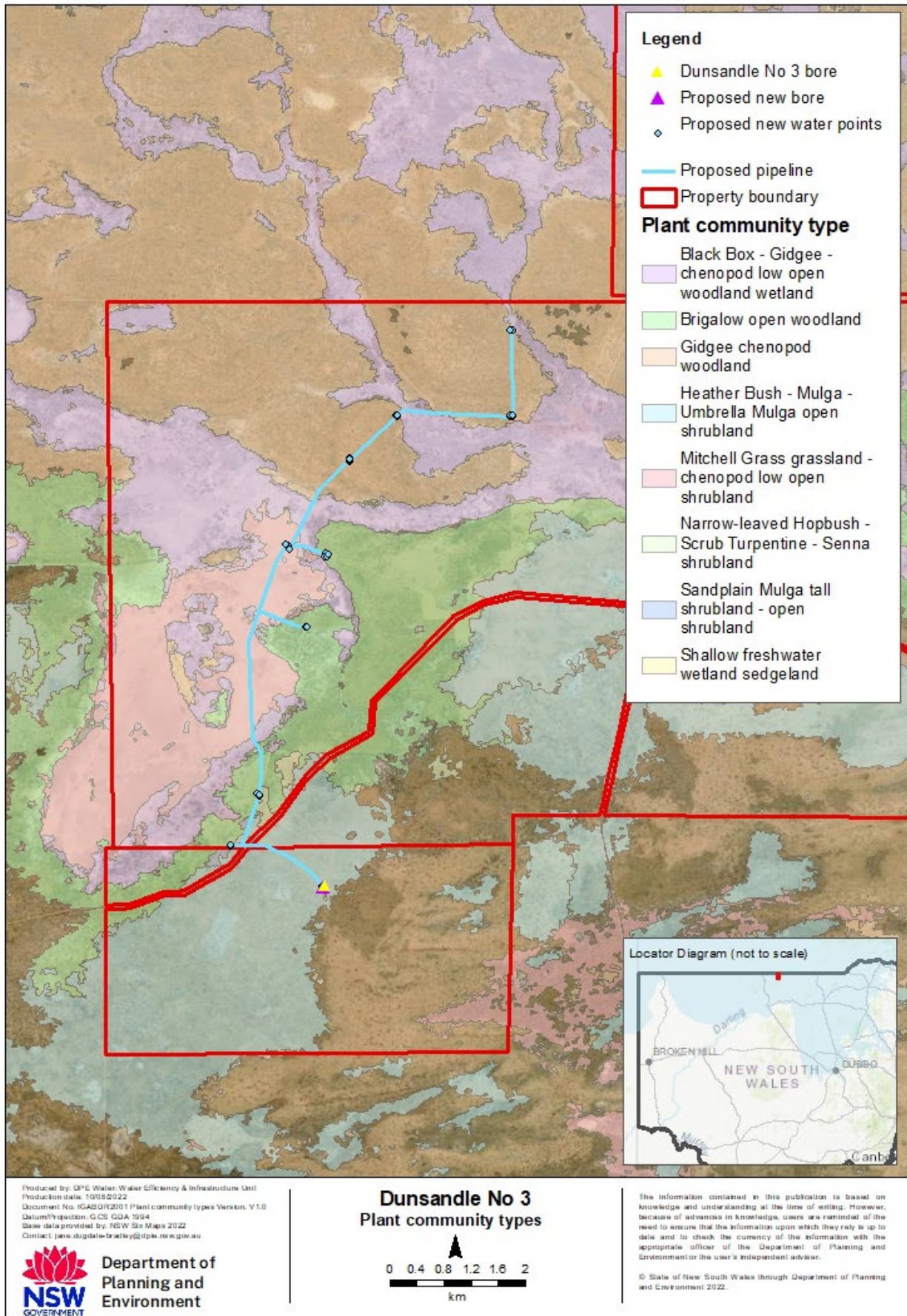


Figure 12: Plant community types potentially present

4.5 Cultural heritage

4.5.1 Aboriginal cultural heritage

The proposed scheme footprint falls within the Weilmoringle Local Aboriginal Land Council area.

The NSW Aboriginal Heritage Information Management System (AHIMS) on-line search tool was accessed on 23 April 2020, and a basic and extensive search undertaken for the proposed Dunsandle scheme area. Several sites were identified within the proposed Dunsandle scheme area. The full search reports are provided in Appendix B.

Guy Gibbs, Western LLS and Kevin Knight, Elder, undertook a site inspection of the proposed Dunsandle pipeline on 1 September 2020 and prepared a Due Diligence assessment for Aboriginal heritage sites. The Due Diligence identified an AHIP would be required for the reticulation works.

A scoping survey was undertaken by Dr Giles Hamm of NGH in December 2021, resulting in a change to the pipeline route to minimise impact on Aboriginal cultural heritage.

Consultation with the Aboriginal community commenced in August 2021, with a methodology approved by the Registered Aboriginal Parties (RAPs) in February 2022. Field work was conducted by Tse Siang Lim and Jorge Fuenzalida of NGH with the RAPs between March and June 2022 with a number of new Aboriginal objects being identified. Figure 13 shows the location of the AHIMS registered sites and newly identified Aboriginal objects in relation to the proposed scheme.

An Aboriginal Cultural Heritage Assessment Report and Archaeological Technical Report are being prepared. An Aboriginal Heritage Impact Permit will be submitted to Heritage NSW.

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 both Collerina and Weilmoringle in the National Estate.

Table 18 below details the search results.

Table 18 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 8 August 2022 for the Dunsandle area.

One record was returned for Aboriginal Places listed under the NPW Act. Table 19 shows an extract of details for the site.

Table 19 Aboriginal Place listed under the NPW Act

Aboriginal place name	Local government area	LALC
Old Gerara Spring	Bourke	Murrawarri

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

No records were returned for items listed by Local Government and State Agencies.

The full search reports are included in Appendix C.

4.6 Land tenure, zoning and land use

4.6.1 Tenure and land use

The proposed works are located on Dunsandle Station which is held under perpetual Western Lands Lease granted under the Western Lands Act 1901.

The proposed works intersect the following crown land parcels - Lot 2165 DP 764099, Lot 5905 DP 768796 and Lot 5915 DP 768806 (see Figure 14).

There are no Travelling Stock Reserve (TSRs) within the vicinity of the proposed Dunsandle No 3 scheme.

The proposed works are located on land zoned RU1 Primary Production under the Brewarrina Shire Local Environmental Plan 2012.

The primary land use is extensive grazing.

4.6.2 Aboriginal land claims

A search request was sent to DPE's Aboriginal Land Claim Assessment Team on 9 August 2022 to determine whether any Aboriginal Land Claims existed within the proposed works area.

The response received on 9 August 2022 noted that there were no outstanding Aboriginal Land Claims on land within the proposed works area.

The search results are included in Appendix E.

4.6.3 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 does not sit within a Native Title Application area.

The proposed works area is not covered by any ILUAs.

The map is included in Appendix E.

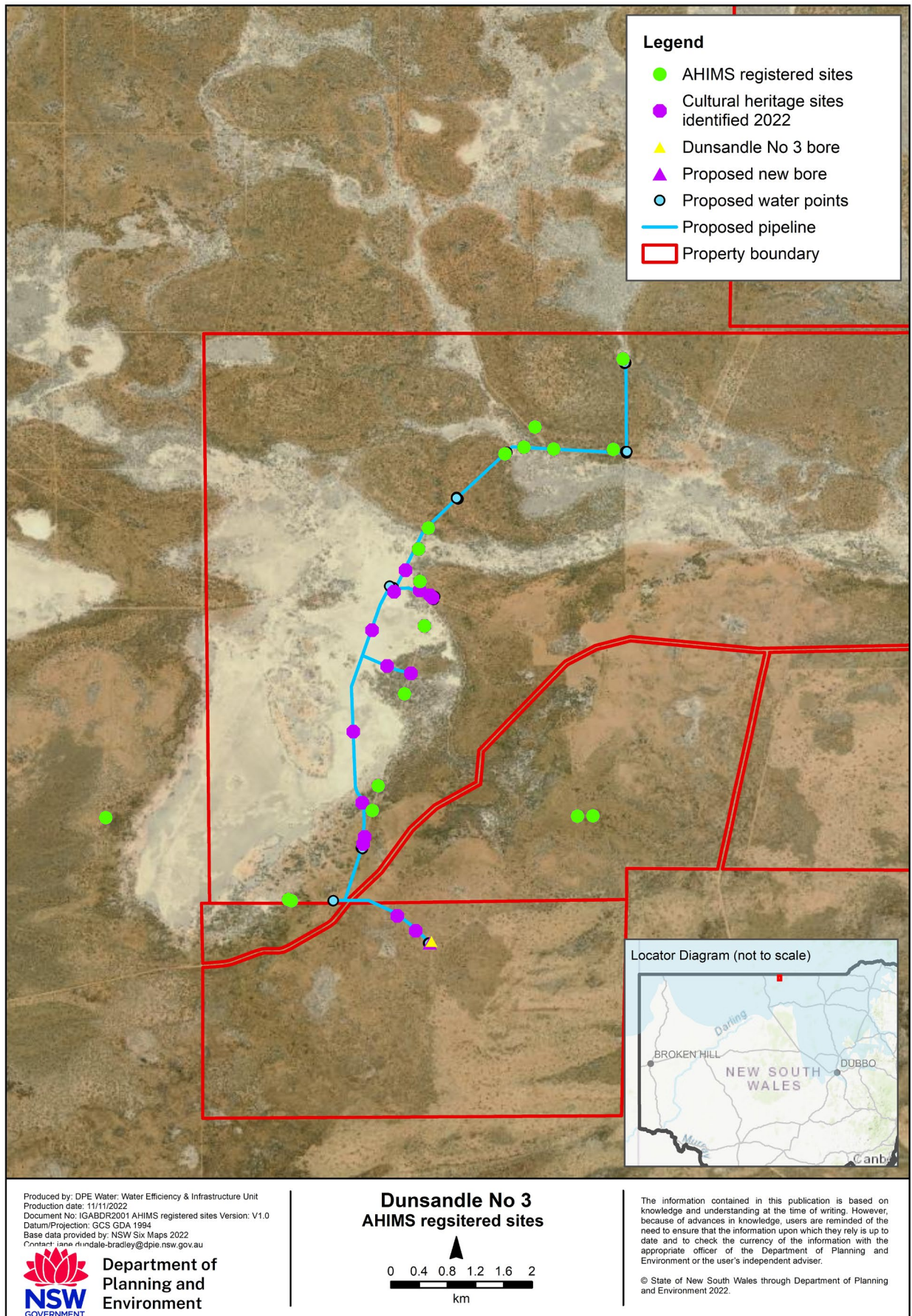


Figure 13: AHIMS registered sites

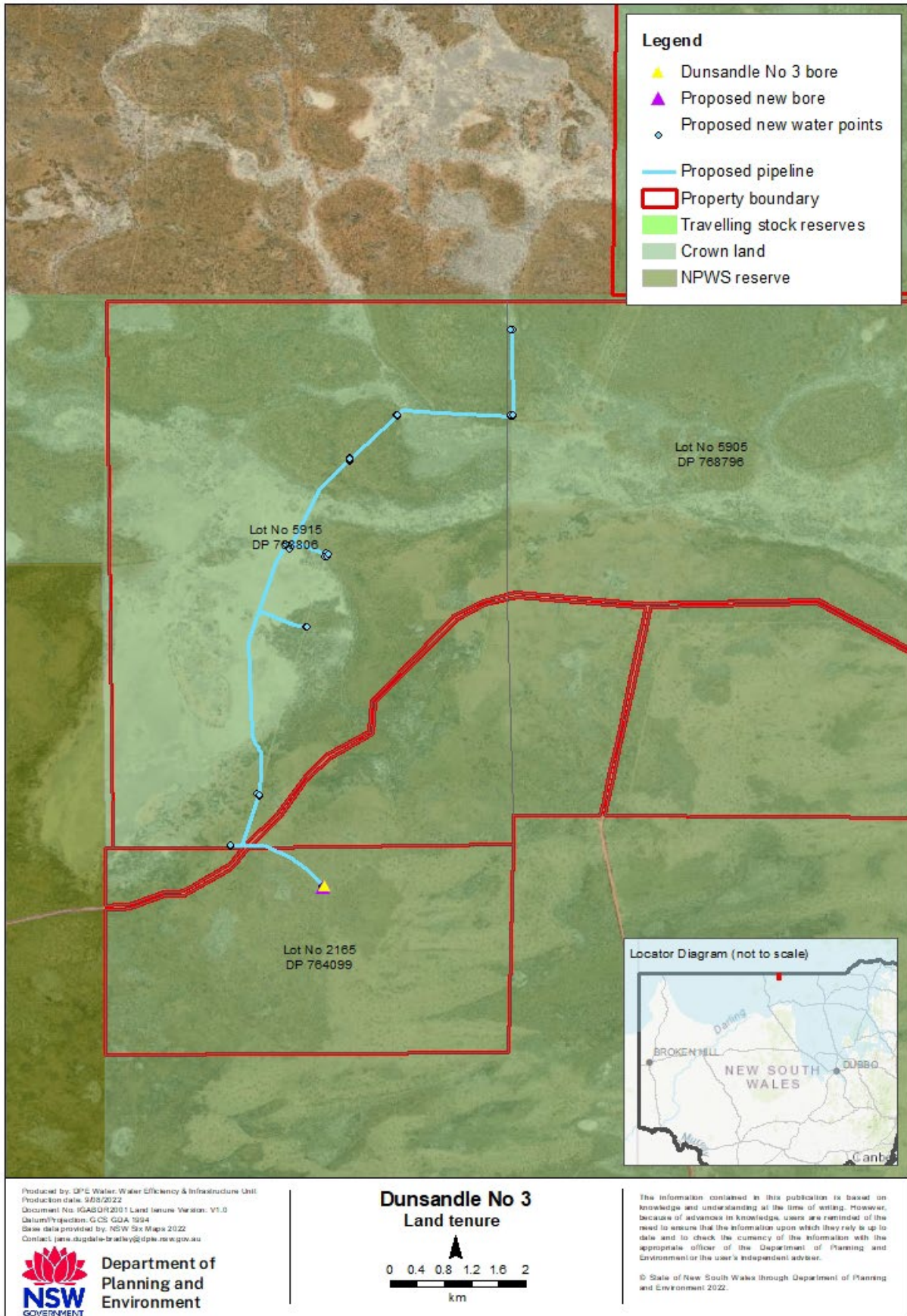


Figure 14: Land tenure

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.
- All construction machinery is to be turned off when not in use to minimise emissions.
- 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.
- Vehicles transporting spoil to and from the sites are to be covered.

- The Contractor is to monitor dust generation potential.
- Any stockpiled spoil/fill is to be protected to minimise dust generation.

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 9.33 ha, 6 ha of which will be in existing previously disturbed areas and 3.33 ha in EECs. This is a minimal amount when considering the total project area of approximately 4,990 ha.

The actual disturbance area will most likely not vary from that described in the Dunsandle No 3 REF - reticulation. Most of this area will be rehabilitated, with the long-term disturbance to soils confined to the area around the holding tanks and trough areas which are estimated to require approximately 1.43 ha of land (Biosis 2023) to be used.

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 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 bore drilling/decommissioning 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 Surface water

5.3.1 Impact assessment

5.3.1.1 Riverstyles

The potential impact from the proposed works lies in the sedimentation from the trenching across McCarthy's Bore Drain (East) and Noorooma Creek.

Noorooma Creek is an ephemeral watercourse. McCarthy's Bore Drain (East) is a bore drain which was dry during the ecological and archaeological field inspections. Given trenching works will be undertaken during no flow conditions and backfilled within 24 hours of excavation, the potential impact to both McCarthy's Bore Drain (East) and Noorooma Creek is considered low.

If the mitigation options discussed in 5.2.2 and 5.3.2 are implemented, the overall risk of impact on water quality and catchment values is considered low.

5.3.1.2 Flooding

The Dunsandle No 3 scheme does not sit within the boundaries of any floodplain management plan.

The landscape within which the proposed Dunsandle No 3 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 Dunsandle No 3 scheme works to change flood patterns or overland flow to any extent is considered negligible.

5.3.1.3 Construction works

The proposed works will result in ground disturbance due to the 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 5.11) the risk will be low.

5.3.2 Mitigation measures

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

- Flow diversion measures will 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 Dunsandle No 3 REF - reticulation.
- 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 Groundwater

5.4.1 Impact Assessment

The proposed pipeline trenches will be up to 900 mm deep and therefore unlikely to encounter groundwater. 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.

5.4.2 Mitigation Measures

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 natural waterway during construction.

5.5 Water quality

5.5.1 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.

5.5.2 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:

- The Contractor is to have a spill kit on site appropriate for the types of hazardous substances being used during construction.
- Workers are to be trained in the EMP and the use of the spill kits.

5.6 Biodiversity

5.6.1 Impact assessment

5.6.1.1 Aquatic

Lowland Darling River aquatic ecological community

The proposed Dunsandle No 3 scheme works sit within the extent of the Lowland Darling River aquatic ecological community (DPI 2007). The proposed works will have a negligible impact on the ecological health of the community.

Key fish habitat

Noorooma Creek is identified as Key Fish Habitat. Given the lack of surface water present during the field investigation, Biosis (2023) suggests that Noorooma Creek is considered a Type 3 (minimally sensitive) and Class 3 (minimal) key fish habitat under Fairfull (2013). The section of Noorooma Creek considered Key Fish Habitat will not be impacted by the proposed works.

5.6.1.2 Terrestrial

The project is likely to result in the following adverse impacts

- Removal and temporary disturbance of approximately 3.33 hectares of remnant native vegetation representative of Plant Community Types (PCTs) 31, 98, 118, 194, 197 and 212 for pipeline, bore, troughs and tank installation.
- Removal of 0.13 hectares of understorey vegetation within the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community, listed as endangered under the EPBC Act and BC Act (this vegetation corresponds to PCT 31).
- Disturbance to 1.46 hectares of known habitat for Painted Honeyeater (vulnerable EPBC and BC Act).
- Disturbance of 1.46 hectares of habitat for Bush Stone-curlew, Pied Honeyeater, Brown Treecreeper (eastern sub-species), Varied Sittella, Major Mitchell's Cockatoo, Hooded Robin, Hall's Babbler, Greycrowned Babbler (eastern subspecies), Little Pied Bat, Yellow-bellied Sheath-tail-bat (all vulnerable or endangered BC Act).
- Disturbance to 3.33 hectares of suitable habitat for inland Forest Bat, Forest's Mouse, Sandy Inland Mouse and Stripe-faced Dunnart (all vulnerable or endangered BC Act).
- Disturbance to 1.46 hectares of suitable habitat for Narrow-leafed Bumble (endangered BC Act).
- Disturbance to ephemeral waterways and bore drains that constitute the Aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River listed under the Fisheries Management Act 1994 (FM Act).
- Reduction in the availability of permanent water within the Dunsandle No. 3 scheme area that may be used by a range of threatened and locally common wildlife species.
- 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 DPIE Water is required to give the Minister written notice of the proposed work, and consider any matters raised by the Minister within 21 days. It is recommended that the REF including this report form part of this consultation.

5.6.2 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 2023).

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 2023).

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 should avoid native vegetation unless quantified and detailed in the Dunsandle No 3 REF.

The works areas should be clearly delineated and areas outside of the works area marked as no go zones prior to construction (Biosis 2023). No go zone delineation is to be maintained throughout construction and only removed after completion of construction.

The above measures, and other actions are to be included in a detailed Environmental Management Plan (EMP) (see 6.1) (Biosis 2023).

5.7 Biosecurity

5.7.1 Impact assessment

No priority weeds were identified near or within the proposed Dunsandle No 3 scheme:

Mitigation measures have been described below to minimise the potential of the introduction of weeds to the Dunsandle No 3 works area.

5.7.2 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

5.8 Aboriginal cultural heritage

5.8.1 Impact assessment

A survey program conducted for the purposes of the Aboriginal Cultural Heritage Assessment (ACHA) was undertaken over three days (29 to 31 March 2022). The survey team comprised two NGH archaeologists as well as two RAP representatives from the Murrawari Peoples Council. Two staff members from NSW DCCEEW – Water Group also accompanied the survey team to facilitate access onto Dunsandle property and advise on the details of the Development Footprint. The survey strategy was to cover as much of the ground surface as possible within the proposed Development Footprint (NGH 2022)

New sites were recorded where the NGH survey activity occurred. In some instances, after site survey and AHIMS submission, it was clarified that there were previously existing sites recorded by Biosis (2018). This has led to some overlap of site areas and some duplication of AHIMS sites numbers (NGH 2022).

In general, high to excellent ground surface visibility (GSV) (70% to 100%) is present across most of the Development Footprint (70%) due to the paucity of dense grass cover and other forms of vegetation across all four landforms. This high level of GSV was also facilitated by the location of the majority of the Development Footprint on either the clay pan (which is mostly devoid of vegetation) or along existing fence lines and farm tracks. Moderate (40% to 60%) GSV was encountered within the remainder of the Development Footprint (30%) which extends into areas bearing some regrowth vegetation comprising short, patchy grass cover and sporadic trees (NGH 2022).

Of the 17 previously recorded sites located within the Proposal Area, nine sites – DS03, DS04, DS05, DS06, DS07, DS08, DS09, DS10 and DS11 – were found to lie within the proposed Development Footprint. In addition, 14 new Aboriginal sites were also encountered and recorded over the course of the survey, noting there is some overlap with the previously recorded sites on occasion. Seven of these sites (Dunsandle AFT 1-4, 8, 12-13) are isolated stone artefacts, while the remaining seven sites (Dunsandle AFT 5-7, 9-11 and 14) comprise stone artefact scatters. Four of these sites –

Dunsandle AFT 1-2, 4 and 12 are located outside, but very close (within 10 m), to the Development Footprint (NGH 2022).

Given that the locations of these sites were recorded using a non-differential GPS with an error margin of 5 m, these three sites are also considered to be located within the Development Footprint for the purposes of the ACHA assessment (NGH 2022).

The survey program over the proposed Development Footprint identified four PADs across all existing and newly-identified AHIMS sites within the Dunsandle property. All four PADs are located within existing AHIMS sites – DS06, DS07, DS09 and DS10 – and were previously identified and recorded by Biosis (2018). More importantly, the extents of all four PADs overlie the Development Footprint and hence, are likely to be impacted by the proposed works (Figure 4-10 to Figure 4-13). All four PADs are also located within the source-bordering dune landform identified in the ACHA report (NGH 2022).

Given impacts to Aboriginal Cultural Heritage cannot be avoided, an Aboriginal Heritage Impact Permit is required.

5.8.2 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 and is developed in consultation with the Registered Aboriginal Parties (RAPs).
- 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 AHIMS registered sites, 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 NGH *Unanticipated Finds Protocol* must be followed.

5.9 Historic heritage

5.9.1 Impact assessment

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

The landscape sensitivity is considered to be low, given the predominant land use has been extensive grazing. Therefore, there is unlikely to be any impact to Historic heritage items as part of the proposed works.

5.9.2 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.

5.10 Noise and vibration

5.10.1 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).

There is one dwelling located approximately 5.65 km north-east of Dunsandle No 3 bore. The site is very isolated, and 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))
Trench digger	107	45	39	32
Bobcat	104	42	36	29
Concrete pump truck	108	46	40	33
Light vehicles	106	44	38	31
Hand-held tools	102	40	34	27
Compressor	101	39	33	26
Generator	99	37	31	24
Total (cumulative)		51	45	39

Notes: The method specified in AS2436 suggests that errors are introduced for distances greater than 100m 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 16 weeks - 15 weeks for reticulation works and one week for connection to the new artesian bore.

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.

All reticulation works 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 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.

5.10.2 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.

5.11 Traffic and access

5.11.1 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.

5.11.2 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 Bourke Shire Council or 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 Bourke or Brewarrina Shire Councils and/or the landholder.

5.12 Utilities and infrastructure

5.12.1 Impact assessment

The works are considered unlikely to impact upon utilities and infrastructure

5.12.2 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.

5.13 Hazardous substance management

5.13.1 Impact assessment

Diesel fuel and lubricating oils will be used in the machinery constructing the reticulation works. 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.

While works are being undertaken in remote rural areas, there is the potential to uncover contaminated material during earthworks.

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

5.13.2 Mitigation measures

- Refuelling and servicing 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.

- 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.

5.14 Waste minimisation and management

5.14.1 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.

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.

5.14.2 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.
- Any works that relate to the backfilling of drainage channels or gullies should be carried out with the appropriate approvals for work near or in waterways (if applicable) and with reference to the rehabilitation manual for Australian streams (Rutherford et al 2000).
- 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.
 - 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.

5.15 Fire

5.15.1 Impact assessment

The proposed works will occur in a remote location surrounded by bush.

The potential for fire exists from a range of ignition sources including hot works, machinery and smoking.

There is also the potential for the site to be impacted by a bushfire started elsewhere, including from dry lightning strikes.

5.15.2 Mitigation measures

- The Contractor is to monitor the weather, Fire Danger Ratings and Total Fire Ban Declarations on a regular basis, and daily if required during the fire season.
- No work is to occur on site during catastrophic Fire Danger Rating Days or Total Fire Ban days.
- A Fire Management Plan must be developed and kept on site at all times. The Plan must be discussed during the site induction, and all personnel must be familiar with its requirements.
- All vehicles and plant must have a suitably sized, appropriate category fire extinguisher that has a correct label and service tag. All extinguishers must have been serviced within the last 6 months.

- Kitchen and accommodation facilities must be fitted out with appropriate fire blankets, smoke detectors and/or extinguishers (correctly labelled with service tag and serviced within the last 6 months).
- All personnel on site must be trained in the use of fire suppression equipment.
- A cigarette smoking policy must be developed which clearly states exclusion areas where smoking is not allowed and the appropriate disposal of ash and cigarette butts.

5.16 Socio-economic impacts

5.16.1 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 56 km
- Weilmoringle approximately 52 km

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

- Noise and vibration (see section 5.10)
- Traffic and access (see Section 5.11)
- Visual amenity (see Section 5.17)

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.

5.16.2 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.

5.17 Visual amenity

5.17.1 Impact assessment

The proposed works are in a remote rural landscape. The nearest dwellings are approximately 5.65 km from the location of the proposed bore works.

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 c installation of approximately 12 km of polyethylene pipe, 10 new poly tanks, 20 new concrete troughs and vegetation removal along the pipeline. The infrastructure associated with the proposed works is typical of what might be expected in an agricultural setting.

5.17.2 Mitigation measures

- The clearing of vegetation is to be kept to the minimum required for the works and no more than defined within the Dunsandle No 3 REF - reticulation.
- All native vegetation removed during the laying of the pipeline and placing of tanks and troughs is to be replaced over the cleared area 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.

5.18 Cumulative impacts

5.18.1 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 of sheep and feral goats being the dominant land use.

The anticipated maximum direct disturbance area is anticipated to be around 9.33 ha, 6 ha of which will be in existing previously disturbed areas and 3.33 ha in EECs. This is a minimal amount when considering the total project area of approximately 4,990 ha.

The proposed reticulation works will have a minor cumulative impact on the locality as they complement the Dunsandle No 3 bore drilling and decommissioning works, which will see approximately the drilling of a new artesian bore and the decommissioning of the existing Dunsandle No 3 bore. 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.

5.18.2 Mitigation measures

No additional mitigation measures are proposed.

6 Environmental management

6.1 Environmental management

The Contractor must develop and implement an Environmental Management Plan (EMP) that complies with the current NSW Government Environmental Management Systems Guidelines (EMS Guidelines). The EMS 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 2023).
- 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.

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	<ul style="list-style-type: none"> • 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. • All construction machinery is to be turned off when not in use to minimise emissions. • 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. • Vehicles transporting spoil to and from the sites are to be covered. • The Contractor is to monitor dust generation potential. • Any stockpiled spoil/fill is to be protected to minimise dust generation. 	Contractor	Pre construction During construction

Aspect	Mitigation measures	Responsibility	Timing
Soils	<ul style="list-style-type: none"> • Stockpiled spoil/fill is to be located away from drainage lines and be protected to 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 <i>Managing Urban Stormwater, Soils & Construction</i> (the Blue Book), and where applicable the <i>NSW Guidelines for Laying Pipes and Cables in Watercourses on Waterfront Land</i> and the <i>Code of Practice for Minor Works in NSW Waterways</i>. • 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 bore drilling/decommissioning 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

<p>Surface water</p>	<p>The EMP must address the following issues to prevent sediment movement and water quality impacts:</p> <ul style="list-style-type: none"> • Flow diversion measures will 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 Dunsandle No 3 REF - reticulation. • Backfilling and stabilising of trenches once pipelines are installed. 	<p>Contractor</p>	<p>Pre construction During construction Post construction</p>
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Aspect	Mitigation measures	Responsibility	Timing
	<ul style="list-style-type: none"> 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. 		
Groundwater	<p>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:</p> <ul style="list-style-type: none"> 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). <p>Groundwater is not to be discharged to a natural waterway during construction.</p>	Contractor	<p>Pre construction</p> <p>During construction</p> <p>Post construction</p>
Water quality	<p>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.</p> <p>An EMP is to be prepared and include the following requirements:</p> <ul style="list-style-type: none"> The Contractor is to have a spill kit on site appropriate for the types of hazardous substances being used during construction. <p>Workers are to be trained in the EMP and the use of the spill kits.</p>	Contractor	<p>Pre construction</p> <p>During construction</p>

Aspect	Mitigation measures	Responsibility	Timing
Biodiversity	<p><i>Existing impact avoidance and minimisation steps</i></p> <ul style="list-style-type: none"> • 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 2023). <p><i>Additional mitigation measures</i></p> <p>The following detailed design, pre-construction and construction measures are to be implemented:</p> <ul style="list-style-type: none"> • The location of trenching and ripping works, and siting of tanks and troughs should avoid native vegetation unless quantified and detailed in the Dunsandle No 3 REF. • The works areas should be clearly delineated and areas outside of the works area marked as no go zones prior to construction. No go zones are to be maintained until after construction is completed. • The above measures, and other actions are to be included in a detailed Environmental Management Plan (EMP) (see 6.1) (Biosis 2023). 	Contractor	Pre construction During construction Post construction

Aspect	Mitigation measures	Responsibility	Timing
Biosecurity	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 and is developed in consultation with the Registered Aboriginal Parties (RAPs). 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 <i>National Parks and Wildlife Act 1974</i>. Contractors must be provided with the location of AHIMS registered sites, 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 <i>NGH Unanticipated Finds Protocol</i> must be followed. 	Contractor	Pre construction During construction

Aspect	Mitigation measures	Responsibility	Timing
Historic heritage	<ul style="list-style-type: none"> 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. 	Contractor	Pre construction During construction
Noise and vibration	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • 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 Bourke Shire Council or 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 Bourke or Brewarrina Shire Councils and/or the landholder. 	Contractor	Pre construction During construction
Utilities and infrastructure	<ul style="list-style-type: none"> • 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. • The landholder is to be consulted about any rural infrastructure which may be impacted by the proposal so infrastructure can be accurately located and avoided where possible during construction. 	Contractor	Pre construction During construction

Aspect	Mitigation measures	Responsibility	Timing
Hazardous substance management	<ul style="list-style-type: none"> • 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 shall 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	<ul style="list-style-type: none"> • 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. • Any works that relate to the backfilling of drainage channels or gullies should be carried out with the appropriate approvals for work near or in waterways (if applicable) and with reference to the rehabilitation manual for Australian streams (Rutherford et al 2000). • 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 <i>Waste Avoidance and Resource Recovery Act 2001</i>, namely, to: <ul style="list-style-type: none"> ○ 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. • 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 Post construction

Aspect	Mitigation measures	Responsibility	Timing
Fire	<ul style="list-style-type: none"> • The Contractor is to monitor the weather, Fire Danger Ratings and Total Fire Ban Declarations on a regular basis, and daily if required during the fire season. • No work is to occur on site during extreme or catastrophic Fire Danger Rating Days or Total Fire Ban days. • A Fire Management Plan must be developed and kept on site at all times. The Plan must be discussed during the site induction, and all personnel must be familiar with its requirements. • All vehicles and plant must have a suitably sized, appropriate category fire extinguisher that has a correct label and service tag. All extinguishers must have been serviced within the last 6 months. • Kitchen and accommodation facilities must be fitted out with appropriate fire blankets and/or extinguishers (correctly labelled with service tag and serviced within the last 6 months). • All personnel on site must be trained in the use of fire suppression equipment. • A smoking policy must be developed which clearly states exclusion areas where smoking is not allowed and the appropriate disposal of ash and cigarette butts. 	Contractor	Pre construction During construction Post construction
Socio-economic impacts	<ul style="list-style-type: none"> • 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

Aspect	Mitigation measures	Responsibility	Timing
Visual amenity	<ul style="list-style-type: none"> The clearing of vegetation is to be kept to the minimum required for the works and no more than defined within the Dunsandle No 3 REF - reticulation. All native vegetation removed during the laying of the pipeline and placing of tanks and troughs is to be replaced over the cleared area 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	<ul style="list-style-type: none"> 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 228 of the EP&A Regs

Factor	Comment
(a) 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.
(b) any transformation of a locality	The proposal will not result in any transformation of a locality.
(c) any environmental impact on the ecosystems of the locality	<p>The Dunsandle No 3 reticulation works will see the removal of permanent surface water in bore drains and ground tanks throughout the scheme area. While this will have a lasting impact on the ecosystems of the locality, the bore drains and ground tanks are not natural features and contribute to significant evaporation and seepage losses from the Dunsandle No 3 scheme.</p> <p>With the implementation of the proposed mitigation measures in Section 6.2, the impacts on the ecosystems of the locality will be minimised.</p>

Factor	Comment
(d) 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.
(e) 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	<p>The proposal will have an impact on Aboriginal cultural heritage. An AHIP will be obtained prior to works commencing.</p> <p>The mitigation measures detailed in Section 6.2 will ensure that these impacts are minimised.</p>

(f) any impact on the habitat of protected animals (within the meaning of the Biodiversity Conservation Act 2016)

The project involves:

- Removal and temporary disturbance of approximately 3.33 hectares of remnant native vegetation representative of Plant Community Types (PCTs) 31, 98, 118, 194, 197 and 212 for pipeline, bore, troughs and tank installation.
- Removal of 0.18 hectares of understorey vegetation within the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community, listed as endangered under the EPBC Act and BC Act (this vegetation corresponds to PCT 31).
- Disturbance to 1.46 hectares of known habitat for Painted Honeyeater (vulnerable EPBC and BC Act).
- Disturbance of 1.46 hectares of potential habitat for Bush Stone-curlew *Burhinus grallarius*, Pied Honeyeater *Certhionyx variegatus*, Brown Treecreeper (eastern sub-species) *Climacteris picumnus victoriae*, Varied Sittella *Daphoenositta chrysoptera*, Major Mitchell's Cockatoo *Lophochroa leadbeateri*, Hooded Robin *Melanodryas cucullata*, Hall's Babbler *Pomatostomus halli*, Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis temporalis*, Little Pied Bat *Chalinolobus picatus*, Yellowbellied Sheath-tail-bat *Saccolaimus flaviventris*, Inland Forest Bat *Vespadelus baverstocki*, Forest's Mouse *Leggadina forresti*, Sandy Inland Mouse *Pseudomys hermannsburgensis* and Stripe-faced Dunnart *Sminthopsis macroura* (all vulnerable or endangered under the BC Act).
- Disturbance to potential habitat or removal of individual threatened flora including Narrow-leafed Bumble *Capparis loranthifolia* var. *loranthifolia*.
- Potential indirect impacts on Brolga *Grus rubicunda* that are known to utilise ground tanks within the Dunsandle No. 3 scheme area on occasion and may be impacted by the reduction in availability and permanency of water within the area.

Factor	Comment
	<ul style="list-style-type: none"> • 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 Dunsandle No 3 area that may be used by a range of threatened and locally common wildlife species. <p>The mitigation measures detailed in Section 6.2 will ensure that these impacts are minimised.</p>

Factor	Comment
<p>(g) any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air</p>	<p>The proposal involves the removal or disturbance of PCTs 31, 98, 118, 194, 197 and 212, disturbance of habitat for Narrow-leaved Bumble <i>Capparis loranthifolia</i> var. <i>loranthifolia</i>, disturbance of woodland habitat for Painted Honeyeater <i>Grantiella picta</i>, Bush Stone-curlew <i>Burhinus grallarius</i>, Pied Honeyeater <i>Certhionyx variegatus</i>, Brown Treecreeper (eastern sub-species) <i>Climacteris picumnus victoriae</i>, Varied Sittella <i>Daphoenositta chrysoptera</i>, Major Mitchell’s Cockatoo <i>Lophochroa leadbeateri</i>, Hooded Robin <i>Melanodryas cucullata</i>, Hall’s Babbler <i>Pomatostomus halli</i>, Grey-crowned Babbler (eastern subspecies) <i>Pomatostomus temporalis temporalis</i>, Little Pied Bat <i>Chalinolobus picatus</i>, Yellowbellied Sheath-tail-bat <i>Saccolaimus flaviventris</i>, Inland Forest Bat <i>Vespadelus baverstocki</i>, Forest’s Mouse <i>Leggadina forresti</i>, Sandy Inland Mouse <i>Pseudomys hermannsburgensis</i> and Stripe-faced Dunnart <i>Sminthopsis macroura</i>, and disturbance to waterways within the Aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River.</p> <p>Potential secondary impacts may occur to threatened waterbird species Brolga <i>Grus rubicunda</i> that may occasionally utilise created wetland habitats in bore drains and ground tanks that will be decommissioned as part of the project.</p> <p>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 2023).</p> <p>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 threatened species or communities (Biosis 2023).</p>

Factor	Comment
<p>(h) any long-term effects on the environment</p>	<p>The Dunsandle No 3 reticulation works will see the removal of permanent surface water in bore drains and ground tanks in the scheme area. While this will have long-term effects on the local environment, the bore drains and ground tanks are not natural features and contribute to significant evaporation and seepage losses from the Dunsandle No 3 scheme.</p> <p>With the implementation of the proposed mitigation measures in Section 6.2, the long-term effects on the environment will be minimised.</p>
<p>(i) any degradation of the quality of the environment</p>	<p>The proposal will cause minor biodiversity, soil, water air and noise impacts to the environment during construction.</p> <p>The mitigation measures detailed in Section 6.2 will ensure that these impacts are limited.</p>
<p>(j) any risk to the safety of the environment</p>	<p>There is a potential risk of establishment and spread of weeds and pathogens during construction and maintenance of infrastructure under the proposal.</p> <p>Implementation of the mitigation measures in Section 6.2 will ensure that the risk is minimised.</p>
<p>(k) any reduction in the range of beneficial uses of the environment</p>	<p>There will be no reduction in the range of beneficial uses of the environment as a result of the proposal.</p>
<p>(l) any pollution of the environment</p>	<p>Construction equipment and plant are potential sources of pollution, which may have an impact on water, air and environmental quality.</p> <p>The adoption of the mitigation measures in Section 6.2 will ensure that the risk of these impacts is minimised.</p>
<p>(m) any environmental problems associated with the disposal of waste</p>	<p>The proposal will result in the production of general construction waste.</p> <p>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.</p>

Factor	Comment
(n) 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.
(o) 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.
(p) 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 8 August 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.

There is an implicit acknowledgment that science and scientific methodologies have limitations. Because of these limitations, it is unlikely that the full consequences a particular act or activity upon the environment can be known in advance. A lack of full scientific certainty is therefore the norm, rather than the exception.

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

8.1.2 Inter-generational equity

This principle states that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

It is based on the notion that current generations hold the environment in trust for future generations. The environment should therefore be managed for the benefit of current and future generations because we have a moral obligation to hand over to subsequent generations a stock of environmental wealth comparable to that which was handed on to us by our forebears. One way of thinking about this is that current generations should use the interest produced by our assets while keeping the capital of the planet intact for the future.

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

Biodiversity refers to the variety of all life on Earth – including ecosystem, species and genetic diversity.

Since biodiversity is the foundation of our social and economic systems, the conservation of biological diversity and ecological integrity should be a fundamental consideration in environmental planning and decision-making processes. Thorough environmental assessments are an example of how this principle is enacted.

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 the improvement in ecological health of groundwater dependent ecosystems associated with the works.

8.2 Justification for the proposed works

The Dunsandle No 3 reticulation works will result in considerable water savings, arrest 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 bore drains and ground tanks. It should be noted, however, that the bore drains and ground tanks are not natural features in the landscape and contribute to significant water losses through evaporation and seepage.

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, as defined in the Dunsandle No 3 REF - reticulation.

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

The Aboriginal Cultural Heritage due diligence assessment identified that impact to cultural heritage could not be avoided for the Stage 2 reticulation works and therefore an AHIP under the NPW Act is required for these works.

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 would 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 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.

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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
BCSD	Biodiversity, Conservation and Science Directorate
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	The Water Group of the NSW Department of Climate Change, Energy, the Environment and Water
DPC	Department of Premier and Cabinet
DPE	Department of Planning and Environment
DPIE	Department of Planning, Industry and Environment
EEC	Endangered ecological community
EMP	Environmental Management Plan
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
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
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
T&I SEPP	State Environmental Planning Policy (Transport and Infrastructure) 2021
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

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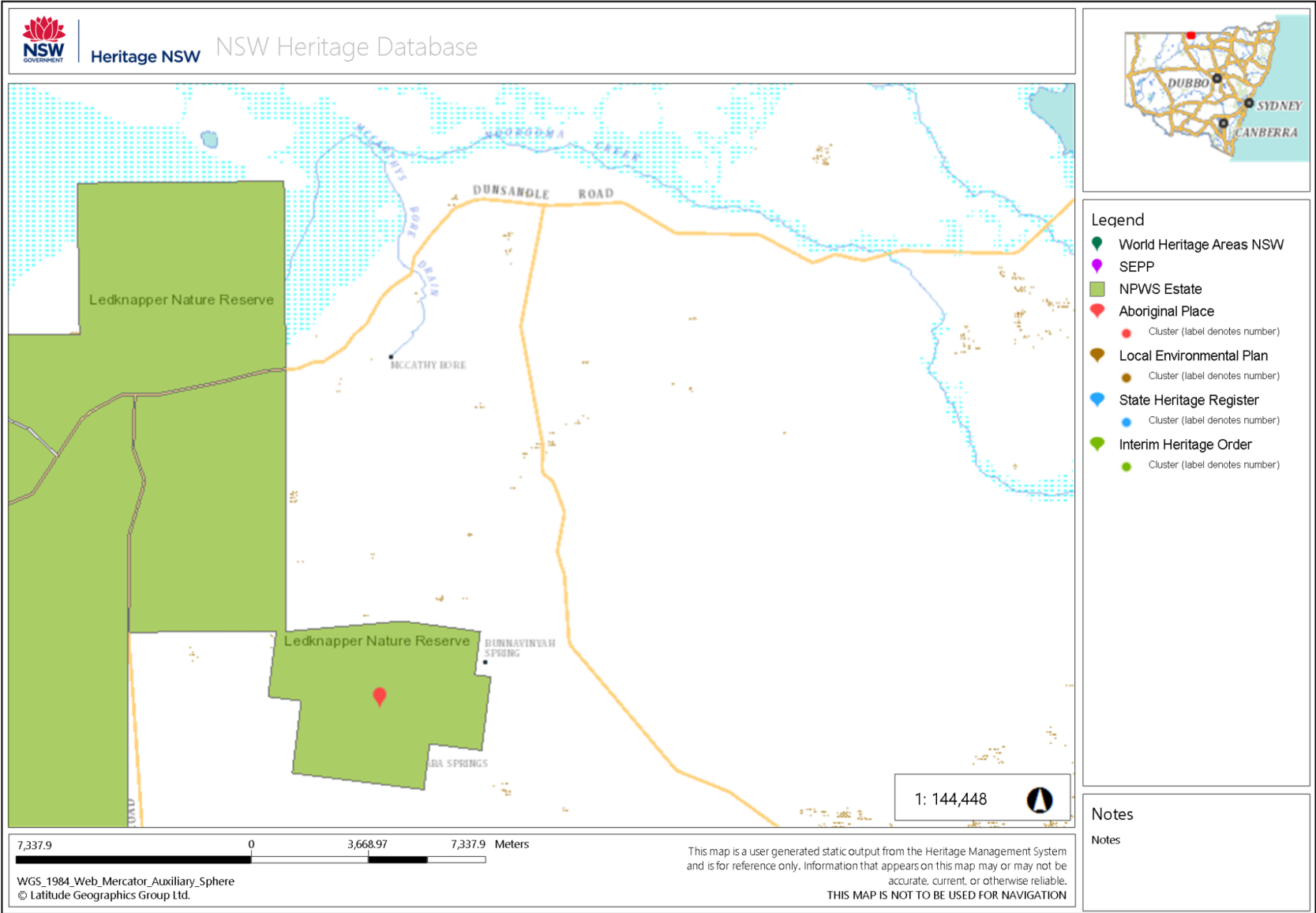
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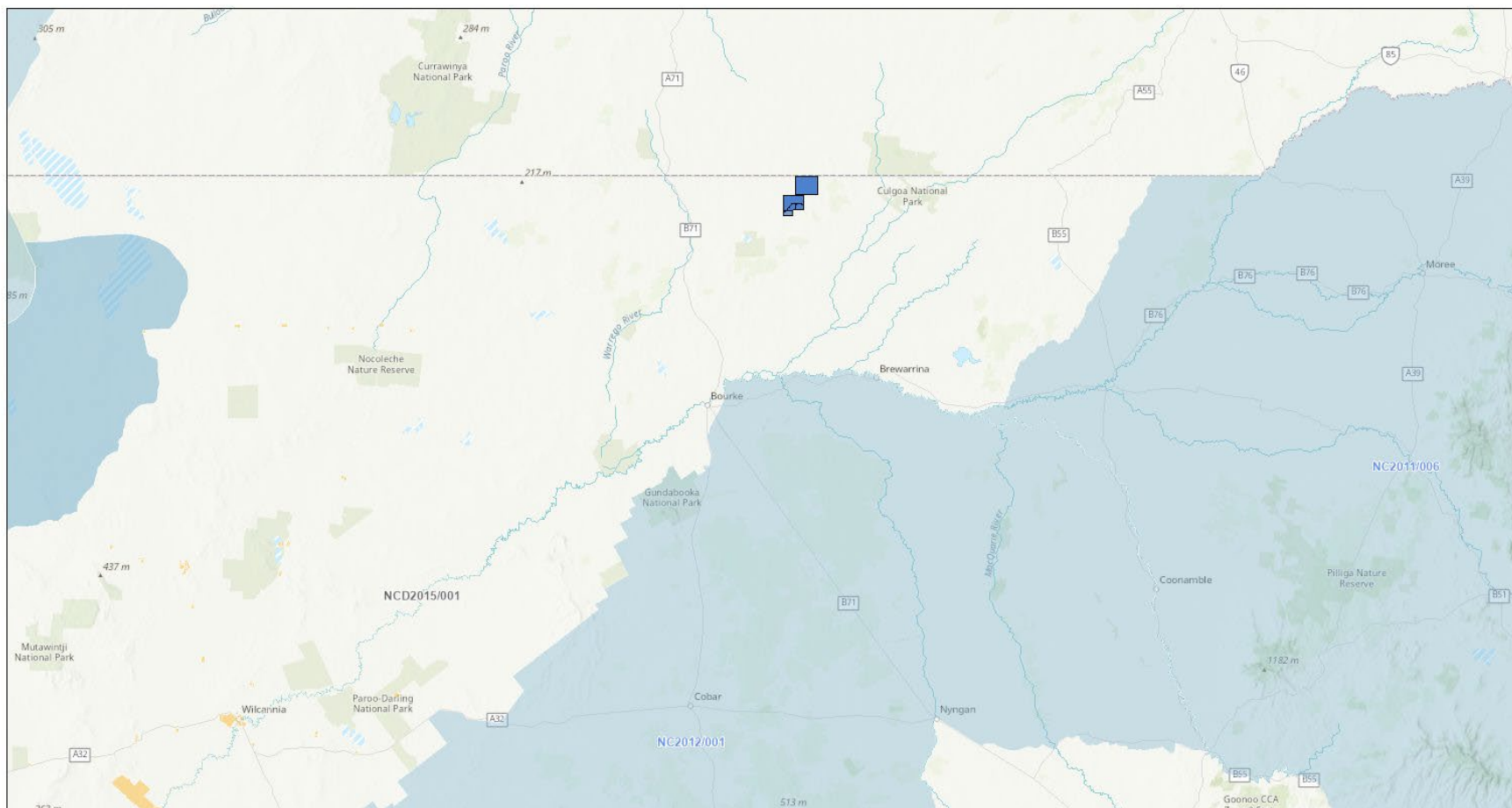
NSW Heritage Database Search Results



Appendix D Consultation Responses

Appendix E Tenure

Native TitleVision Web Map



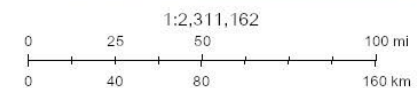
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Determinations

In effect - Finalised

Applications (Schedule)



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