Kempsey - Armidale Road Restoration

Review of Environmental Factors

October 2024

ARMIDALE Regional Council

Acknowledgement of Country

Armidale Regional Council acknowledges the traditional custodians of the land on which the Kempsey Road Restoration project is proposed.

We pay our respects to Elders past and present and celebrate the diversity of Aboriginal people and their ongoing cultures and connections to the lands and waters of NSW.

Many of the transport routes we use today – from rail lines, to roads, to water crossings – follow the traditional Songlines, trade routes and ceremonial paths in Country that our nation's First Peoples followed for tens of thousands of years.

Armidale Regional Council is committed to honouring Aboriginal peoples' cultural and spiritual connections to the land, waters and seas and their rich contribution to society.

Approval and authorisation

Title	ARC Kempsey - Armidale Road Restoration Review of Environmental Factors
Accepted on behalf of Armidale Regional Council by:	Darren Schaefer, Chief Officer Assets and Services (Acting)
Signed	
Date:	21/11/2024

Witnessed.
Alex Manners
21.11.24

Document review tracking

Version No	Date	Comments
Version 1	30/11/2023	Prepared by Michelle Campione-van Zetten (GeoLINK) Reviewed by Jacob Sickinger (GeoLINK)
Version 2	21/12/2023	Prepared by Michelle Campione-van Zetten (GeoLINK)
Version 3	19/01/2024	Prepared by Michelle Campione-van Zetten (GeoLINK)
Version 4	25/09/2024	Prepared by Lauren Buchanan (GeoLINK) Reviewed by Michelle Campione-van Zetten (GeoLINK)
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Version 6	29/10/2024	Prepared by Michelle Campione-van Zetten (GeoLINK)
Version 7	30/10/2024	Prepared by Michelle Campione-van Zetten (GeoLINK)

Prepared by GeoLINK and Armidale Regional Council

Executive summary

The Activity

Armidale Regional Council (ARC) proposes restoration works on Kempsey Road and Lower Creek Road to restore the road to pre-disaster conditions. Given the larger scale of the project, the Transport for NSW (TfNSW) Project REF template has been adopted. Key features of the proposal, based on the Early Contractor Involvement (ECI) phase include:

- Upslope slip remediation & stabilisation.
- Drainage works.
- Scour protection.
- Downslope slip remediation and reinforcement.
- Road maintenance and reinstatement.

The road is currently closed except to essential travel by residents and emergency services. During construction, the road will be fully closed during a 10-days on work roster, with a midday opening for partial travel. The road will maintain closure except to residents and emergency services overnight and during the four-days off roster.

Construction would be a design and construct contract and would take approximately four years (weather permitting) to complete.

This Review of Environmental Factors (REF) has been prepared based on the ECI design and construction methodology (Seymour Whyte 2023). The final design and construction methodology would be further developed by the contractor appointed to deliver the project. The safeguards and management measures outlined in this REF (refer to **Section 6**) would be adopted by the contractor appointed, as well as any amendments to this document approved during the project.

Need for the Activity

The project is designated Essential Public Asset Restoration work under the NSW Natural Disaster Asset Restoration program.

The proposed works (the Activity) occur along Kempsey-Armidale Road and Lower Creek Road, which provide important transport routes between Armidale and Kempsey for local, forestry, agricultural and tourist traffic. A risk to road users exists as a result of the landslips and washouts, which occurred after bushfires in 2019/20 and subsequent flooding in 2020 and 2021. Remediation works are required to repair the roadway, prevent further slips, and improve road safety. Delaying the proposed remediation works may result in further slips and additional damage to the road pavement. This may then require major rehabilitation that is likely to involve a higher risk of negative environmental impacts, greater financial cost, full road closures and lengthy delays for motorists.

Activity objectives

The objectives of the proposal are:

- Stabilise the roadways associated with the proposal to prevent further erosion along the edge of Kempsey Road and Lower Creek Road, including:
  - drainage design and culvert restoration and size to one-in-50-year storm event for Kempsey Road and one-in-20-year event for Lower Creek Road;
  - pavement rehabilitation/ road design;
  - downslope remediation and treatments/ geotechnical design; and
  - structure rehabilitation.
- Undertake works to minimise traffic, environmental, social impacts.
- Ensure Kempsey Road and Lower Creek Road remain safe and trafficable transport routes.

Options considered

The following options for the proposal were assessed.

Option 1: Do nothing

This option involves leaving the existing road, culverts, and associated structures in their current state. The 'do nothing' option does not attempt to repair drainage or stability of Kempsey Road, which has been damaged because of recent bushfires and floods. This option would not restore the existing road and culverts to a pre-disaster state, a key responsibility of ARC. Furthermore the 'do nothing' option would not address the current condition of Kempsey Road which in the longer term would risk further damage to the road asset.

Option 2: The Proposal

This option involves undertaking the culvert, drainage, road reinstatement, and slip remediation work as proposed.

The scope of works proposed is for the restoration of an essential public road asset back to its pre-disaster condition in accordance with the NSW Natural Disaster Asset Restoration Guidelines (Disaster Recovery Funding Arrangements) which allows these assets to be reinstated to current engineering standards.

Option 3: Re-route Kempsey-Armidale Road

This option involves closing the existing road and re-routing Kempsey-Armidale Road along a new alignment. This option was not deemed to be suitable.

Statutory and planning framework

All relevant statutory planning instruments have been examined in relation to the proposal. The proposal is categorised as development for the purpose of 'a road and/ or road infrastructure facilities' and is being carried out by or on behalf of a public authority. Under section 2.109 of State Environmental Planning Policy (Transport and Infrastructure) (formerly clause 94 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP)) the proposal is permissible without development consent. The proposal is not State significant infrastructure or State significant development. As the proposal is for road restoration and related ancillary works and is to be carried out on behalf of Armidale Regional Council, it can therefore be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Development consent is not required.

ARC is the proponent and determining authority for the proposal, which becomes an 'Activity' under Part 5, Division 5.1 of the EP&A Act. This REF fulfils ARC's obligation under section 5.5 of the EP&A Act, including to examine and consider to the fullest extent possible all matters affecting or likely to affect the environment by reason of the Activity.

The proposal has also been assessed against relevant NSW legislation and other environmental planning instruments. A small portion of the proposal falls on land reserved under Part 4 of the *National Parks and Wildlife Act 1974* (NPW Act) and for those areas where encroachment will occur approval/ authorisation under the NPW Act must be firstly obtained. For the remaining area of the proposal, no further statutory approvals are required. The Matters of National Environmental Significance (MNES) that are protected under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) have been considered for the proposal and a referral to the Australian Department of Climate Change, Energy, the Environment and Water would not be required as no significant impacts to MNES are expected/ likely.

Community and stakeholder consultation

Community consultation and communication with affected stakeholders, landowners and government agencies has been undertaken and has informed the proposal and this REF. Consultation and communication will continue to occur during design and construction.

Consultation has also been initiated with Transport for NSW (TfNSW). Advice received as part of this consultation has been addressed in this REF.

Consultation has also been undertaken as per the requirements of the State Environmental Planning Policy (Transport and Infrastructure). This is outlined in **Section 5.4**.

Environmental impacts

The main environmental impacts of the proposal are:

Biodiversity

The Activity involves removal of vegetation and select trees, instream impacts to select waterways, and removal of culverts acting as low carrying capacity potential microbat roost sites used by the Southern Myotis. The REF concluded that the Activity is not likely to significantly impact threatened species, populations or communities or their habitats under the *Biodiversity Conservation Act 2016*, *Fisheries Management Act 1994*, or EPBC Act. Safeguards and management measures detailed in the REF include best practice microbat management methods, including roost exclusion which would ameliorate or minimise expected impacts.

National Parks estate

A portion of the Activity falls on land within the Cunnawarra National Park and Georges Creek Nature Reserve and would affect the vegetation and trees in these areas. Works within these areas require approval/ authorisation from National Parks under the NPW Act before commencing.

Traffic and transport

Users of Kempsey Road and Lower Creek Road would be subject to complete road closures and a 10/4-day construction roster during the proposed work. The road is currently closed except for essential local travel and emergency services. During the 10 days on roster period, the road would be fully closed during the day, with a partial travel window at midday. The road would revert to the local and essential services travel during the overnight period and the four days off roster period. The proposed works would generate increased traffic associated with work crews and material delivery within the locality. As outlined above, the construction on the roads would result in traffic and transport impacts, however, considering the road is currently closed and dangerous to travel, the additional closure periods are major but not significant. Completion of the works and the reopening of the road would have long-term positive effects for road users and transport.

Aboriginal cultural heritage

Overall, the Activity is likely to have a low potential to impact on Aboriginal archaeological sites on the upper Macleay River and New England escarpment. However, the Aboriginal Heritage Assessment concluded that the Activity's ancillary work areas along Kempsey Road are located within landform areas which have the potential to contain Aboriginal archaeological sites. Based on the findings of the Due Diligence assessment, additional investigation in accordance with the *Code of Practice for the Investigation of Aboriginal Objects* (DEECW 2010B) or the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (OEH 2011) is not required, subject to the implementation of the recommended safeguards and management measures. These measures include the identification of no-go areas unless additional investigations are employed.

Matters of National Environmental Significance

No significant impacts to any Matters of National Environmental Significance (MNES) listed in the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) will occur because of the proposal.

Other potential environmental impacts would be generally minor in nature. A variety of safeguards and management measures have been developed to minimise the risk and potential magnitude of potential impacts posed by the proposal to the environment. The proposal would have several positive environmental and socio-economic impacts, including reopening of the road and improvements to road infrastructure, safety, and efficiency.

Justification and conclusion

Rehabilitation of Kempsey Road and Lower Creek Road is required to restore the condition of the road to pre-disaster conditions, which benefits the local community through improved safety and assisting in protecting the road assets within the locality and reinstating normal connectivity.

With effective implementation of the safeguards and management measures of this REF, environmental impacts associated with undertaking the Activity would not be considered significant and would not significantly affect the local environment. Overall, key benefits would include improved flood water recession times and road safety.

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Appendices

1. Introduction

This chapter introduces the Activity and provides context for the environmental assessment. In introducing the Activity, the objectives and project development history are detailed, and the purpose of the report provided.

1.1 Existing environment

The Activity site is located at the interface of the Northern Tablelands and coastal escarpment, in the upper reaches of the Macleay River catchment. It is situated mid-way between Armidale and Kempsey (refer to **Illustration 1.1** and **Illustration 1.2**). Kempsey-Armidale Road is identified as Kempsey Road within the Armidale Regional Council Local Government Area (LGA) and as Armidale Road within the Kempsey Shire Council LGA. From the Armidale end of the Activity site, Kempsey Road follows a ridgeline above Georges Creek, passing first through State Forest, then through Cunnawarra National Park and adjacent to Georges Creek Nature Reserve. At the confluence with Macleay River, Kempsey-Armidale Road follows the river on the northern slope and the Activity site ends just past the boundary with Kempsey Shire Council. The land use surrounding the site in this section is largely agricultural (cattle grazing), with residential properties and a small proportion of tourist accommodation. The site at Lower Creek Road generally follows Dyke River to the north, which is also predominantly agricultural land use.

The majority of the trafficable general road width is four metres along the 45 km section of Kempsey Road, with limited passing opportunities due to the steep natural terrain. There is no posted speed limit.

The pavement materials have eroded as a result of heavy rainfall events and a majority of the culverts are blocked with sediment and vegetation. Temporary safety barriers have been placed at select slip locations along the site and emergency works have previously occurred to correct the most dangerous slips. Scour damage is evident at the bridge locations resulting from water flow.

1.2 Activity identification

Armidale Regional Council (ARC) proposes to carry out road restoration works for a section of Kempsey-Armidale Road and Lower Creek Road. The roads are narrow, unsealed single lane roadways that predominantly accommodate a combination of local, forestry, agricultural and tourist traffic. Kempsey-Armidale Road also provides a critical connection between the towns of Armidale and Kempsey.

The local geology and steep terrain of the region makes the subject roads prone to ongoing drainage and pavement damage from regular landslips and washouts. The roadways were damaged by bushfires in 2019 and 2020 and subsequent flooding in 2020 and 2021. The condition of the roads has deteriorated, and emergency works have been undertaken to reopen the road to emergency services and essential local traffic.

Key features/ scope of the Activity would include:

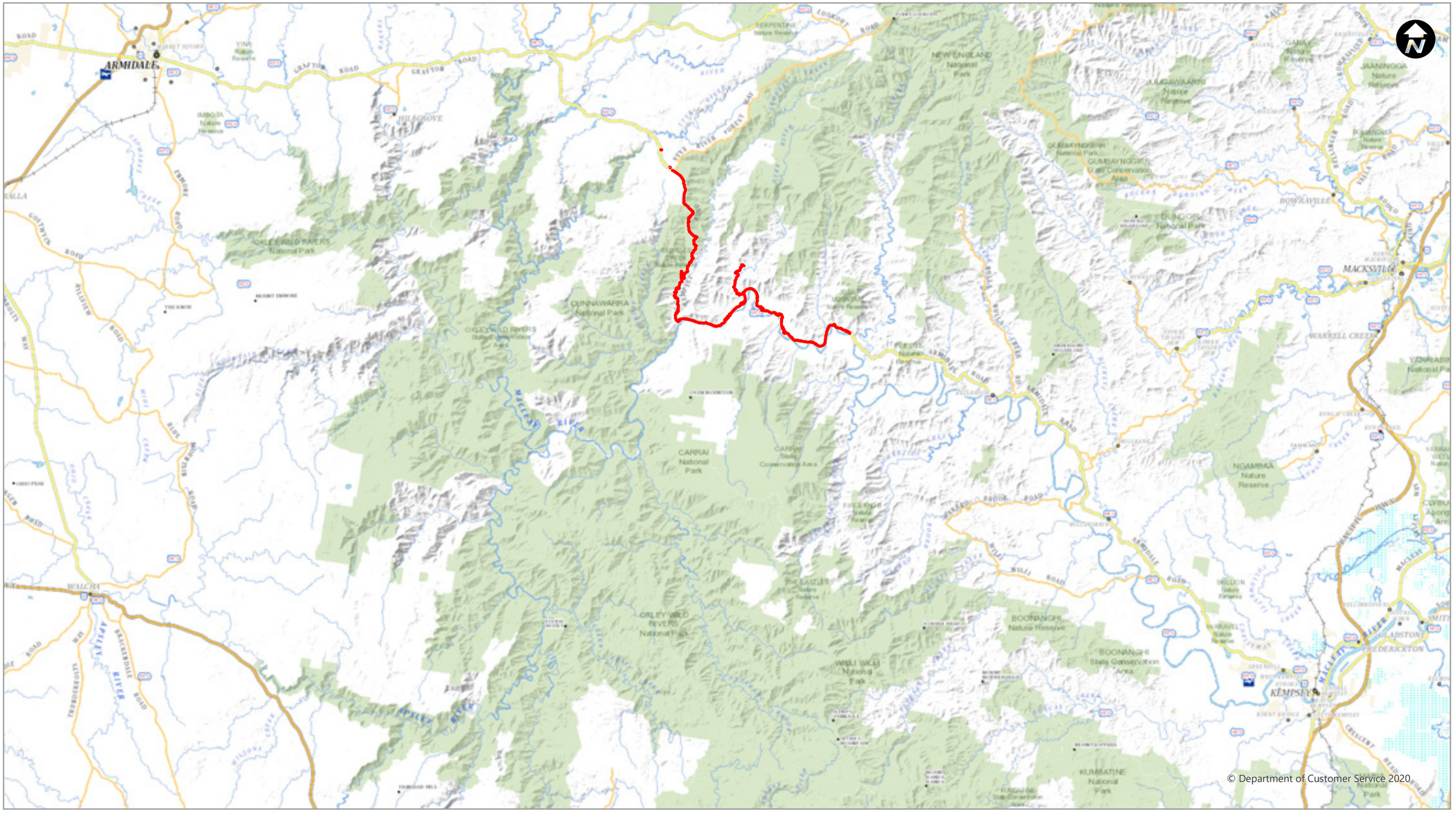
- Installation of traffic control.
- Establishment of ancillary sites, including:
  - Main site office.
  - Satellite offices.
  - Workers Camp.
  - Fuel Storage.
  - Laydown/ Stockpile Sites.
  - Concrete Batch Plants.
  - Small Volumetric Mixers.
  - Work site at existing quarries.
  - Compound Site.
- Removal and/ or trimming of select safety risk trees along road reserve.
- Works to assist movement within the site, including:
  - Sidetracks.
  - Passing bays.

- U-turn bays.
- Hairpin curve widening.

- Upslope slip remediation.
- Replacement of existing pipe culverts and installation of new pipe culverts.
- Open drain reinstatement.
- Installation of scour protection for pipe culverts and bridges.
- Downslope slip remediation including soil nail walls and gravity walls.
- Road maintenance and reinstatement.

The Activity and construction details are subject to design refinement as part of a Design and Construct contract. Construction is expected to commence in mid-2024 and be completed by late 2028.

The site locality of the proposal is shown in **Illustration 1.1** and the site of the proposal is provided in **Illustration 1.2**.



LEGEND

Activity boundary

0 7 Km

Site Locality - Illustration 1.1

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4055-1073

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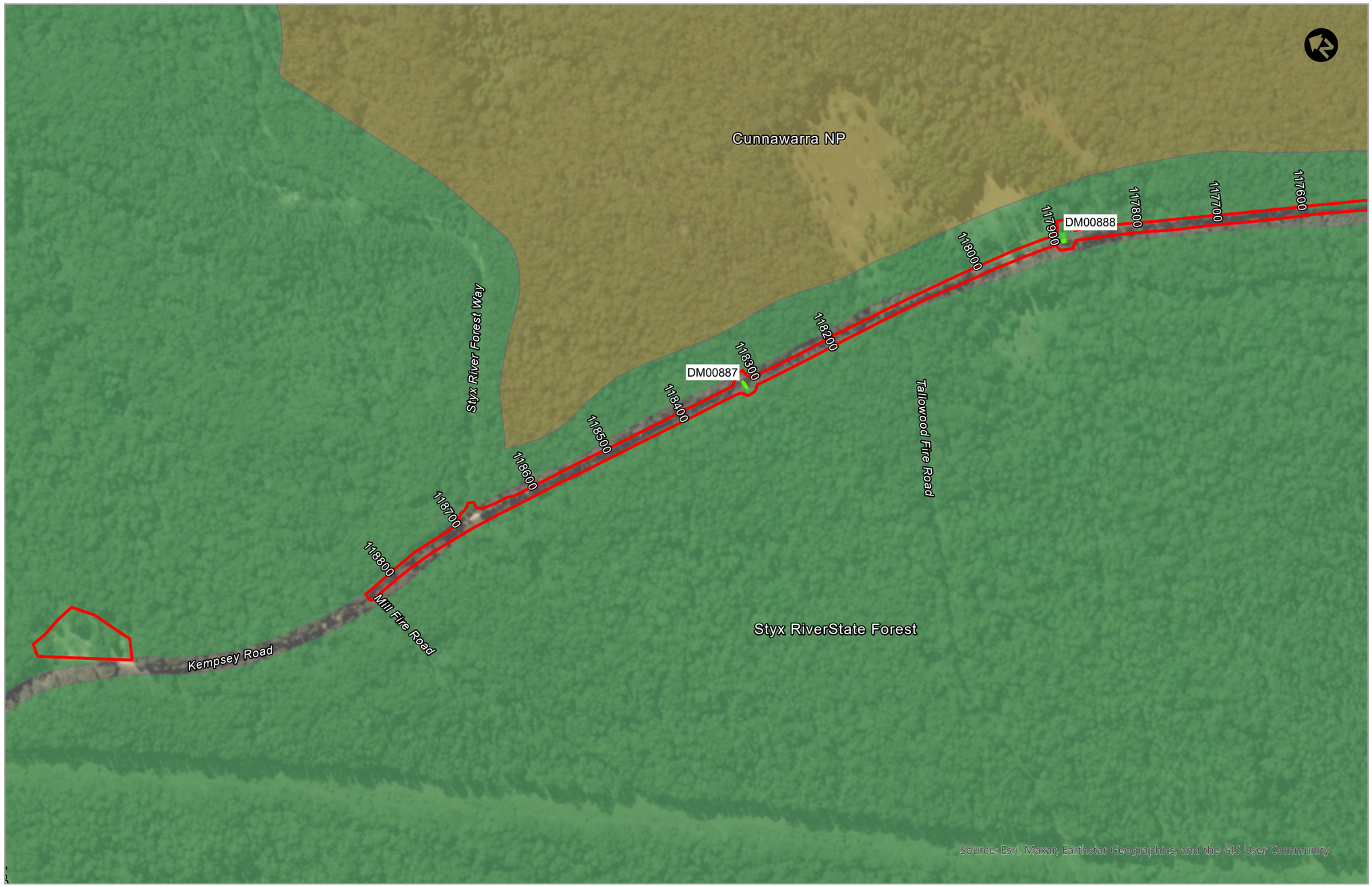

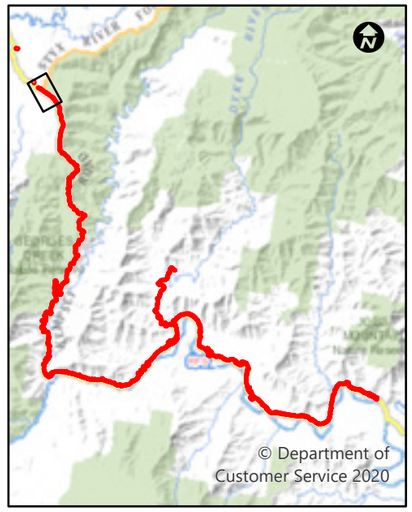

Map Sheet Location

LEGEND

- Activity boundary
- Culvert
- National Park reserve
- State Forest

0 100 Meters

The Site
Illustration 1.2 - Sheet 1 of 27

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4055-1076

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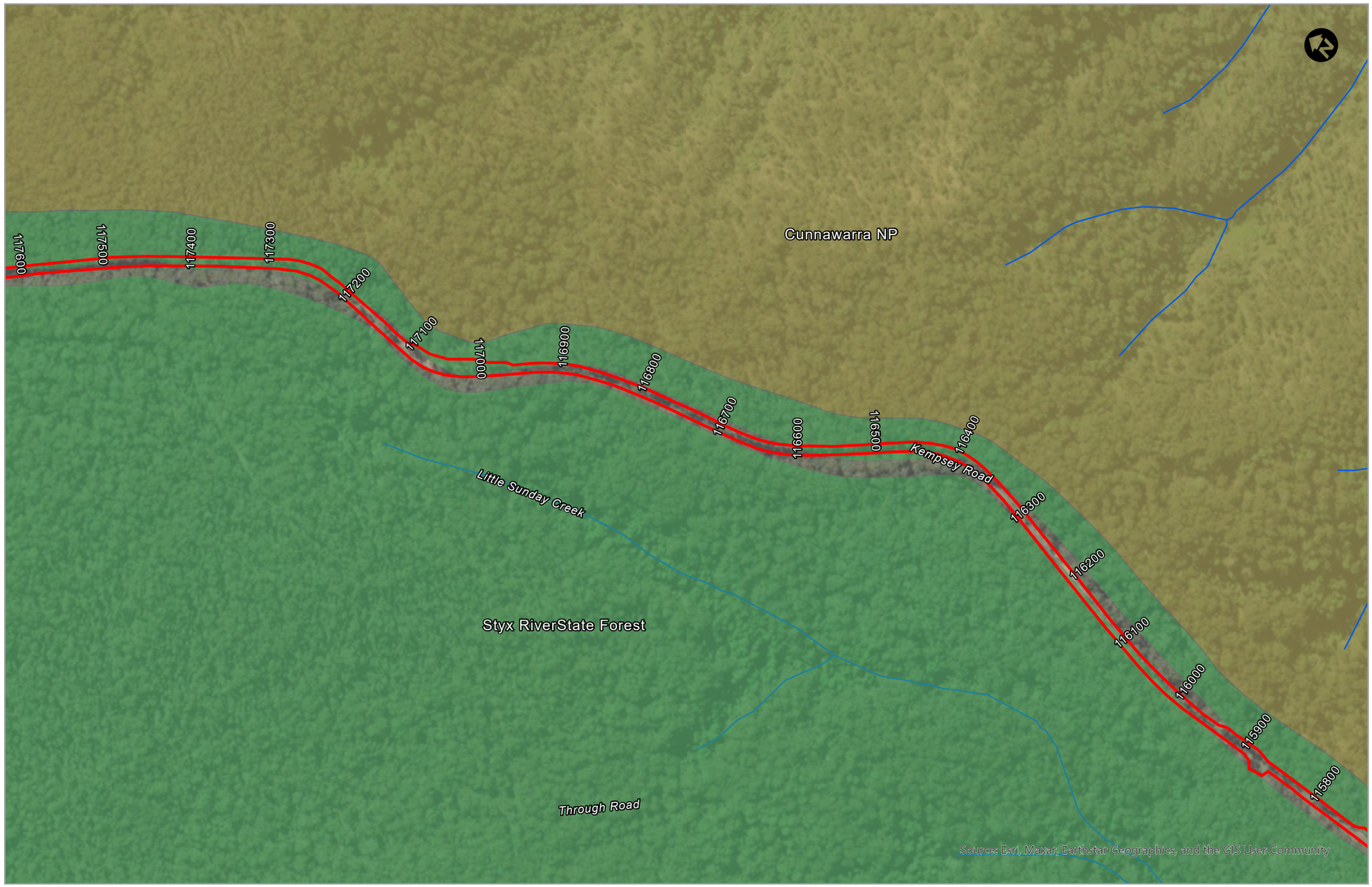

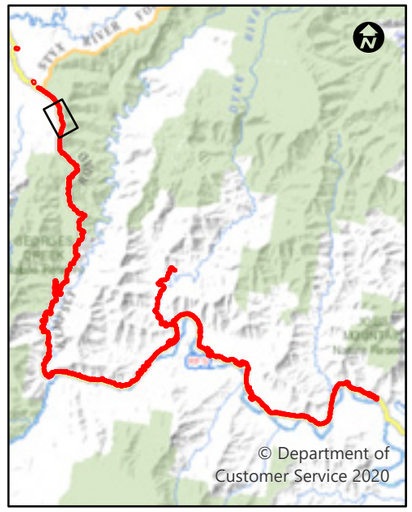

Map Sheet Location

LEGEND

Activity boundary
National Park reserve
State Forest
Watercourse

0 100 Meters

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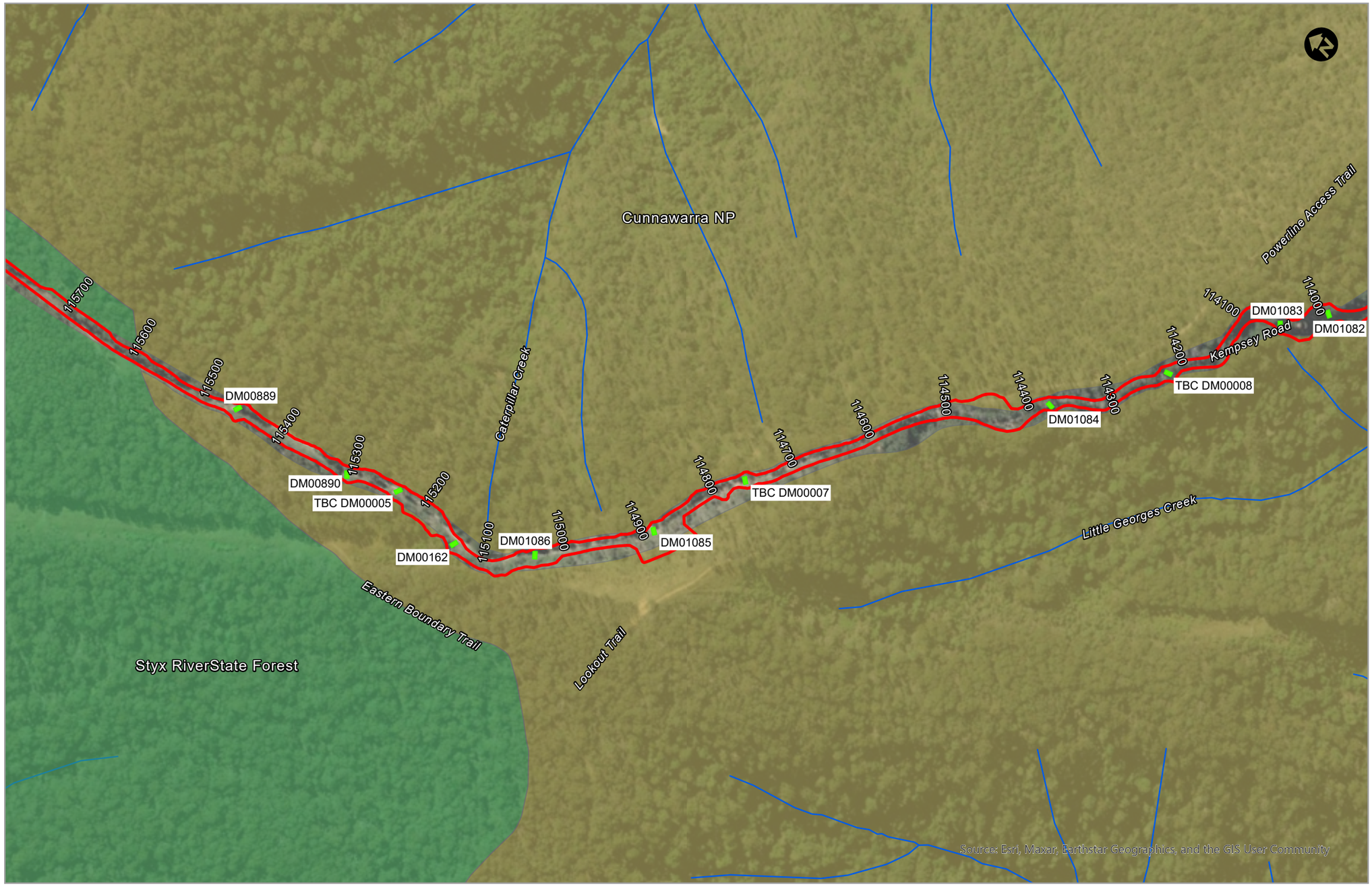

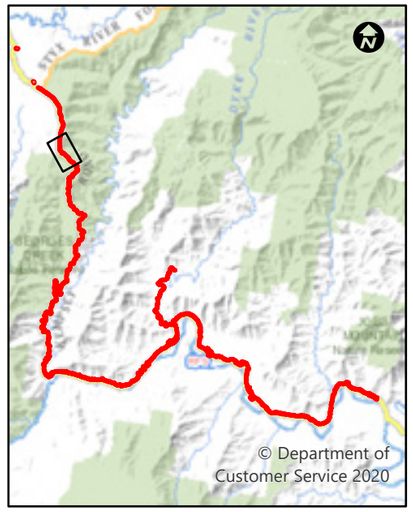

Map Sheet Location

LEGEND

- Activity boundary
- Culvert
- National Park reserve
- State Forest
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 3 of 27

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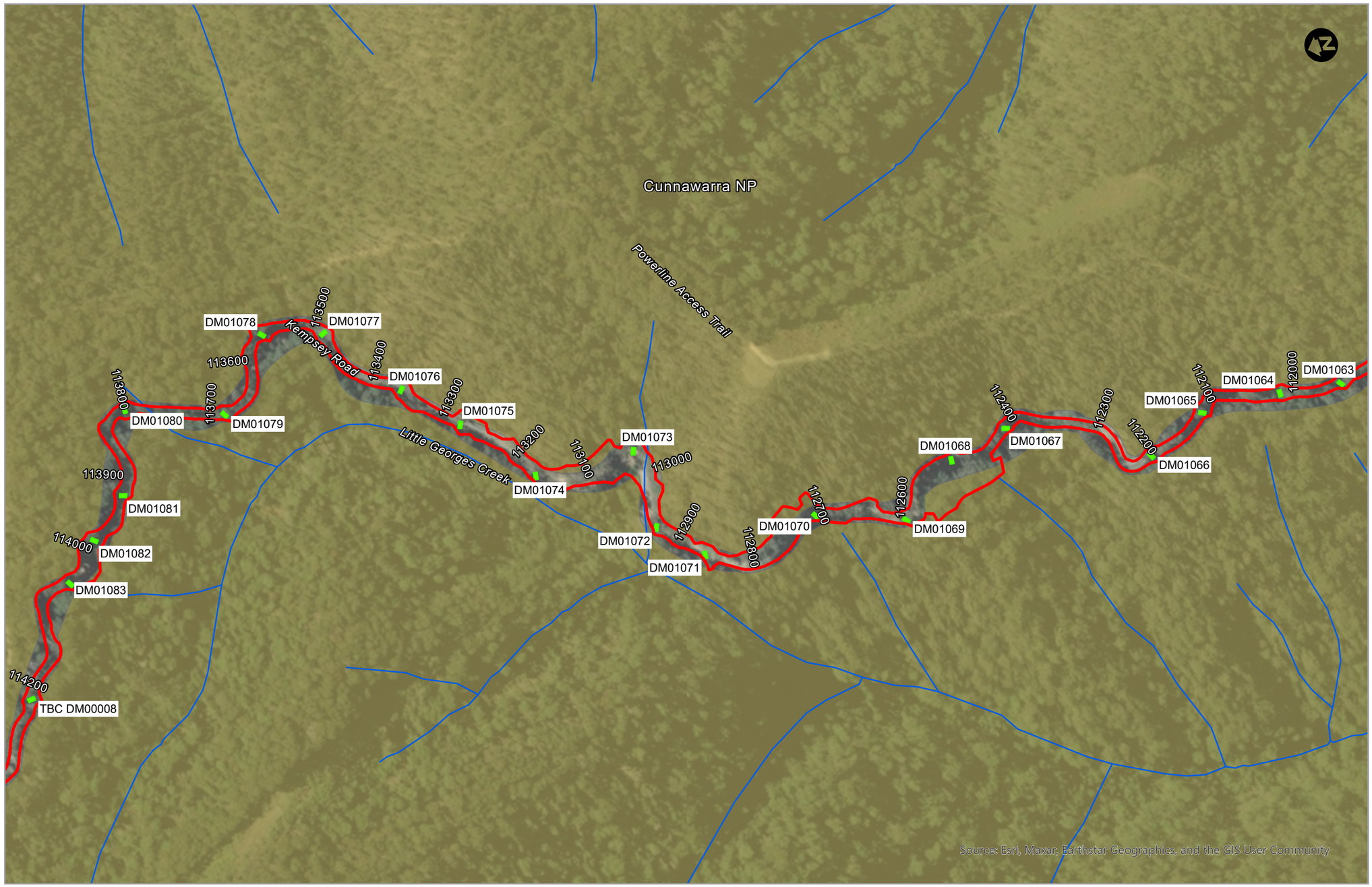

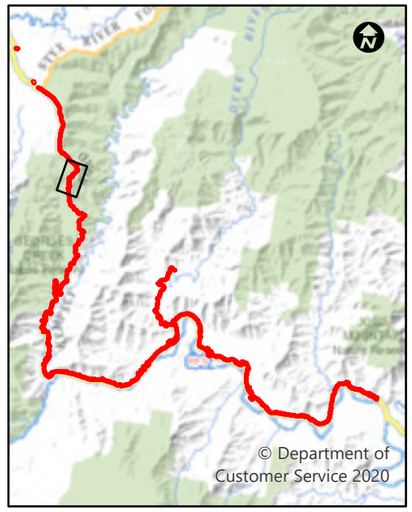

Map Sheet Location

LEGEND

- Activity boundary
- Culvert
- National Park reserve
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 4 of 27

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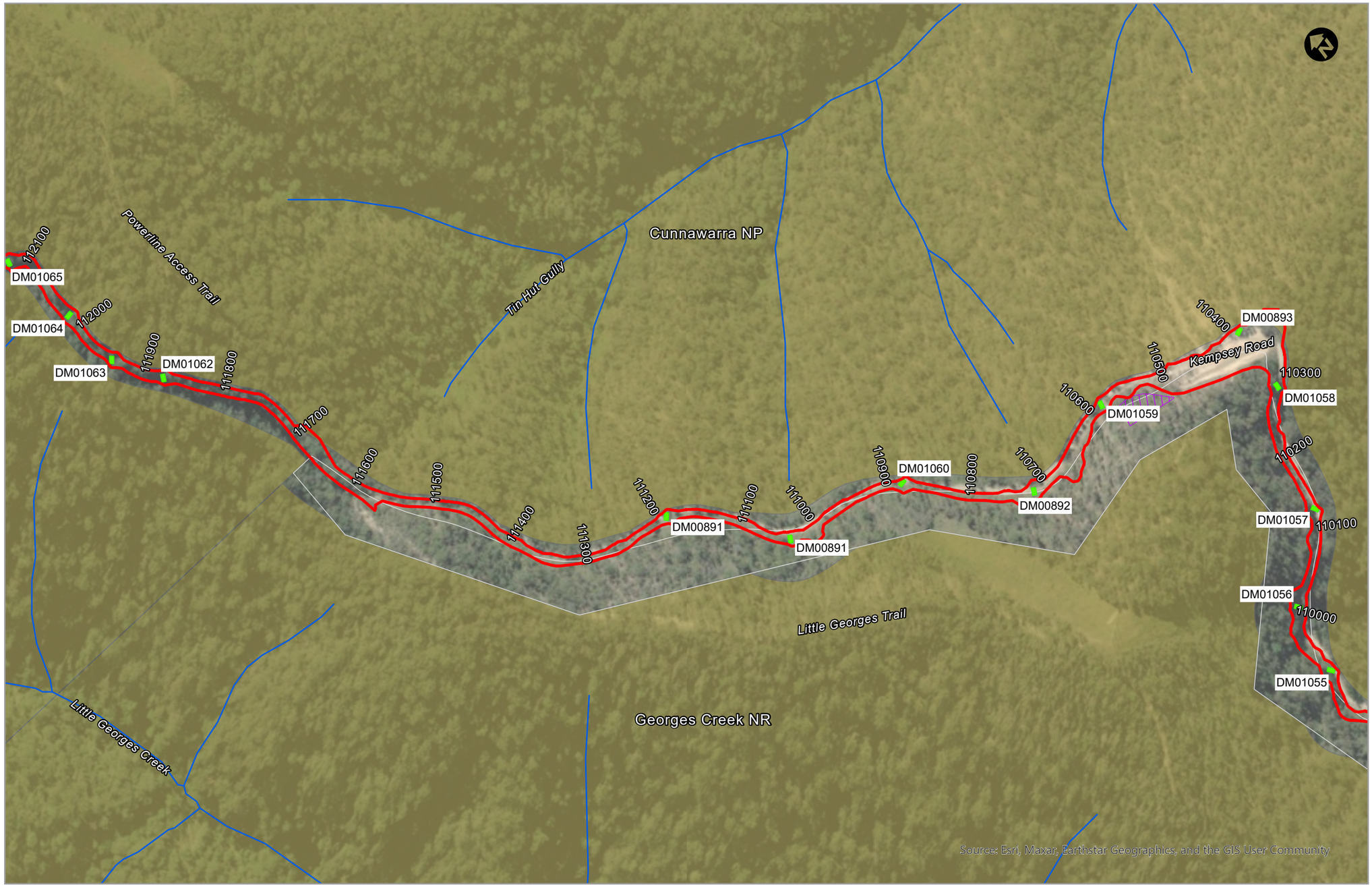

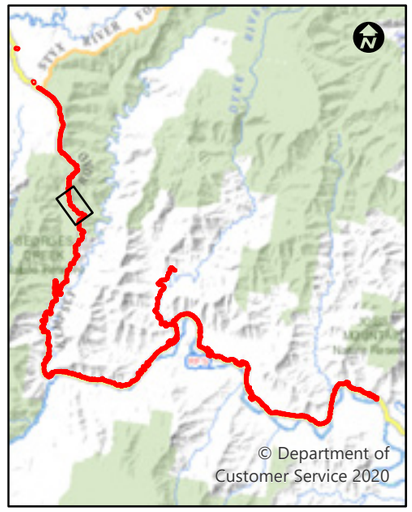

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- White Cliff Quarry
- National Park reserve
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 5 of 27

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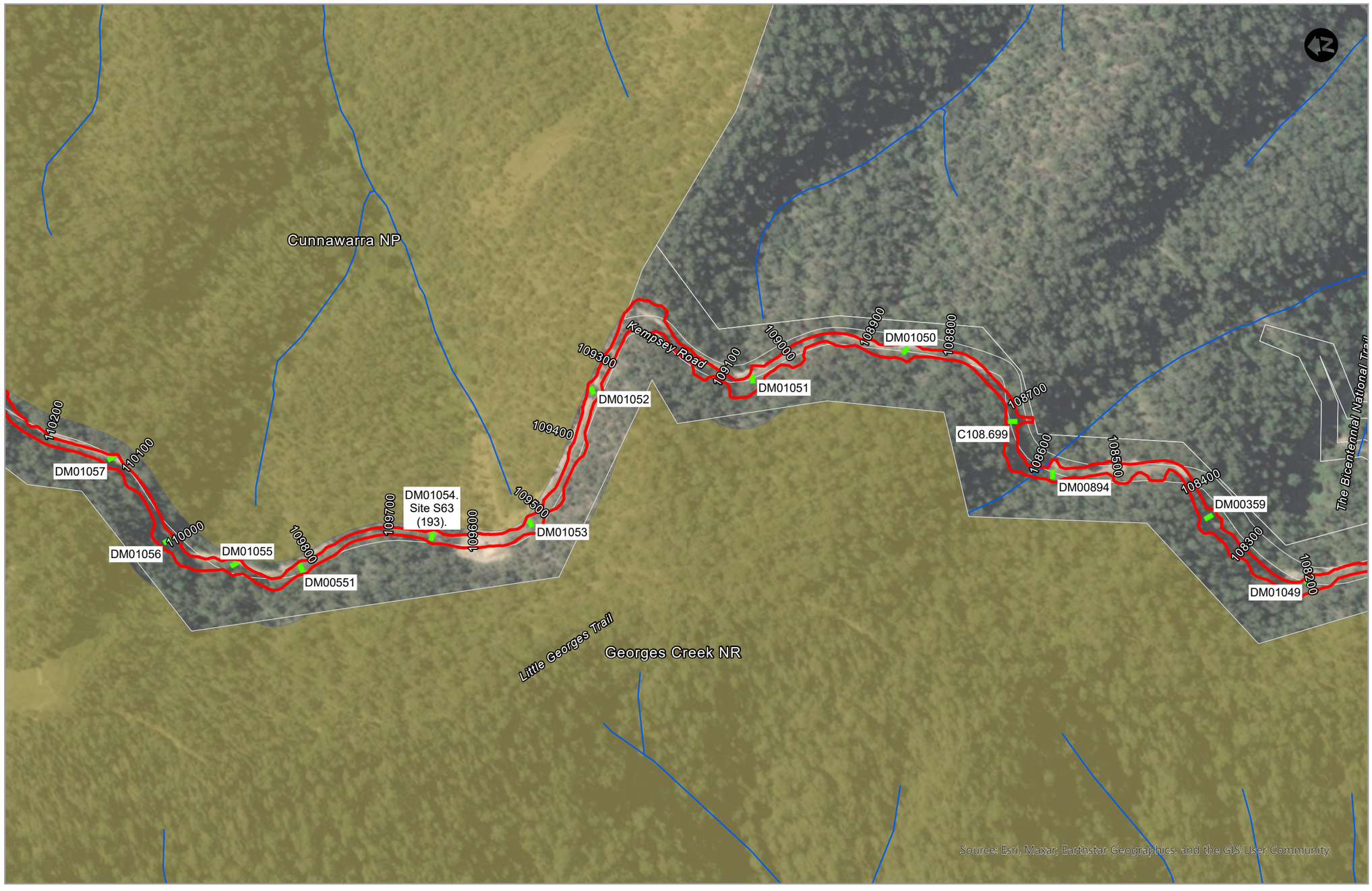

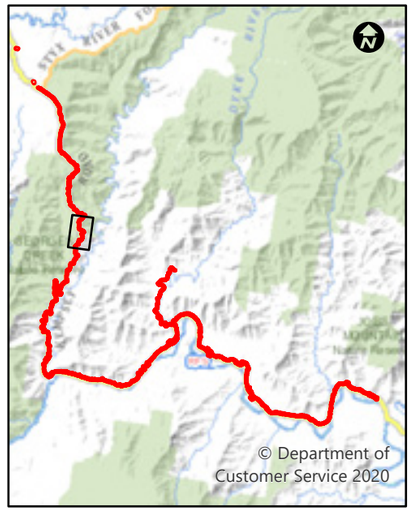

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- National Park reserve
- Watercourse

0 100 Meters

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Review of Environmental Factors – ARC Kempsey Road Restoration
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The Site
Illustration 1.2 - Sheet 6 of 27

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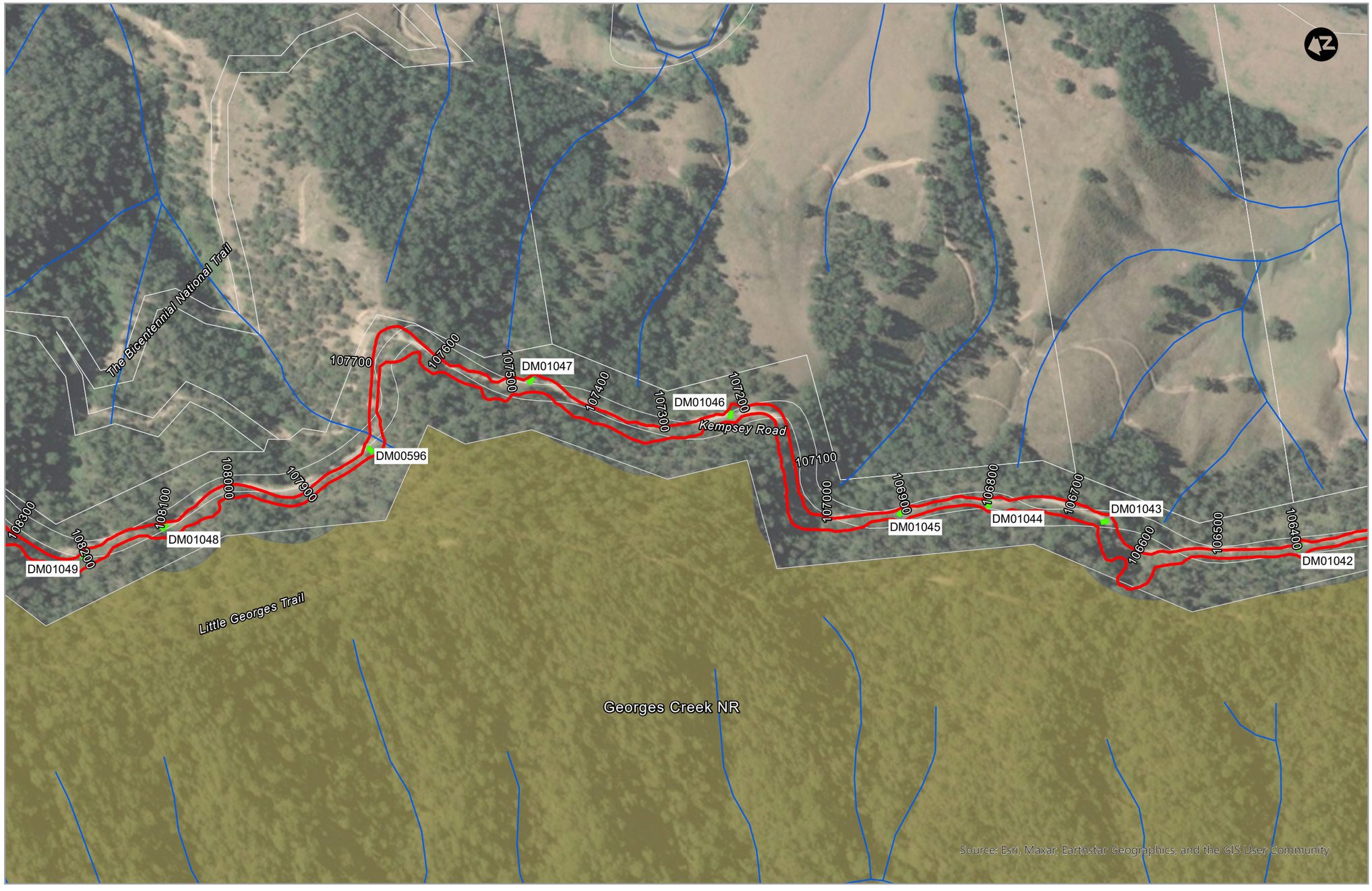

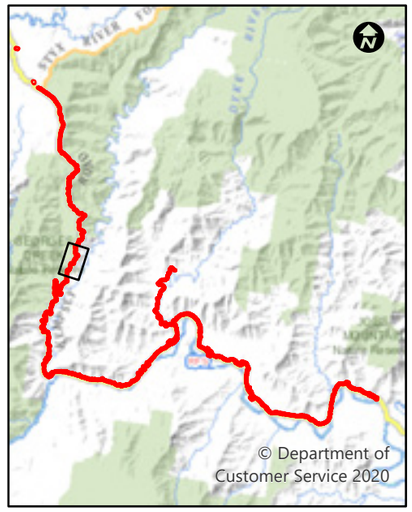

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- National Park reserve
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 7 of 27

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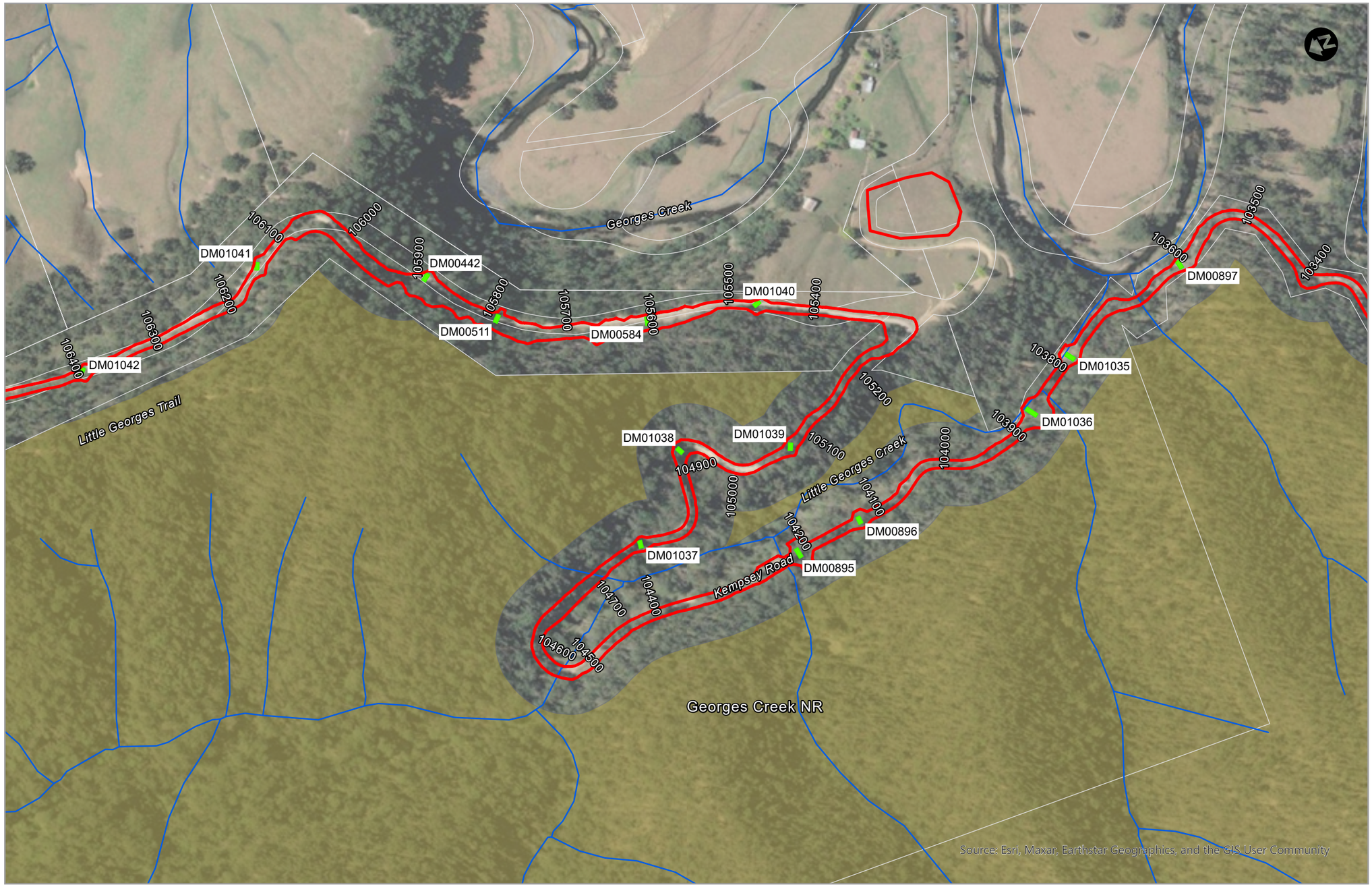

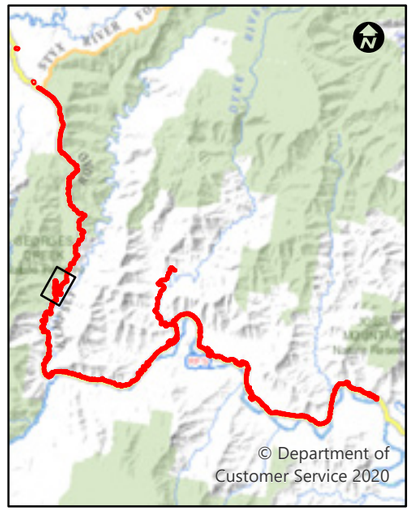

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- National Park reserve
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 8 of 27

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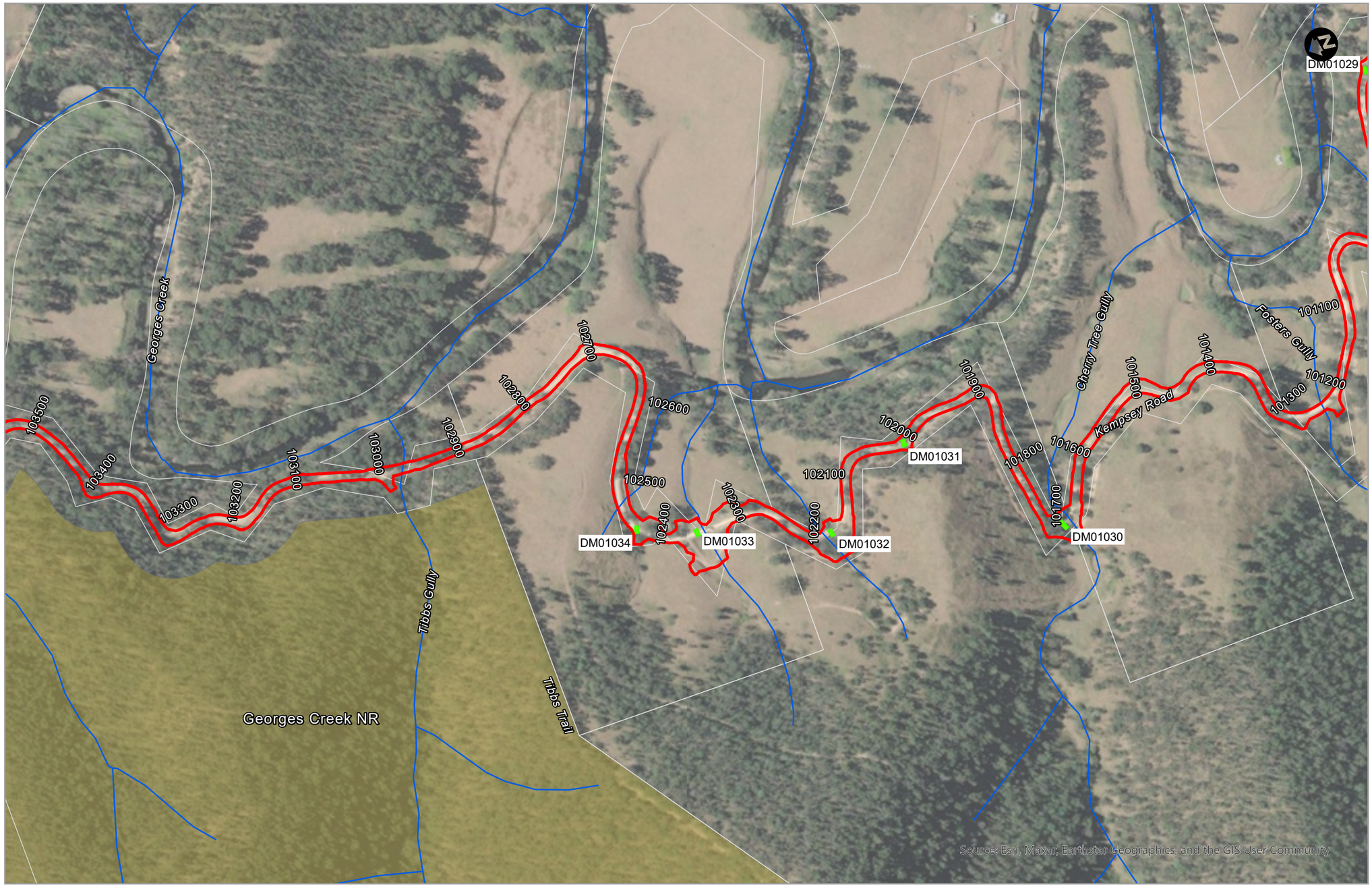

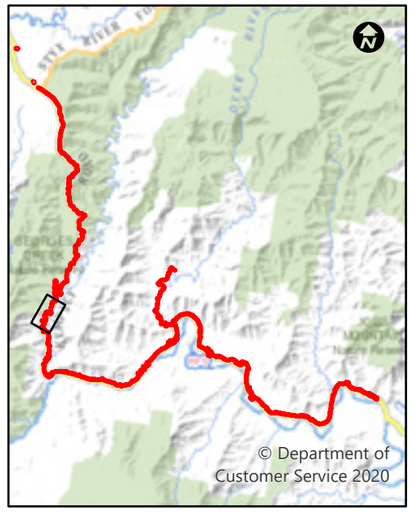

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- National Park reserve
- Watercourse

0 100 Meters

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Review of Environmental Factors – ARC Kempsey Road Restoration
4055-1076

The Site
Illustration 1.2 - Sheet 9 of 27

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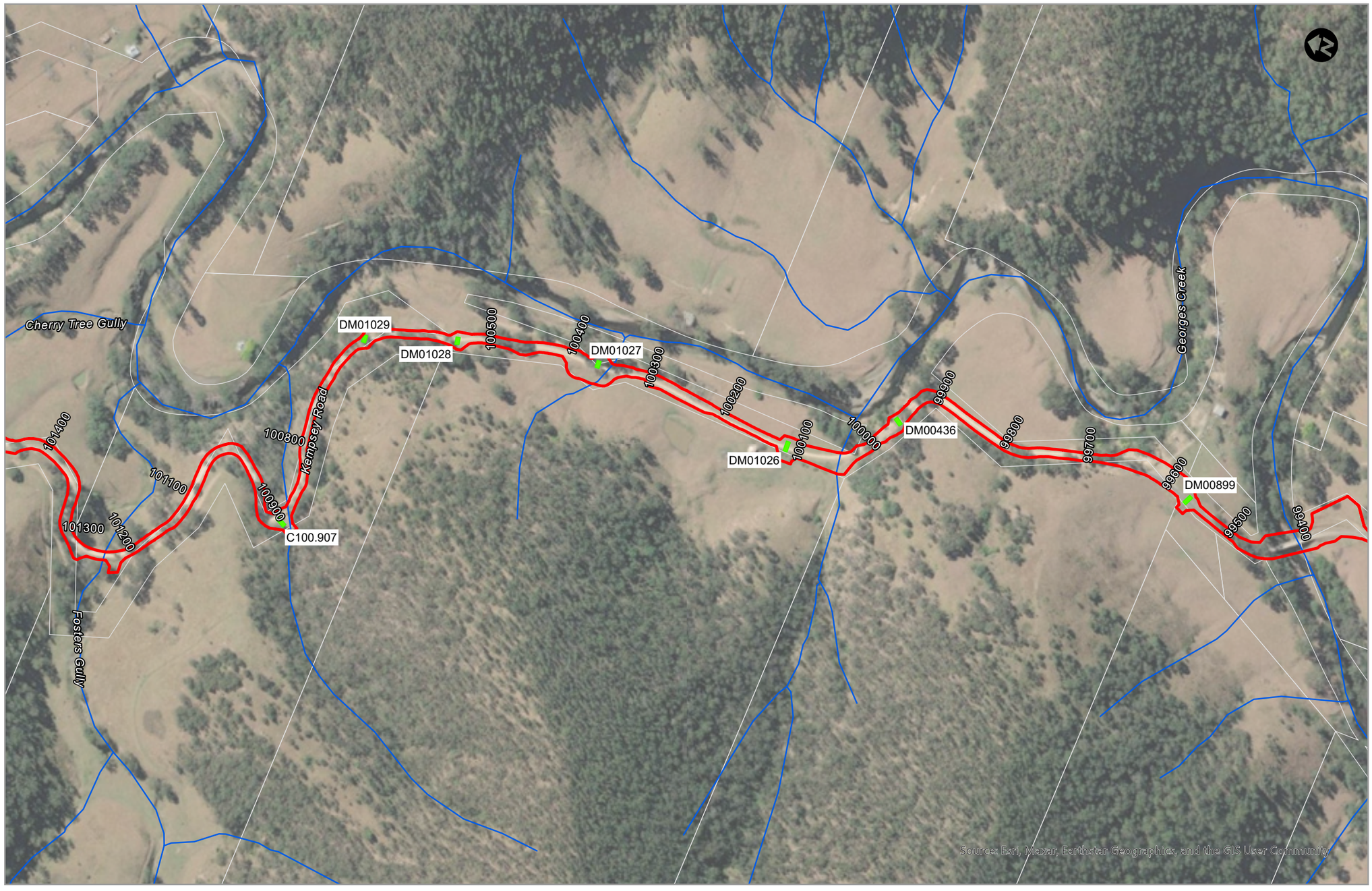

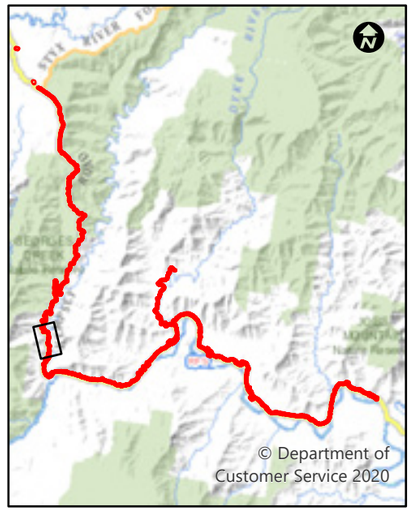

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 10 of 27

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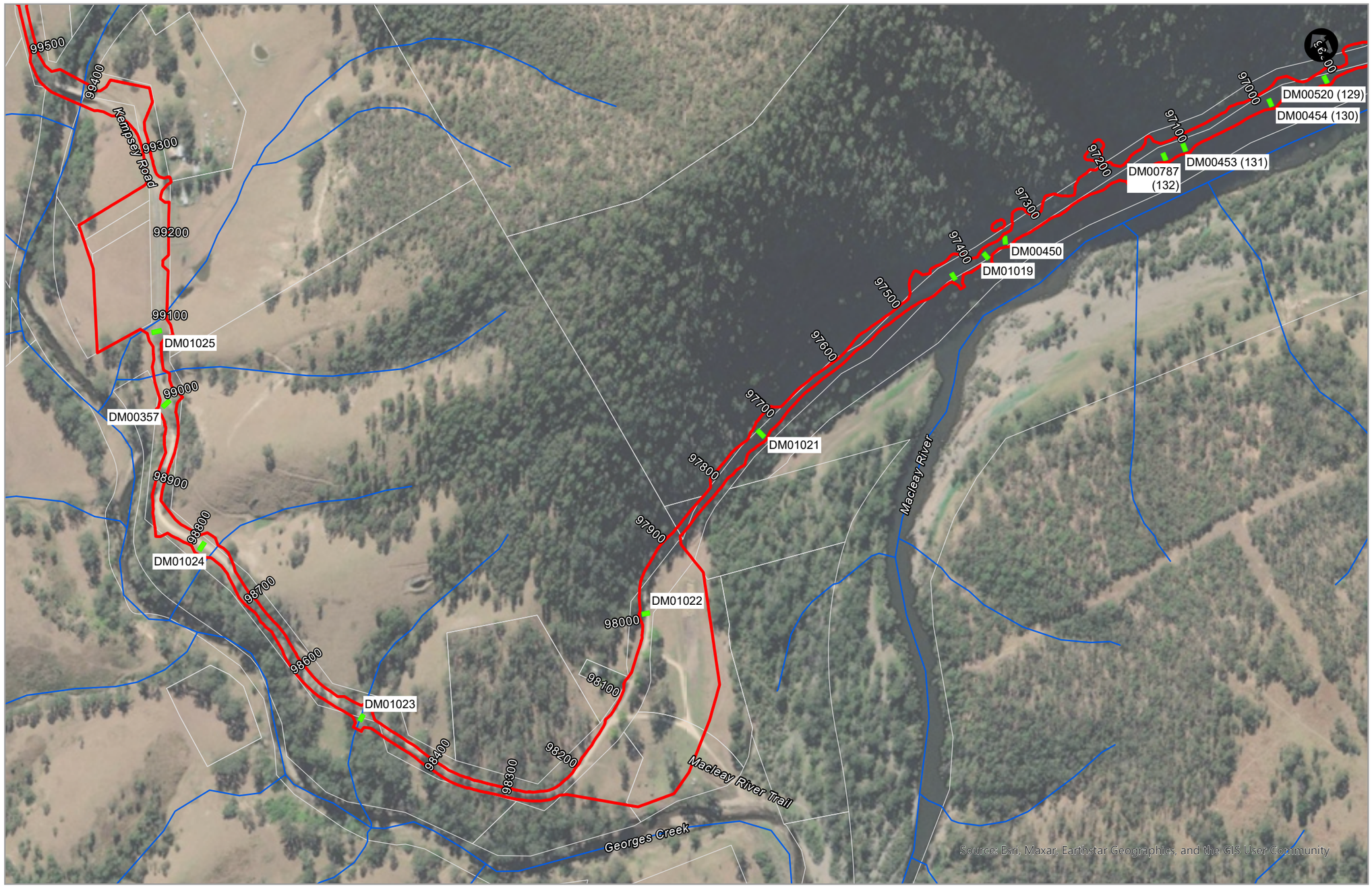

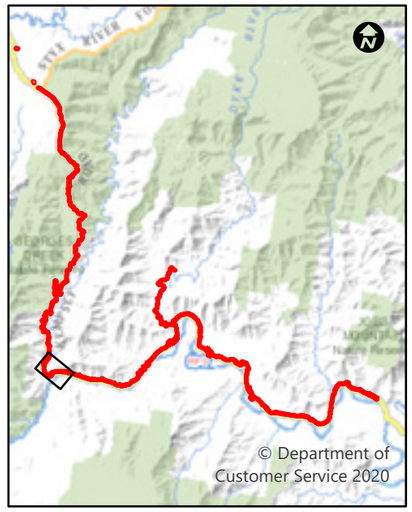

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 11 of 27

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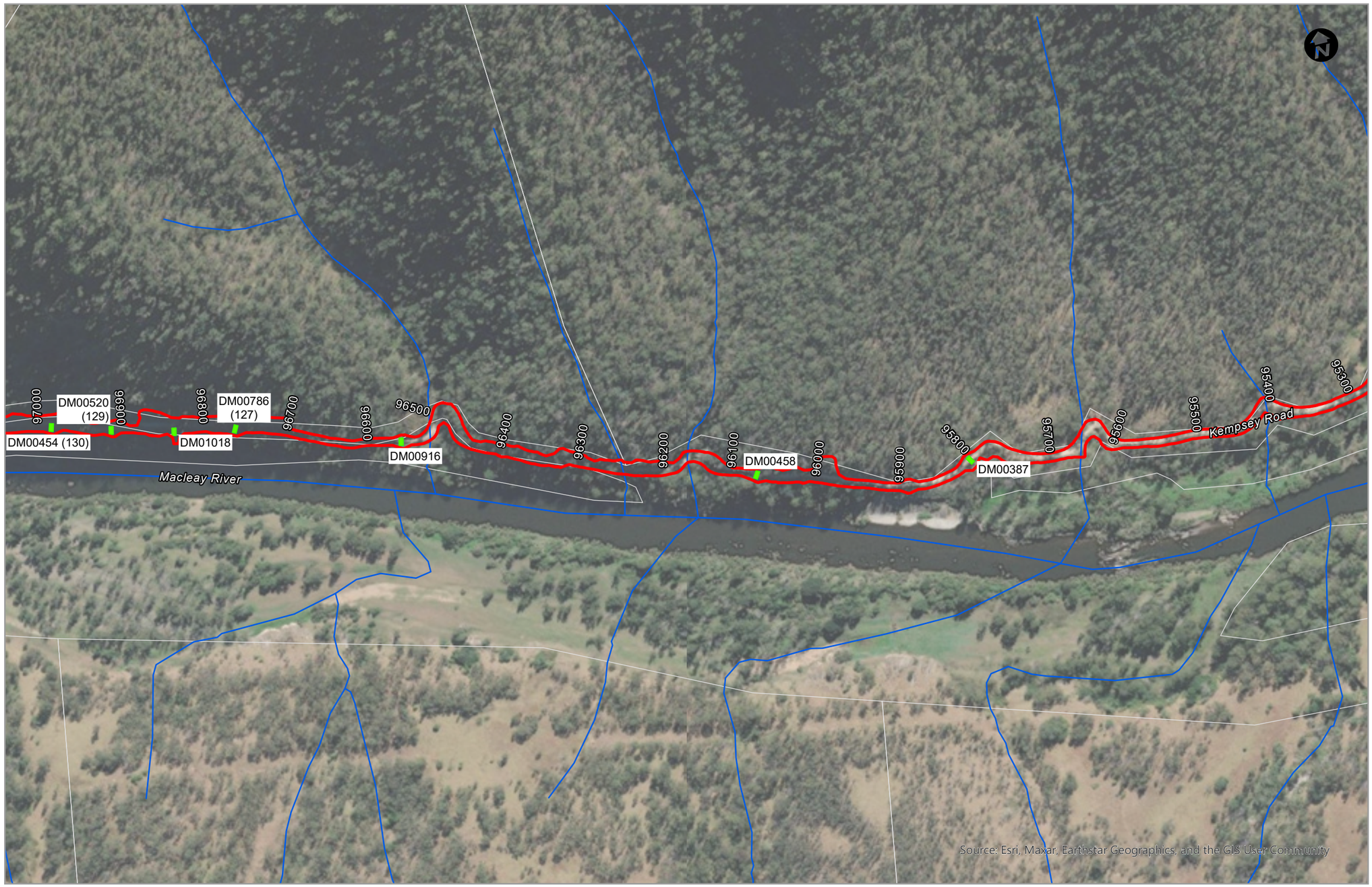

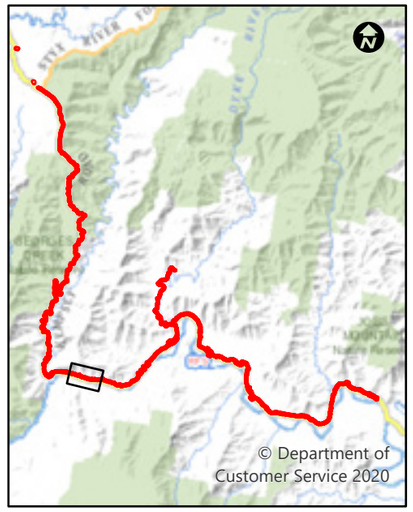

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 12 of 27

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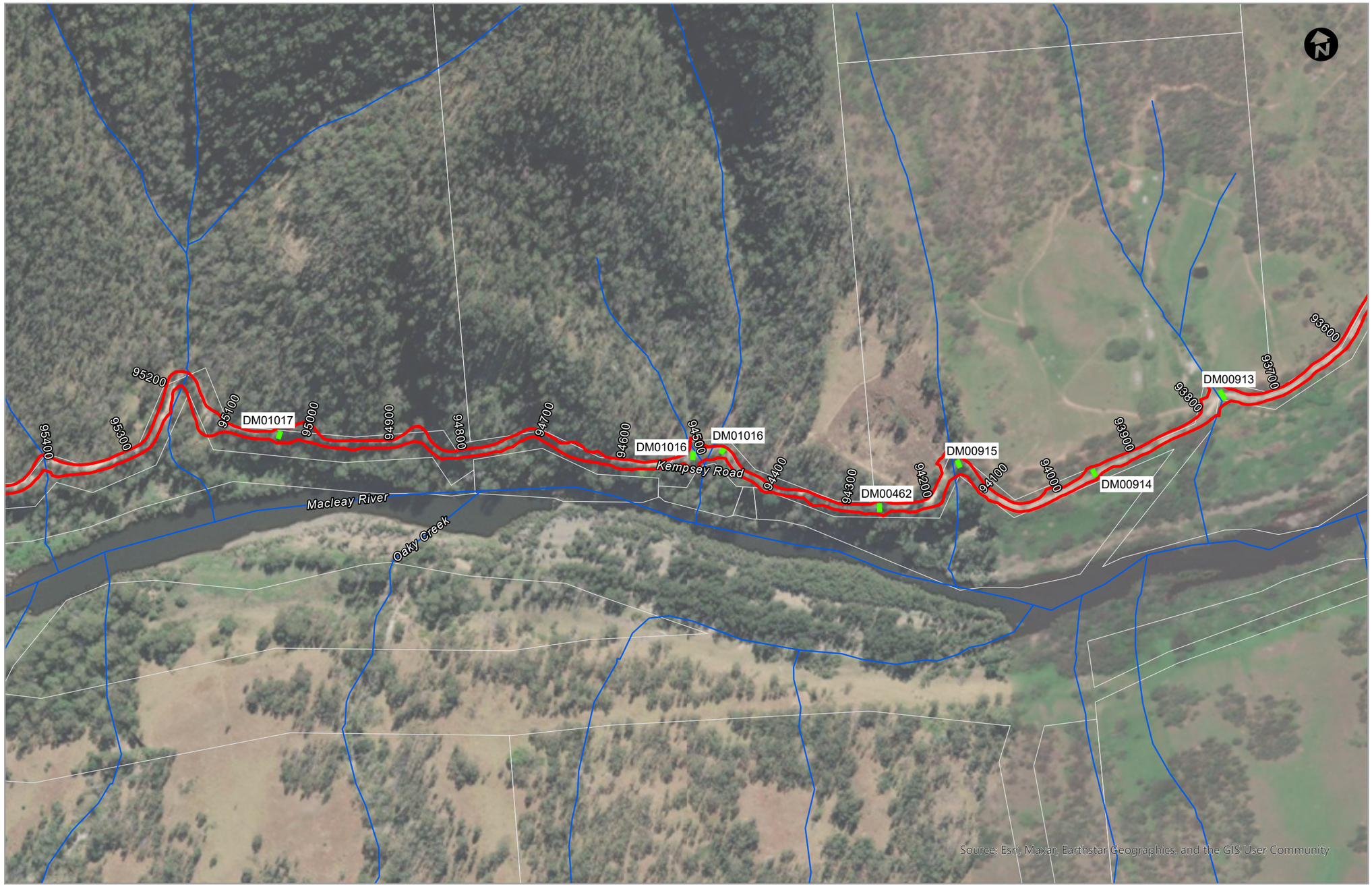

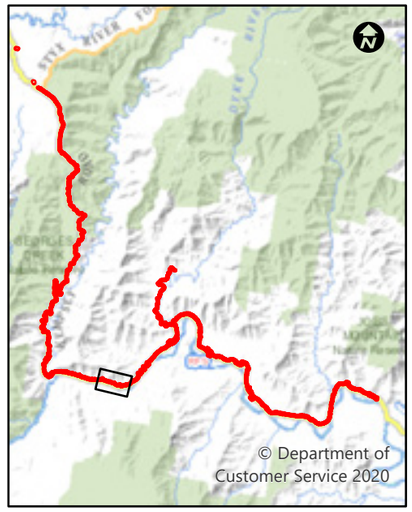

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 13 of 27

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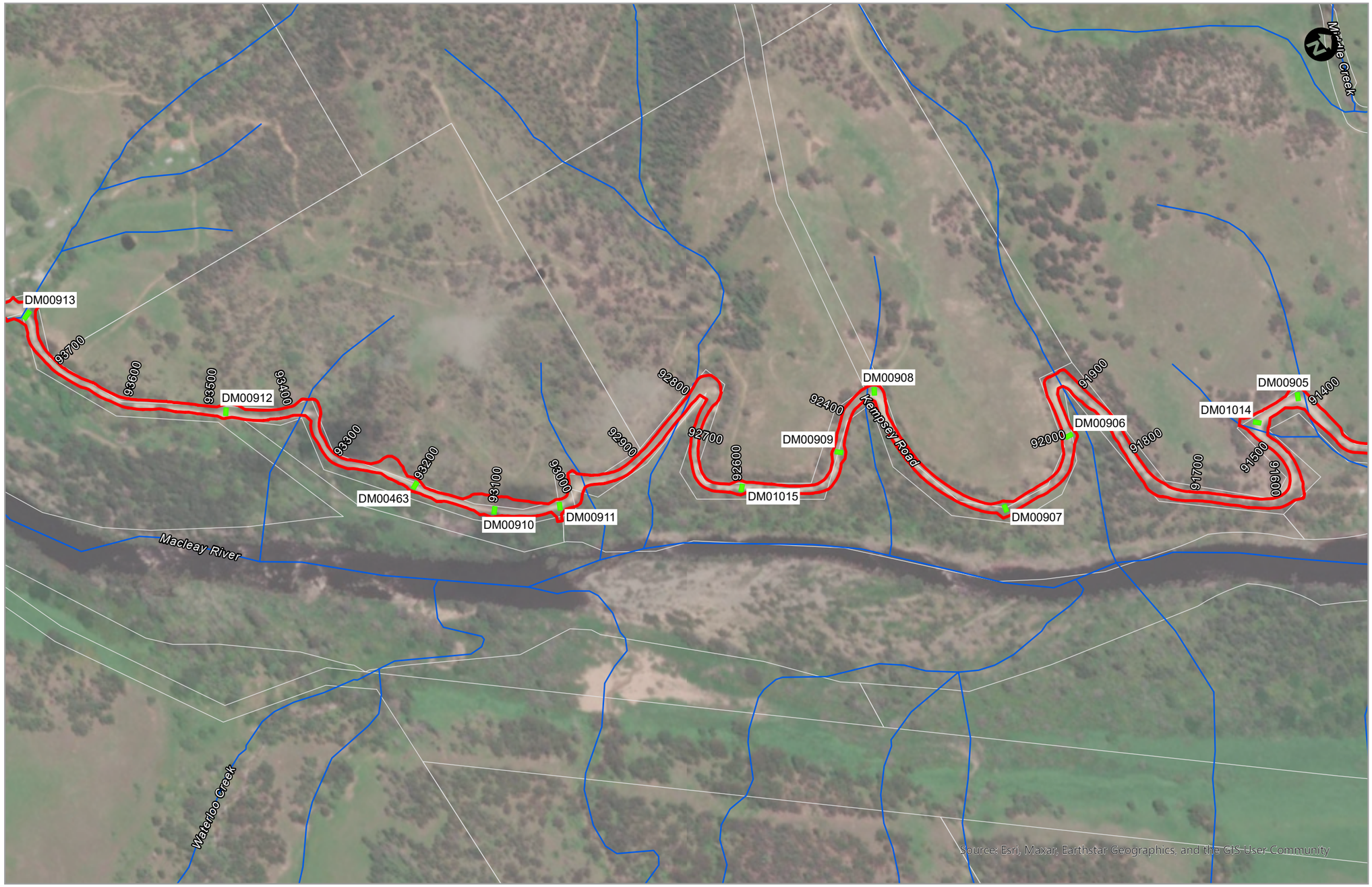

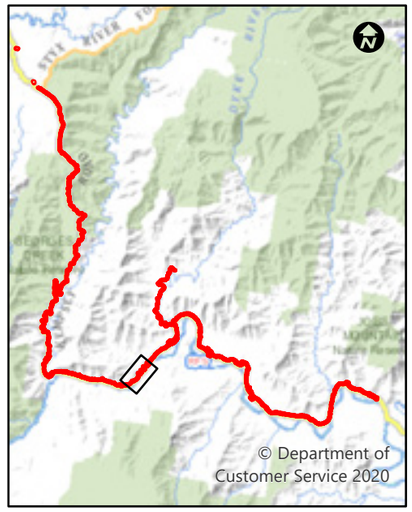

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 14 of 27

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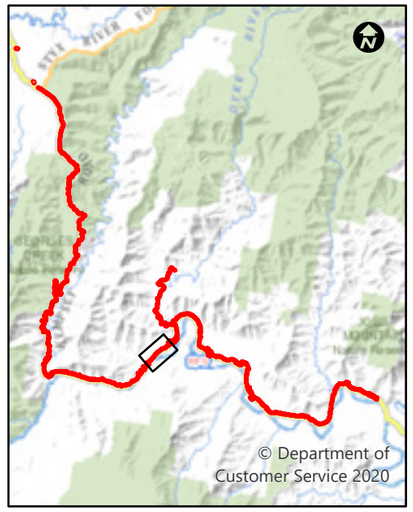

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 15 of 27

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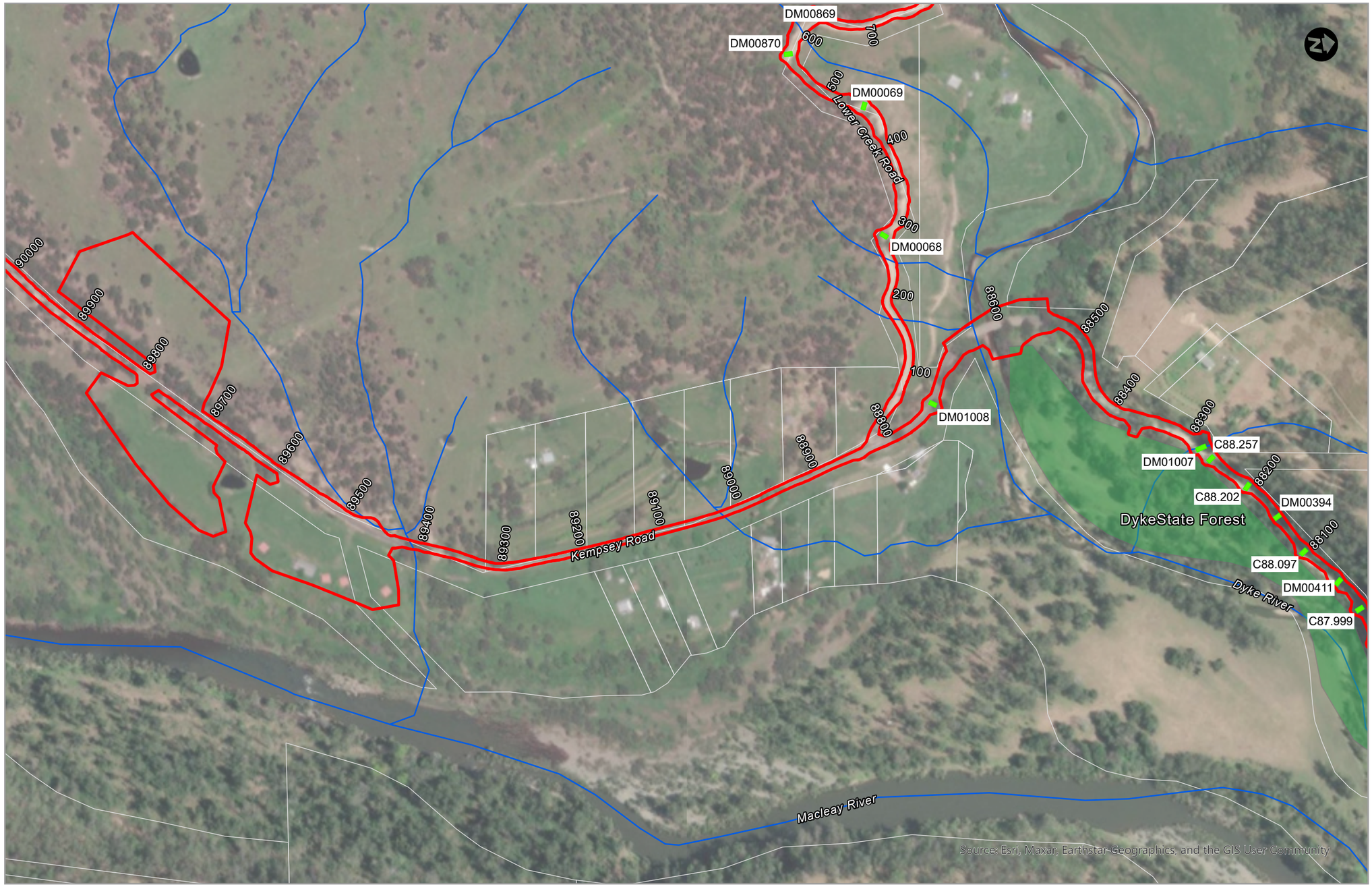

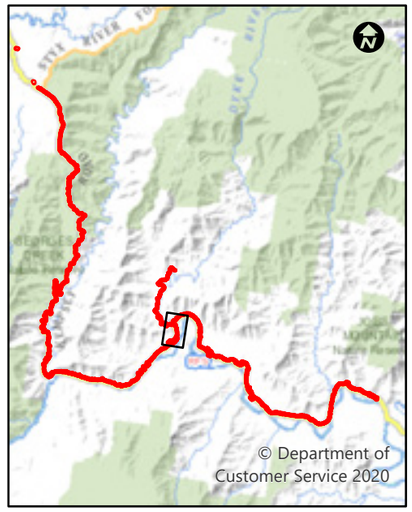

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- State Forest
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 16 of 27

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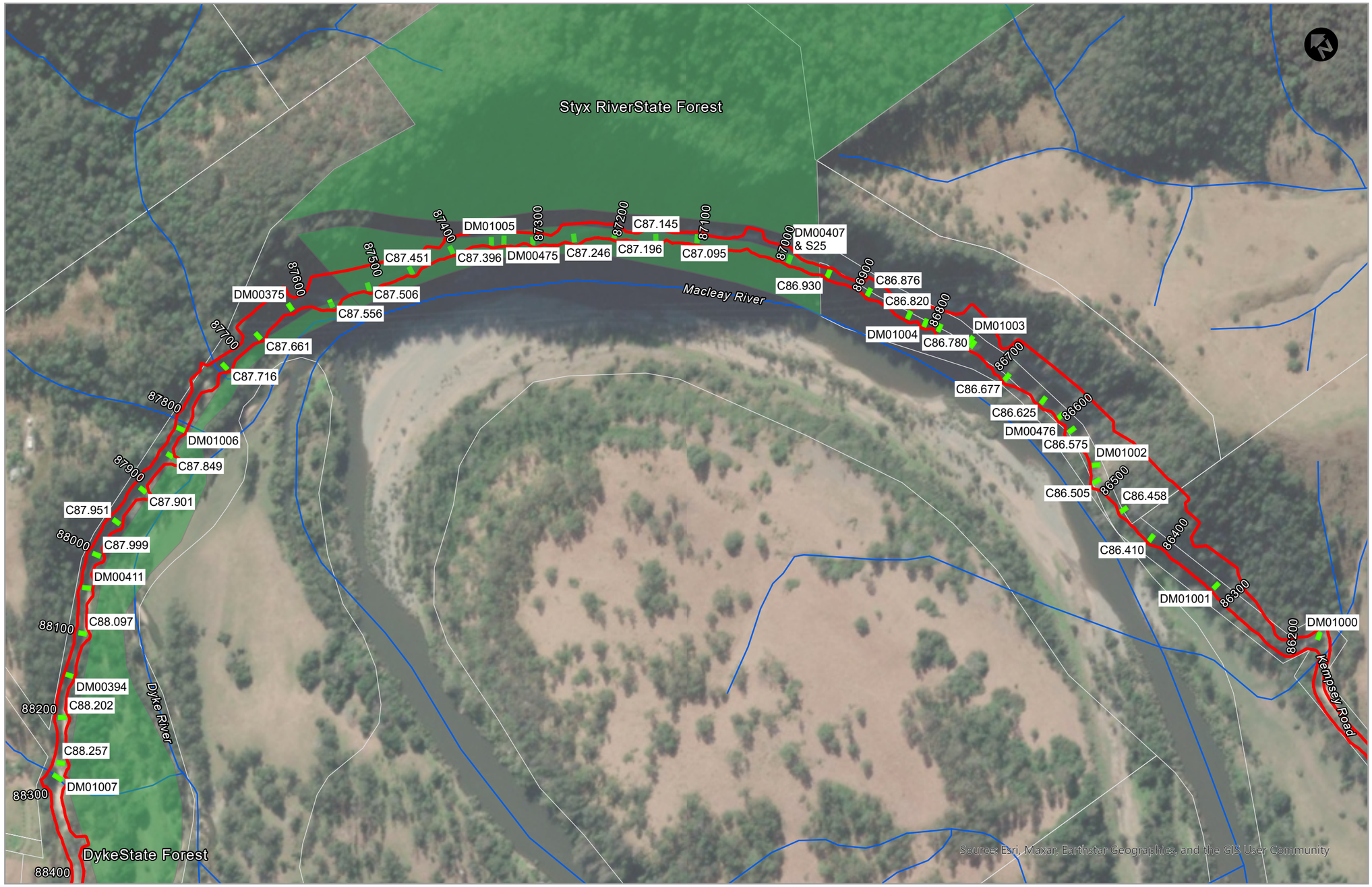

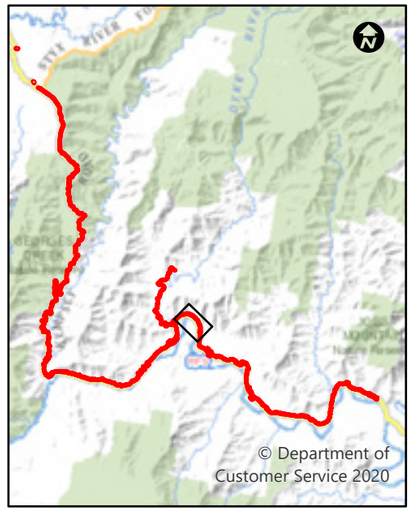

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- State Forest
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 17 of 27

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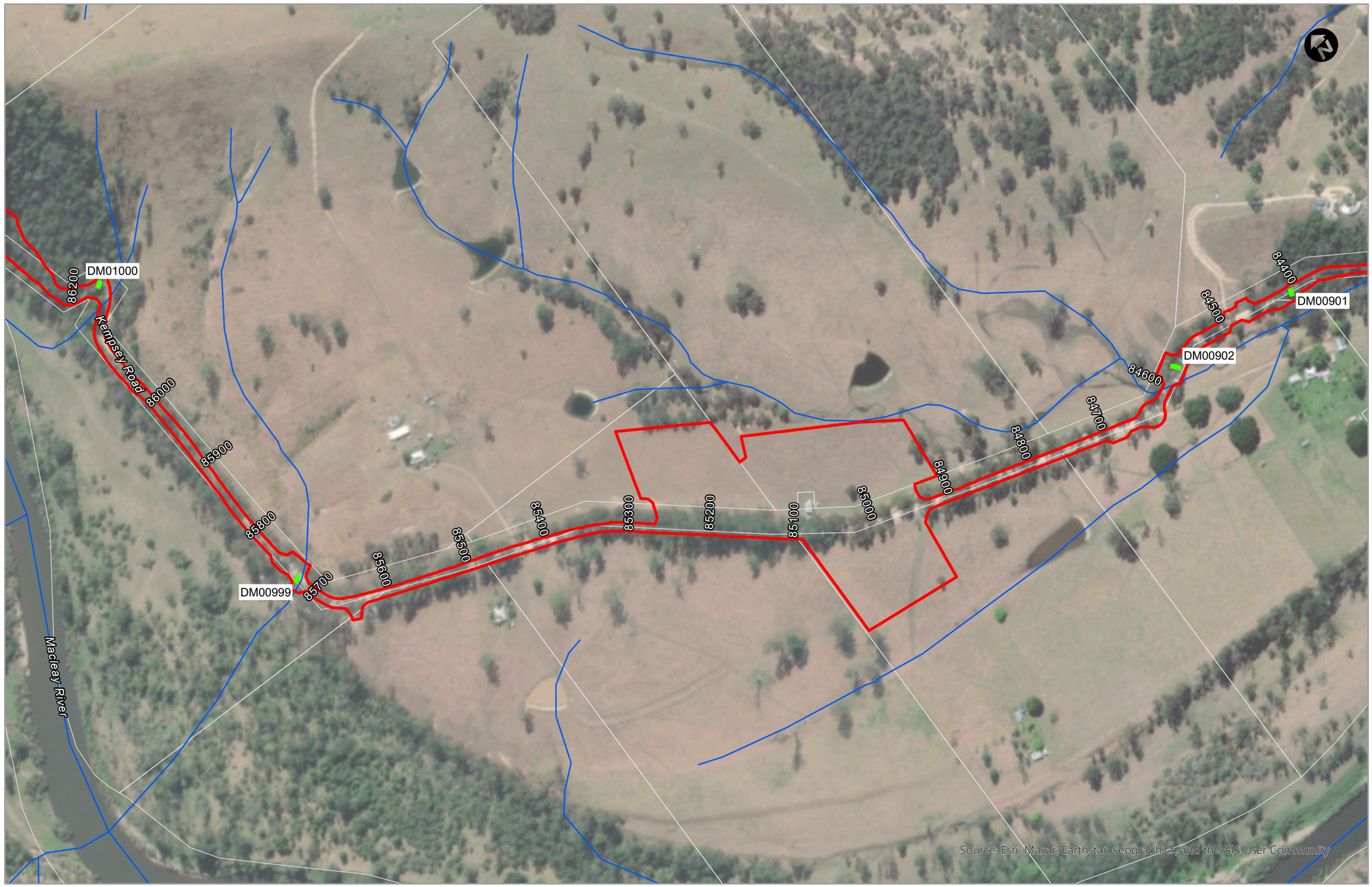

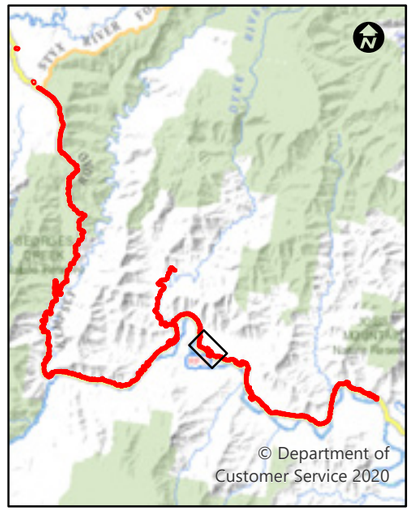

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 18 of 27

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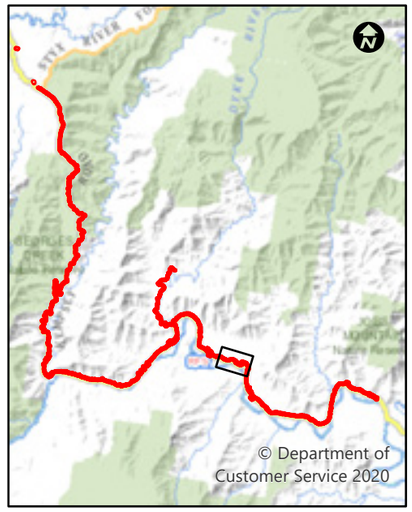

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Smiths Creek Quarry
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 19 of 27

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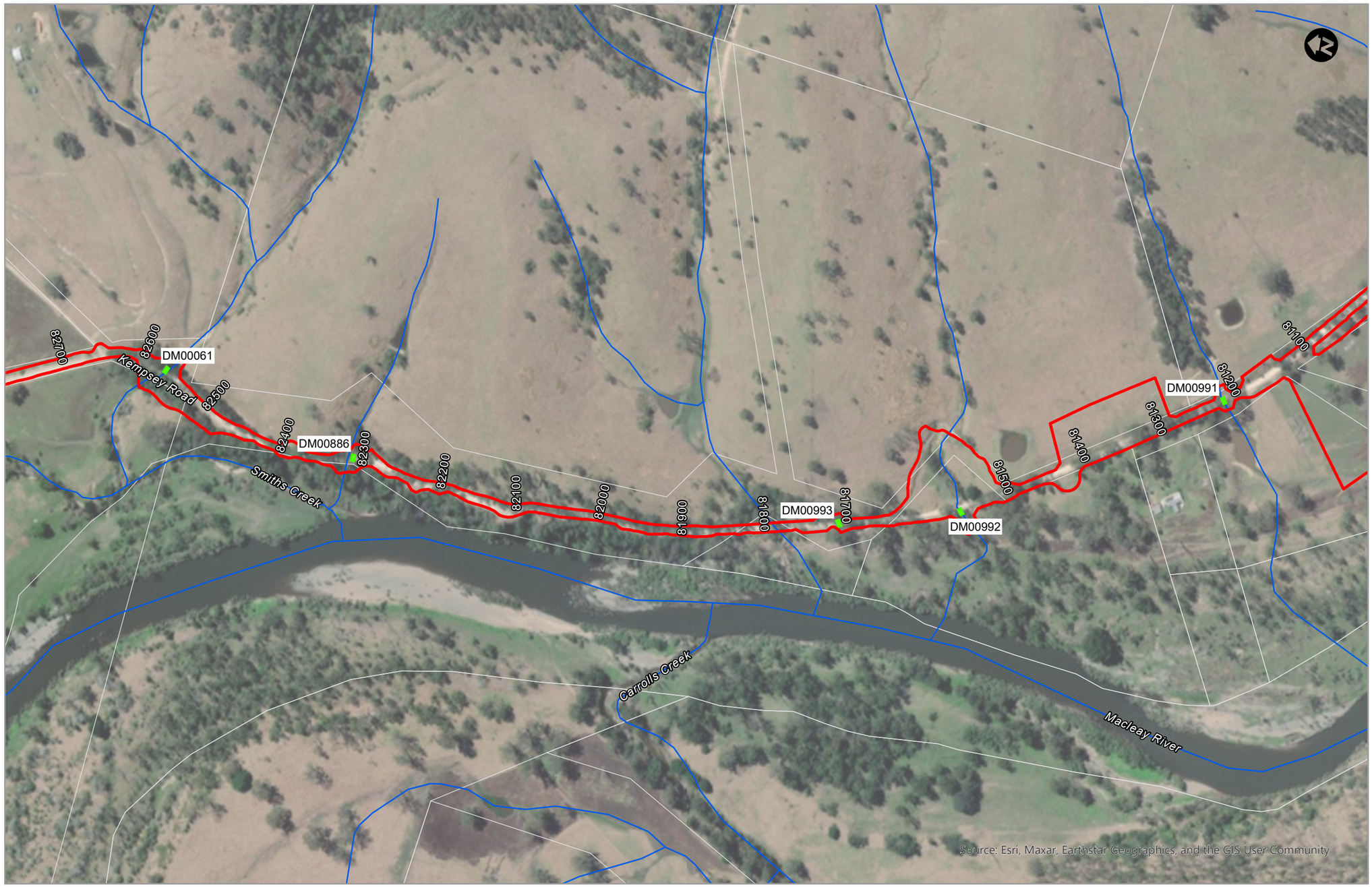

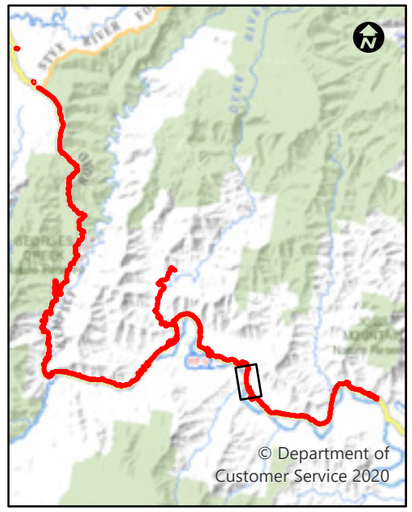

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 20 of 27

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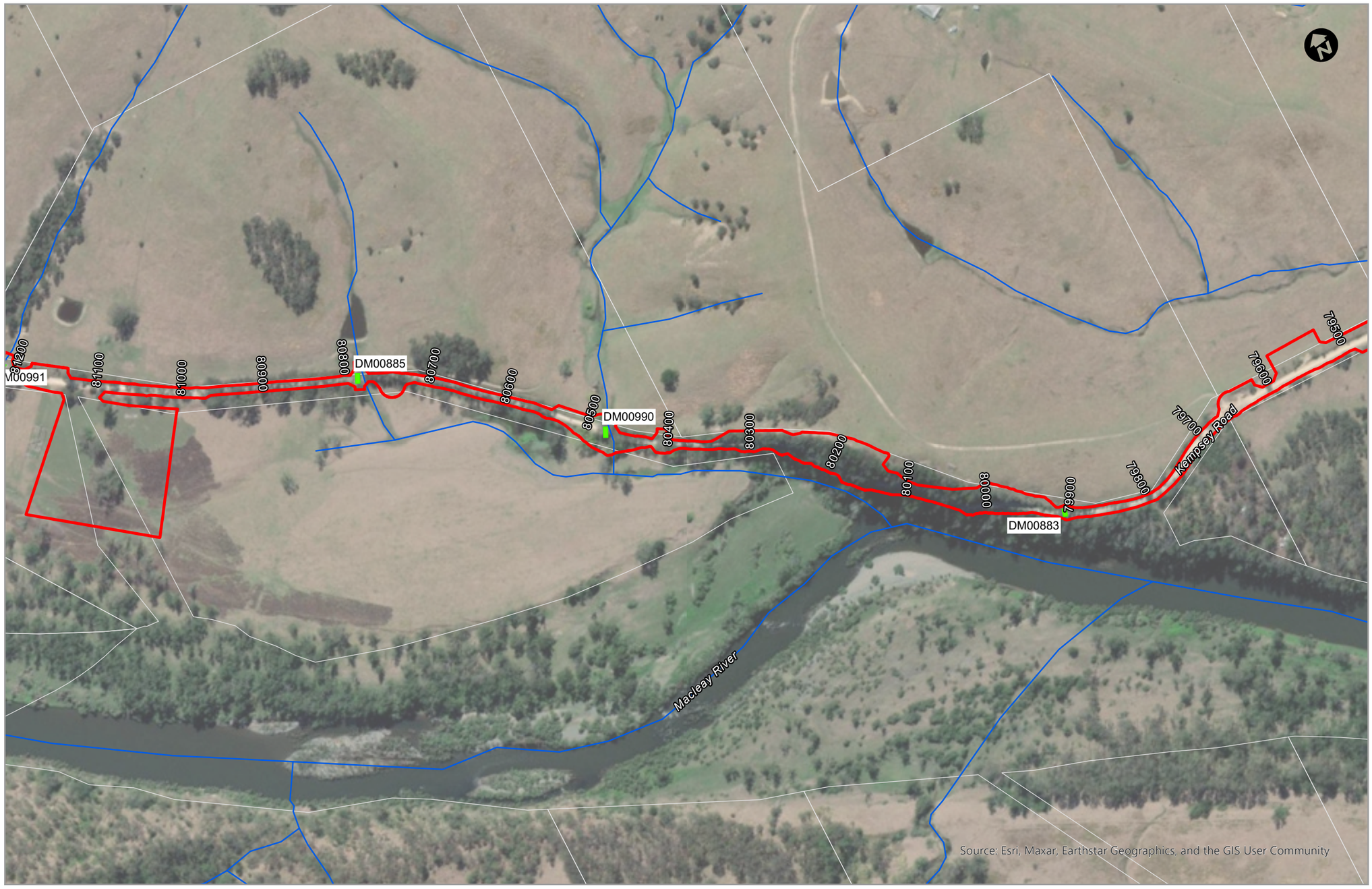

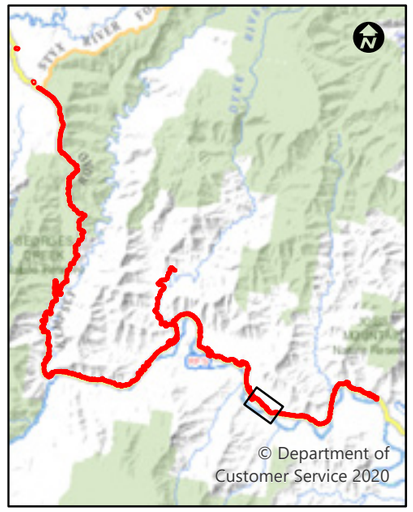

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 21 of 27

Information shown is for illustrative purposes only
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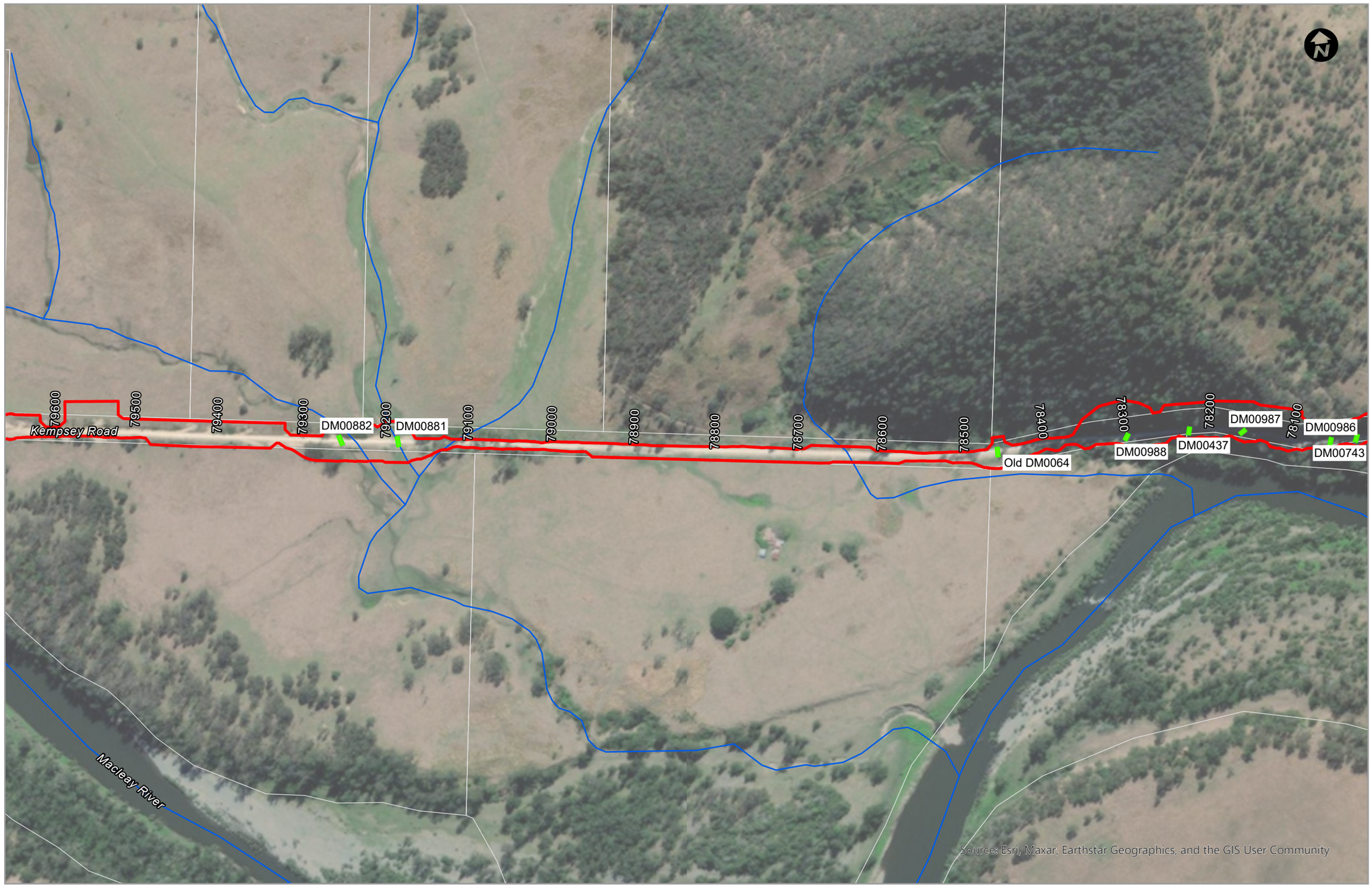
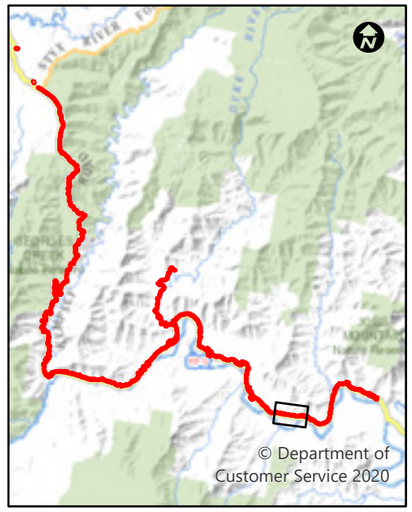
Source of base data: ESRI World Imagery
Date: 14/12/2023
Revision: E





Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 22 of 27

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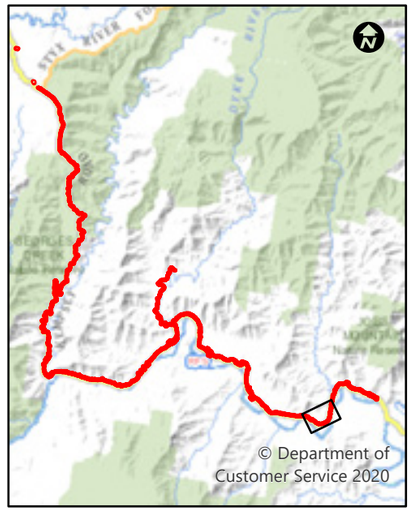

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 23 of 27

Information shown is for illustrative purposes only
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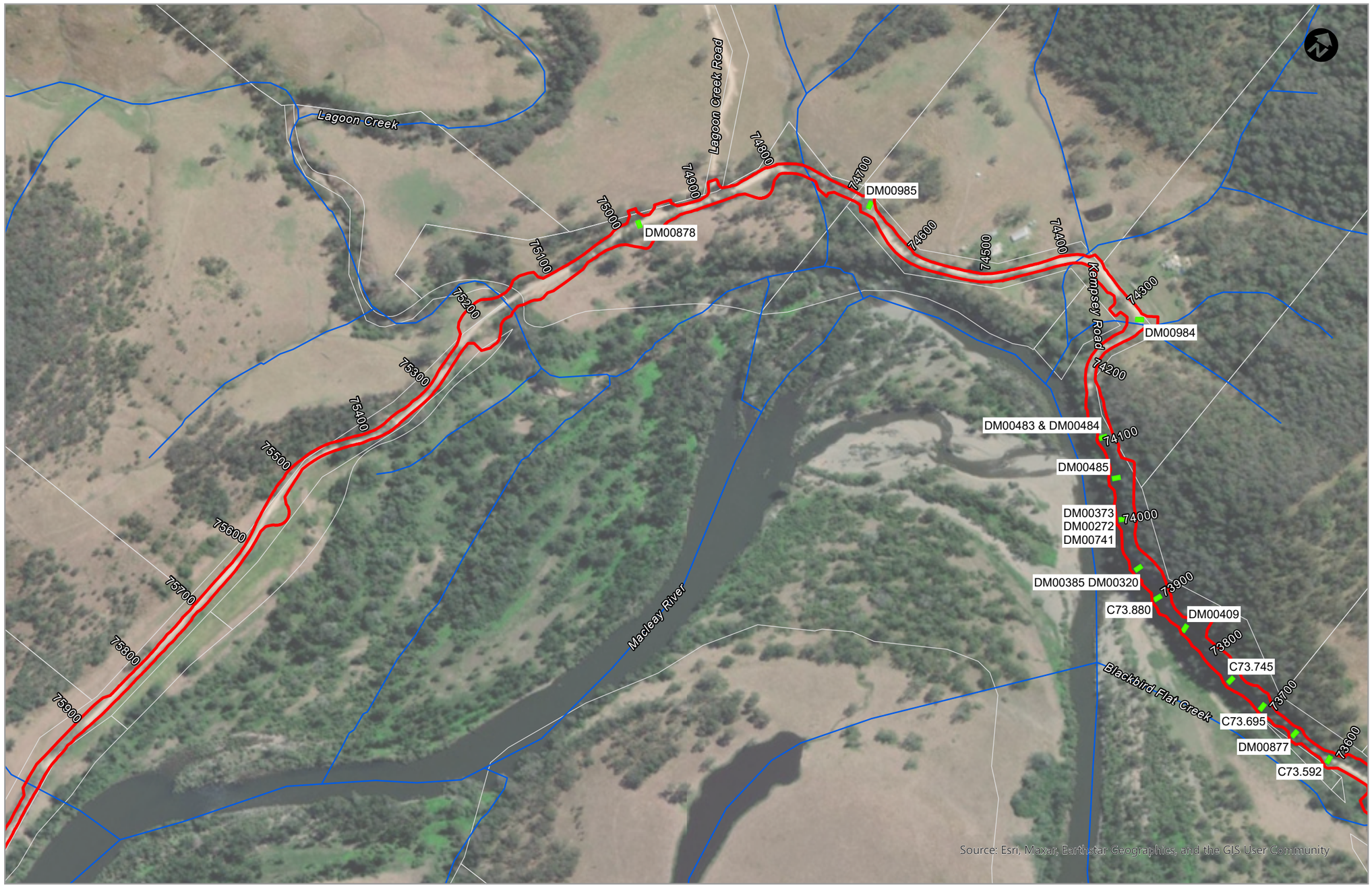

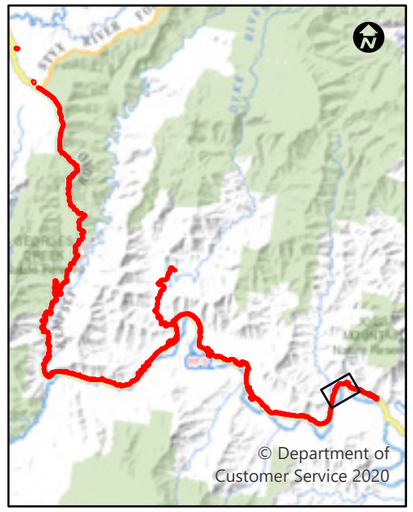

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 24 of 27

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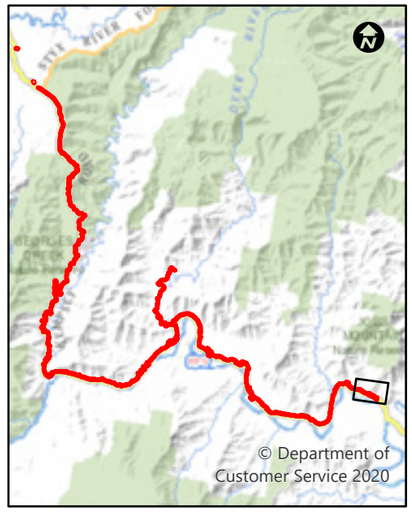

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

GeoLINK
environment | engineering | planning | design

Review of Environmental Factors – ARC Kempsey Road Restoration
4055-1076

The Site
Illustration 1.2 - Sheet 25 of 27

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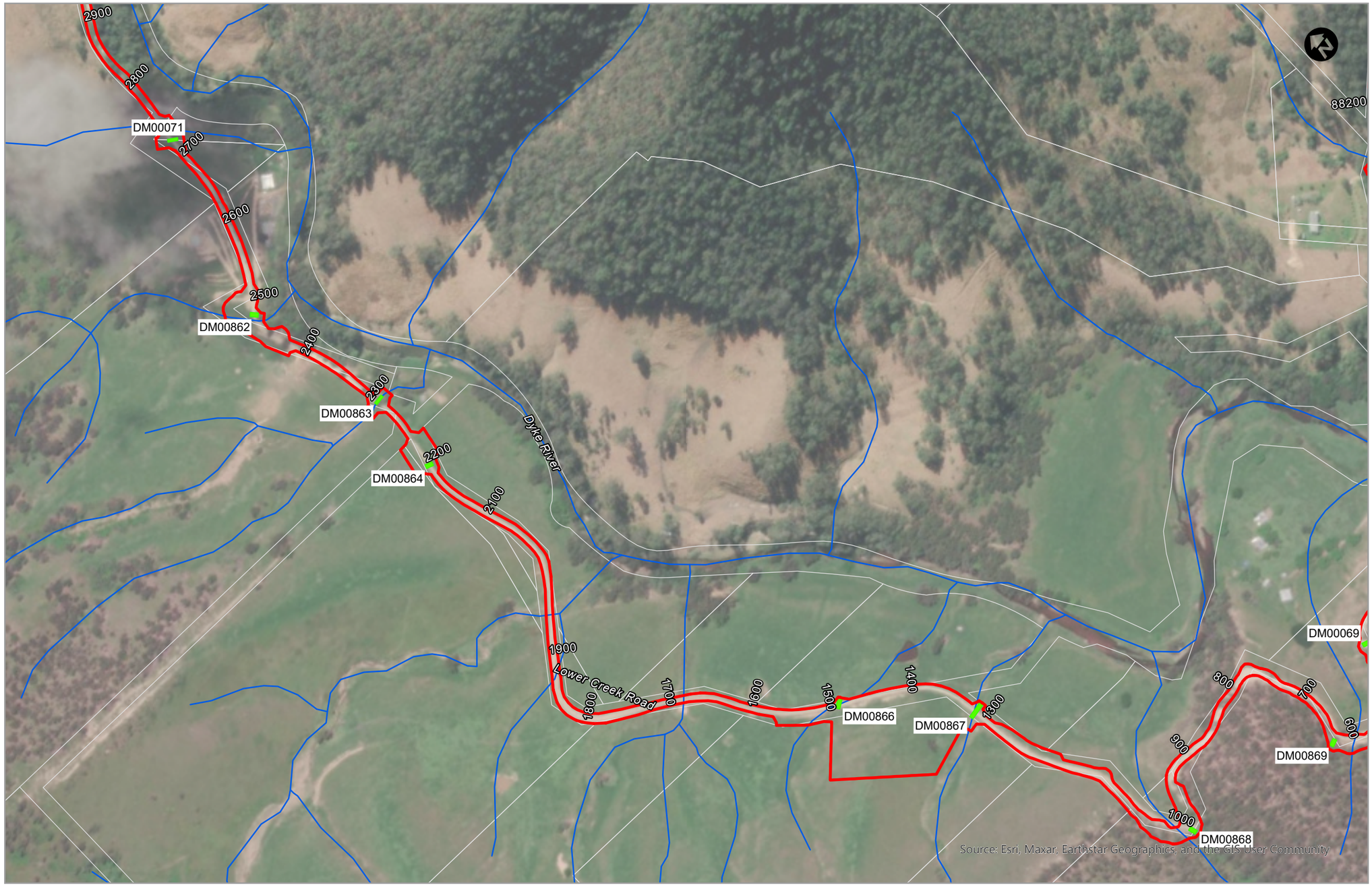

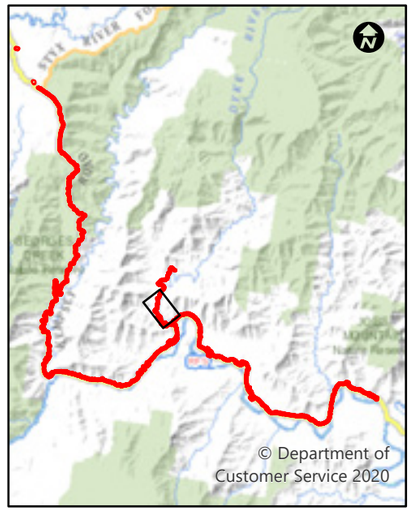

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 26 of 27

Information shown is for illustrative purposes only
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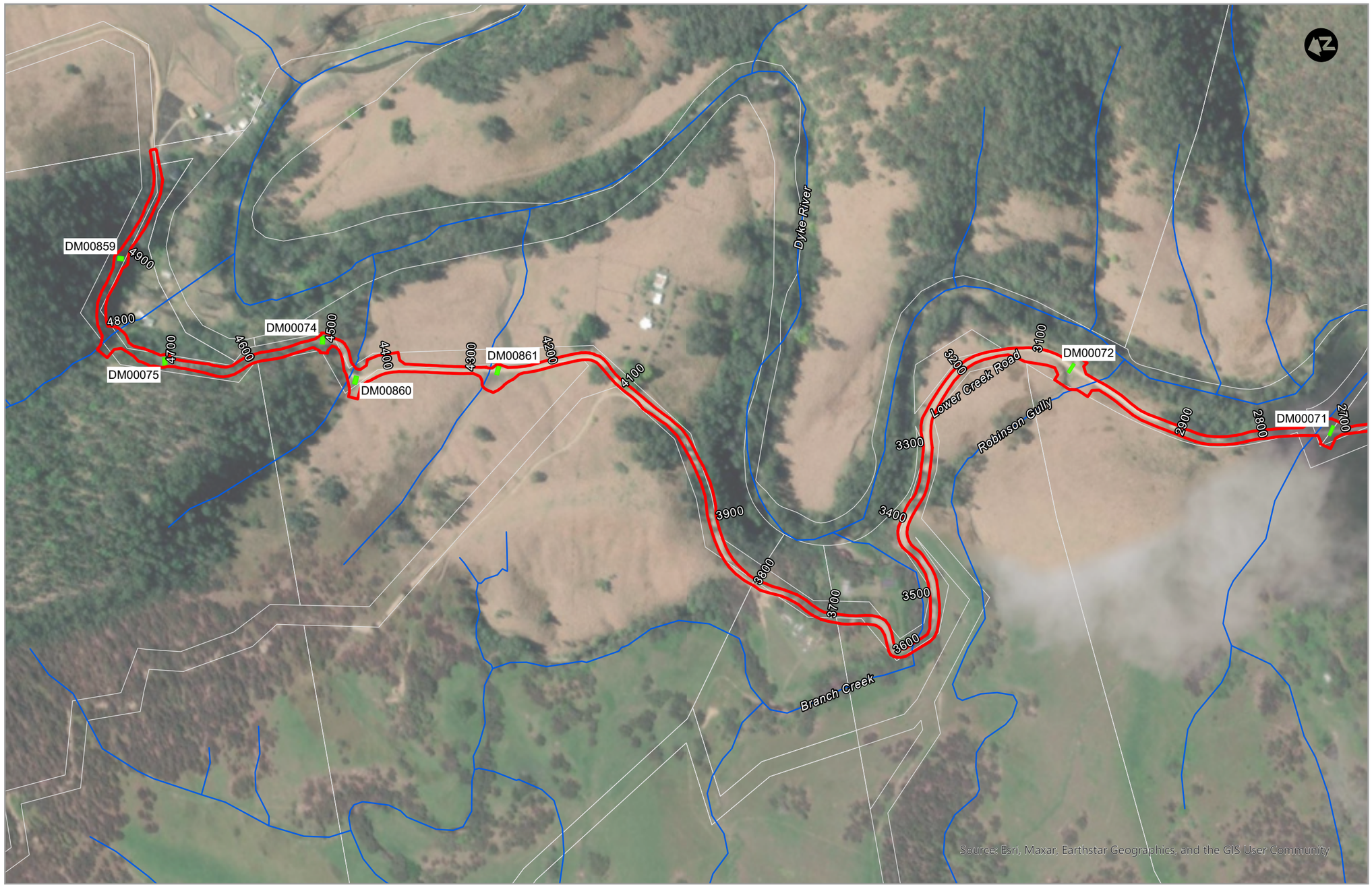

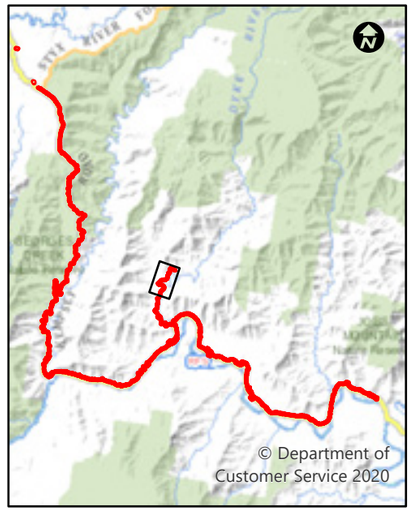

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Culvert
- Watercourse

0 100 Meters

The Site
Illustration 1.2 - Sheet 27 of 27

Information shown is for illustrative purposes only
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1.3 Purpose of the report

This review of environmental factors (REF) has been prepared by GeoLINK on behalf of ARC, utilising the TfNSW REF template as requested. For the purposes of these works, ARC is the proponent and determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act)*.

The purpose of the REF is to describe the Activity, to document the likely impacts of the Activity on the environment, and to detail mitigation and management measures to be implemented.

The description of the proposed work and assessment of associated environmental impacts has been undertaken in the context of Section 171 of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation), the *Guidelines for Division 5.1 Assessments* (DPE 2022) approved under Section 170 of the EP&A Regulation, *Roads and Related Facilities EIS Guideline* (DUAP 1996), the *Biodiversity Conservation Act, 2016 (BC Act*), the *Fisheries Management Act 1994 (FM Act)*, and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth) (EPBC Act)*.

In doing so, the REF helps to fulfil the requirements of:

- Section 5.5 of the *EP&A Act* including that ARC examine and take into account, to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the Activity.

The findings of the REF would be considered when assessing:

- Whether the Activity is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared under Division 5.1, Subdivision 3 of the EP&A Act or approval sought from the Minister for Planning under Division 5.2 of the *EP&A Act*.
- The significance of any impact on threatened species as defined by the *BC Act* and/ or *FM Act*, in section 1.7 of the *EP&A Act* and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report.
- The significance of any impact on nationally listed biodiversity matters under the *EPBC Act*, including whether there is a real possibility that the Activity may threaten long-term survival of these matters, and if offsets are required and able to be secured.
- The potential for the Activity to significantly impact any other matters of national environmental significance or Commonwealth land and the need, subject to the *EPBC Act* strategic assessment approval, to make a referral to the Australian Government Department of Climate Change, Energy, the Environment and Water for a decision by the Commonwealth Minister for the Environment and Water on whether assessment and approval is required under the *EPBC Act*.

2. Need and options considered

This chapter describes the need for the Activity in terms of its strategic setting and operational needs. It identifies the various options considered and the selection of the preferred option for the Activity.

2.1 Strategic need for the Activity

The proposed works would occur along Kempsey-Armidale Road and Lower Creek Road, which provide important transport routes between Armidale and Kempsey for local, forestry, agricultural and tourist traffic. A risk to road users exists as a result of the landslips and washouts, which occurred after bushfires in 2019 and 2020 and subsequent flooding in 2020 and 2021. Remediation works are required to repair the roadway, prevent further slips, and improve road safety. Delaying the proposed remediation works may result in further slips and additional damage to the road pavement. This may then require major rehabilitation that is likely to involve a higher risk of negative environmental impacts, greater financial cost, and lengthy delays for motorists.

The Activity is mostly funded by a state road and natural disaster program, with a small amount of the road works funded through the Fixing Country Roads and Fixing Local Roads programs.

The proposal will be undertaken with low environmental impacts, and construction activities would be guided by the safeguards and management measures described in this REF.

This REF supersedes a previous REF written for Kempsey Road and Lower Creek Road works. The previous REF was written based on conceptual designs, while this REF takes into account the design developed during the Early Contractor Involvement (ECI) design development.

2.2 Limitations of existing infrastructure

The road alignment largely follows Georges Creek and Macleay River with the majority of the trafficable general road width being four metres along the 45.8 km section of Kempsey Road, with some passing opportunities due to the steep natural terrain. There is no posted speed limit.

The pavement materials have eroded as a result of heavy rainfall events and over 90% of the culverts are blocked with sediment and vegetation. Temporary safety barriers have been placed at select slip locations along the site. Scour damage is evident at the bridge locations resulting from water flow.

2.3 Activity objectives and development criteria

2.3.1 Activity objectives

The objectives of the Activity are:

- Stabilise the roadways associated with the Activity to prevent further erosion along the edge of Kempsey Road and Lower Creek Road, including:
  - drainage design and culvert restoration and size to one-in-50-year storm event for Kempsey Road and a one-in-20 year event for Lower Creek Road;
  - pavement rehabilitation/ road design;
  - downslope remediation and treatments/ geotechnical design; and
  - structure rehabilitation.
- Undertake works to minimise traffic, environmental, social impacts.
- Ensure Kempsey Road and Lower Creek Road remain safe and trafficable transport routes.
- Reopen Kempsey-Armidale Road to all traffic.

2.3.2 Development criteria

The Kempsey Road and Lower Creek Road restoration works are required to recover the roads to pre-disaster condition in accordance with the *NSW Government Natural Disaster Essential Public Asset Restoration Guidelines*.

The Natural Disaster Recover Works (Milestone 1) would be to restore the asset to the same functionality as the pre-disaster condition. This milestone would fall under the National Disaster Recovery Works funding.

Under the Fixing Local Roads Improvement Works, Blackbird Flat (Milestone 2; refer to page 1 of **Appendix A**) and Flying Fox (Milestone 3; refer to pages 25 and 26 of **Appendix A**) would have granular overlay and sealing of the road for 0.8 km and 1.85 km respectively, and also include some drainage upgrades – all to ARC design standards.

Works under the Fixing Country Roads Improvement Works at the sites listed in **Table 2.1** (Milestone 4) would comprise of a variety of works to increase the roadway width and provide safer turning paths along selected sites. The Activity would include widening uphill cuttings and pavement, as well as drainage improvements and retaining structures.

Table 2.1 Fixing Country Roads Improvement Works sites

Site	Reference
3	Refer to page 30 of **Appendix A**
4	Improvement Works
9	Refer to page 54 of **Appendix A**
12 (Big Hill)	Refer to page 64 of **Appendix A**

Milestone 1 would fall under the National Disaster Recovery Works funding while the remaining milestones would fall under the Fixing Local Roads and Fixing Country Roads Improvement Works funding. As such, each milestone would need to adhere to guidelines and requirements of the funding sources as listed in **Table 2.2**. It should be noted that although the Natural Disaster Recovery Works does not allow for improvements to the asset, the works are to meet current engineering standards.

Table 2.2 Funding and guidelines per milestone

Milestone	Funding	Guidelines	Scope
1	Natural Disaster Recovery Works	• NSW Government Natural Disaster Essential Public Asset Restoration Guidelines October 2018 • Commonwealth Disaster Recovery Funding Arrangements 2018 (DRFA)	Restoration of a 45.8 km section of Kempsey Road and a 5 km section of Lower Creek Road, to their pre-disaster conditions.
2	Improvement Works	• Fixing Local Roads Program Guidelines	Improving and sealing a 800 m section of Blackbird Flat Cutting.
3	Improvement Works	• Fixing Local Roads Program Guidelines	Improving and sealing a 1.85 km section of Flying Fox Cutting.
4	Improvement Works	• NSW Fixing Country Roads Guideline	Improving four curves (unsealed) on Big Hill.

2.3.3 Design standards

The following design standards would apply to the Activity (but not limited to):

- Various Armidale Regional Council design codes and specifications.
- Austroads Guide to Traffic Management.
- TfNSW Construction Noise and Vibration Strategy, Version 4.1, 2019.
- Managing urban stormwater: Soils and construction.
- Technical Guide Management of road construction and maintenance wastes.
- TfNSW Guide to Slope Risk Analysis.
- Austroads Guide to Road Design and associated supplements.
- Australian Rainfall and Runoff – The Institution of Engineers, Australia 2019 Edition.
- Austroads Guide to Pavement Technology.
- TfNSW Technical Directions, Guides and Manuals.
- Shotcrete Design Guidelines. TfNSW Design Guidelines to Improve the Appearance of Shotcrete in NSW.
- TfNSW standard drawings.
- Traffic Control at Work Sites Version 6.1 – TfNSW, February 2022.

2.4 Alternatives and options considered

2.4.1 Methodology for selection of preferred option

The design would generally follow the existing alignments of the Kempsey Road and Lower Creek Road, essentially reinstating the pre-disaster roadway widths and crossfalls, with additional areas to stabilise slips on the downslope side of the road. The gradient of the roads would remain essentially unchanged. Select locations would undergo improvement works under the Fixing Local Roads and Fixing Country Roads programs.

2.4.2 Identified options

The following options for the Activity were assessed.

Option 1: Do nothing

This option involves leaving the existing road, culverts, and associated structures in their current state. The 'do nothing' option does not attempt to repair, stabilise, or reopen Kempsey-Armidale Road or Lower Creek Road, which have been damaged because of recent bushfires and floods. This option would not restore the existing roads and culverts to a pre-disaster state, a key responsibility of ARC. Furthermore the 'do nothing' option would not address the current condition of Kempsey-Armidale Road and Lower Creek Road, which in the longer term would risk further damage to the road asset.

Option 2: The Activity

This option involves undertaking the culvert, drainage, road reinstatement, and slip remediation work as proposed.

The scope of works proposed would be for the restoration of an essential public road asset back to its pre-disaster condition in accordance with the NSW Natural Disaster Asset Restoration Guidelines (DRFA), which allows these assets to be reinstated to current engineering standards.

Option 3: Re-route Kempsey-Armidale Road

This option involves closing the existing road and re-routing Kempsey-Armidale Road along a new alignment. This option was not considered suitable.

2.4.3 Analysis of options

Option 1: Do nothing

This option would potentially divide the community and may not meet the DRFA guidelines.

Option 2: The Activity

This option is currently the preferred option as it satisfies the objectives of the Activity and can be undertaken within the constraints of the funding stream requirements.

Option 3: Re-route Kempsey-Armidale Road

This option would potentially divide the community, may not meet the DRFA guidelines, and is the most expensive option.

2.5 Preferred option

The preferred Option 2 – The Activity – has been selected as it satisfies the objectives whilst aiming to minimise impacts of the Activity.

The nature of the Activity is such that impacts to road uses, the environment, and community are relatively minor and can be managed through safeguards and management measures. The impacts on stakeholders and the community are considered minor.

The objectives of the EP&A Act encourage Ecologically Sustainable Development (ESD). The 'integration' principle of ESD requires the integration of economic, social development and environmental considerations into the decision-making process for all developments. These factors are consistent with the preferred options for the Activity.

3. Description of the Activity

This chapter describes the Activity and provides descriptions of existing conditions, the design parameters including major design features, the construction method, and associated infrastructure and activities. The Activity description and assessment is based on the Early Contractor Involvement Phase (ECI) design (refer to **Appendix A**). As the project continues through the detailed design phase as part of a Design and Construct contract, further assessment may be required should the Activity boundary need to be expanded to accommodate additional areas of impact or if additional or expanded works not previously assessed are added to the scope of works.

It is to be noted that Site 16, which is shown on pages 74 and 75 of the ECI design drawings (refer to **Appendix A**), is not included in the scope of works. The Site 16 area was removed from the Activity boundary (refer to **Illustration 1.1** and **Illustration 1.2**) and has not been considered in the assessment of this REF.

3.1 The Activity

Generally, the main construction works can be described as works to the culverts, road surface, and slope stabilisation. Due to the site being on steeply sloped terrain adjacent to the river and located in a rural area, there is a substantial amount of work required to maintain safety, allow traffic flow, and facilitate supply of materials and workforce. The scope of works for the Activity would include:

- Permanent Works

  - New culverts and replacement of identified damaged existing culverts.
  - Inlet and outlet treatments at culverts.
  - Longitudinal open drainage reinstatement.
  - Scour protection at six bridges.
  - Downslope slip remediation, including soil nail walls and gravity retaining walls.
  - Pavement reinstatement to pre-disaster condition.
  - Unbound pavement construction.
  - Bitumen sealing at certain locations.

- Temporary Works

  - Construction of temporary passing bays, U-turn bays.
  - Construction of temporary and permanent stockpile sites.
  - Establishment of workers accommodation camp, batch plants, compounds, and other minor ancillary sites.
  - Utilisation of existing quarries.
  - Removal and/ or trimming trees where they pose a risk to worker's safety.
  - Upslope slip remediation (scaling, rock bolting, removal of boulders, netting) where they pose a risk to worker's safety.

Individual aspects of the construction works are described in the following sections.

3.1.1 Upslope slip remediation

Upslope safety works would include:

- Drone inspections.
- Light and heavy scaling.
- Rock mesh and pins.
- Soil nails.
- Removal and/ or securing of isolated loose blocks.
- Removal of loose dirt.
- Potential water bombing.
- Geotechnical inspections.
- Scope of works as defined by designers.

Scaling and pinning manually by rope access

Rope access would be used for scaling the upslopes to perform the upslope works, being removal of loose dirt and removing or securing isolated loose blocks and rocks, as well as for vegetation removal where required.

Scaling and pinning mechanically

For stabilising the upslope, works within approximately 8 m above the road level would be done using a 14T excavator.

Rockfall mesh installation

Net/ mesh installations would be used on upslopes for stabilisation. Rope access would be used as required.

Monitoring

Monitoring of the slope movements and pore pressure may be done visually by experienced supervisors and Geotechnical Engineers, or with sensors.

3.1.2 Drainage works

Culvert replacements and installations

A main part of the road rehabilitation involves replacing existing damaged culverts and the installation of new culverts where required. The cross drains would include single and multi-cell pipes with a range of sizes varying between 600 to 2,000 mm in diameter. Some concrete box culvert sections are also proposed where suitable.

Excavations for the culverts would range in depth and width. Some deep culverts would require stepped excavations to prevent trench collapse on workers. Side-tracks would be used where traffic access cannot be maintained through staged works across the culvert.

Open drain reinstatement

The open drain reinstatement would be immediately adjacent to the road.

Backfilling

Where feasible, excess material would be used for backfilling. Any further excess material would be disposed of in an appropriate manner.

Temporary site drainage

Temporary ditches or channels to divert water away from the construction area would be constructed as required. They would be removed post-construction, and the land would be returned to the pre-construction state.

3.1.3 Scour protection

The Activity would include installation of scour protection to prevent or mitigate the erosion of soil around the outlet at drainage structures and under multiple bridges along Kempsey Road and Lower Creek Road.

3.1.4 Downslope slip remediation and reinforcement

Downslope slip remediation would consist mostly of soil nailing and shotcrete method, with a small number of locations using a concrete block retaining wall method.

3.1.5 Road maintenance and reinstatement

The road surface would be repaired and reinstated to a pre-disaster condition. A few locations would also undergo improvement of the road, including road widening. Most of the road would be reinstated as a gravel road and a couple of locations, being at Blackbird Flat Cutting and Flying Fox Cutting, would undergo bituminous sealing.

3.1.6 Sidetracks

Construction of temporary side tracks for maintaining traffic flow around excavations and culvert work is proposed at locations where their use is possible.

3.1.7 Passing bays and U-turn bays

To allow safe passing and turning around, passing bays and U-turn bays would be constructed along Kempsey Road and Lower Creek Road to facilitate construction works. The passing bays located along narrow sections of road would allow safe passage of vehicles travelling in opposite directions. U-turn bays would reduce the length trucks and other plant need to travel before being able to turn around safely.

3.1.8 Hairpin curves

There are two hairpin curves located along Kempsey Road that are expected to restrict truck and plant movement along the road. These areas will be widened to allow for accessibility.

3.1.9 Helicopter pads

Emergency helicopter landing pads are required for emergency access and intended to be installed during the mobilisation and construction planning phase.

3.1.10 Tree removal and trimming

Tree removal would generally be planned to precede the main construction works as part of the mobilisation and construction planning phase. The scope of this work is a safety initiative to remove potential hazards above areas where workers will be performing construction tasks.

3.2 Design

The Natural Disaster Recover Works (Milestone 1) would be to restore the asset to the same functionality as the pre-disaster condition.

Under the Fixing Local Roads Improvement Works, Blackbird Flat (Milestone 2) and Flying Fox (Milestone 3) would have granular overlay and sealing of the road for 0.8 km and 1.85 km respectively, and also include some drainage upgrades – all to ARC design standards.

Works under the Fixing Country Roads Improvement Works at Sites 3, 4, 9 and 12 on Big Hill (Milestone 4) would comprise of a variety of works to increase the roadway width where feasible and provide safer turning paths along the selected sites. The Activity would include widening uphill cuttings and pavement, as well as drainage improvements and retaining structures.

As part of the Early Contractor Involvement (ECI) phase of this project, the Contractor was required to submit an ECI design. During the Design and Construct Contract, the Contractor would need to develop the Activity through to Issued for Construction Detailed Design. There are various steps within the Design process whereby the Contractor would submit the design for the Principal's review and comment.

The detailed design must meet the requirements of the documents listed in **Section 3.2.1** below.

3.2.1 Design criteria

The following design standards would apply for detailed design development of the Activity (but not limited to):

- Various Armidale Regional Council design codes and specifications.
- Managing urban stormwater: Soils and construction. Technical Guide Management of road construction and maintenance wastes.
- Australian Rainfall and Runoff – The Institution of Engineers, Australia 2019 Edition.
- TfNSW Technical Directions, Guides, Manuels and Standards, including:
    - Construction Noise and Vibration Strategy, Version 4.1, 2019.
    - Guide to Slope Risk Analysis.
    - Design Guidelines to Improve the Appearance of Shotcrete in NSW.
    - Standard Drawings.
    - Traffic Control at Work Sites Version 6.1
- Austroads Guides to:
    - Traffic Management.

- Road Design and associated supplements.
- Pavement Technology.

3.2.2 Activity constraints

The expected engineering constraints for the Activity are likely to include limited road width due to the steep terrain, difficulties in the installation of culverts due to the presence of bedrock and obtaining sufficient bearing capacity to support the structural wall to repair the areas where road slips have previously occurred.

The following have been identified as expected critical constraints for the Activity and may result in impacts on how the project would be delivered:

- Limited road width due to the steep terrain, including very narrow work sites with limited passing and turning locations.
- Unknown previous alignment of the road and limited survey data pre disaster.
- Limited geotechnical data.
- Difficulties in the installation of culverts due to the presence of bedrock.
- Obtaining sufficient bearing capacity to support the structural wall to repair the areas where road slips have previously occurred.
- Concrete availability and delivery to sites.
- Size of plant limited by access and reduced load limits.
- Land tenure and access to site requiring numerous landowner agreements.
- Community traffic window and available times when the community can travel through the construction site.
- Significant travel times from Regional Centres for material supply.
- Site safety for workers and road users.
- Remote location with limited accommodation, requiring a workers' camp due to the amount of labour required to deliver the project in the timeframe.
- Availability of skilled resources.
- Logistical challenges for the daily movements of plant and materials in and out of work zones.

3.2.3 Major design features

The major design features would be limited to designing a range of structural walls or other alternative structures to repair the identified slip areas to reinstate the road to its pre-disaster width and in accordance with current engineering design standards, where applicable.

3.3 Construction activities

3.3.1 Work methodology

The Activity has been broken into seven zones for logistics and staging, which would allow the contractor to operate each zone independently of each other. The zones are identified as:

- Zone 1 – CH:73000 to CH:77000 (Blackbird Flat to McGee's Flat).
- Zone 2 – CH:77000 to CH:85000 (McGee's Flat to Flying Fox).
- Zone 3 – CH:85000 to CH:89000 (Flying Fox to Lower Creek).
- Zone 4 – CH:89000 to CH:103000 (Lower Creek to Eastern Boundary Trail).
- Zone 5 – CH:103000 to CH:111700 (Eastern Boundary Trail to First Change Over).
- Zone 6 – CH:111700 to CH:118000 (First Change Over to Top of Big Hill).
- Zone 7 – Lower Creek Road.

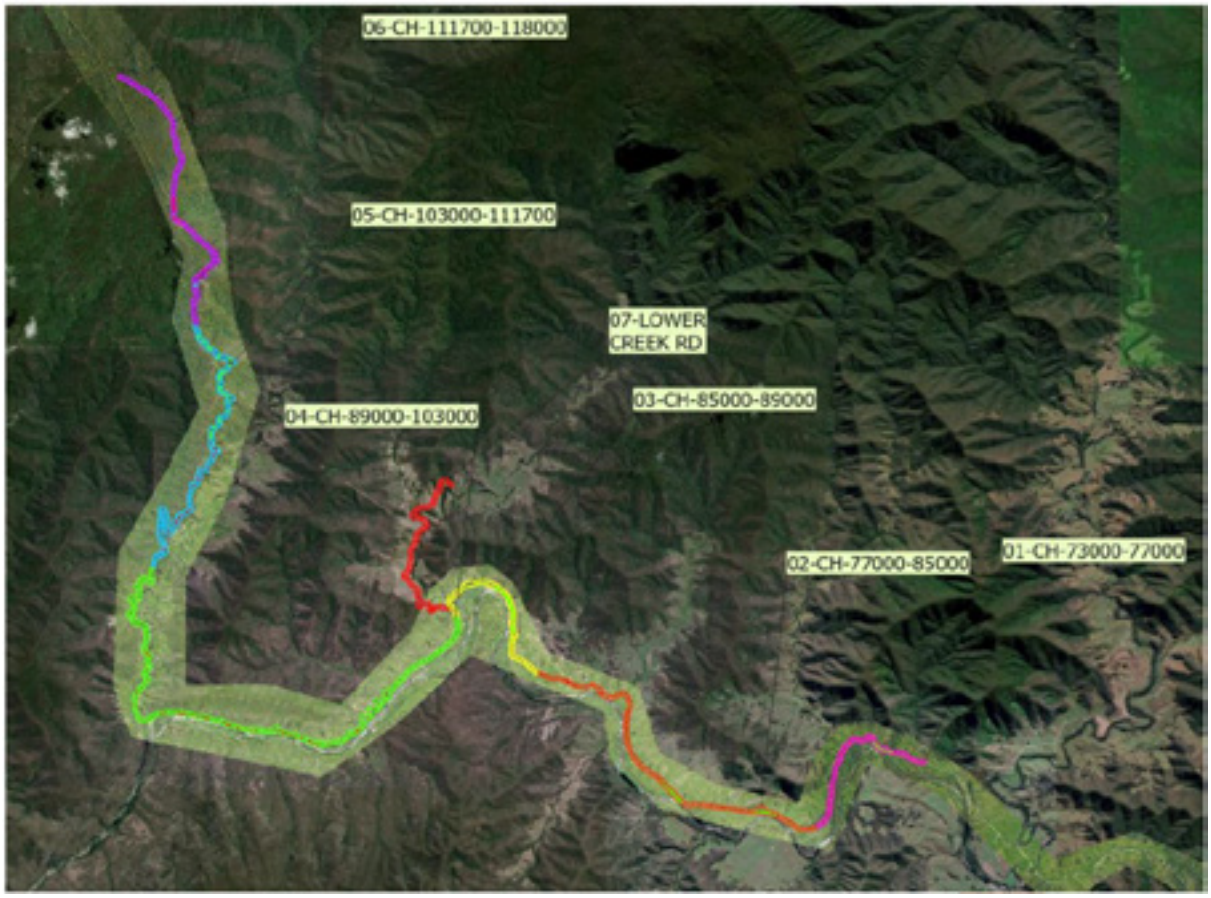


Figure 3.1 Map illustrating division of Activity into discrete zones

The construction works have been divided into two packages, being the Mobilisation and Construction Planning Phase and the Main Works programs, which would apply to each zone independently. The Mobilisation and Construction Planning Phase would commence early to late-2024 for approximately six months, and the Main Works would follow for approximately four years (weather permitting).

Mobilisation and Construction Planning Phase

- Complete design to 'Issued For Construction' status and formulate all Management Plans.
- Establish worker accommodation and main site office.
- Establish batch plant, stockpile locations, fuel storage and laydown areas.
- Upslope scaling works and slip remediation to reduce the risk of rock dislodgment and mobilisation downhill risking workforce safety.
- Trimming/ removing trees that pose a safety risk to workers.
- Design and install side-tracks, passing bays, U-turn bays, hairpin curve widening to enable permanent works construction activities.
- Install traffic control stations at the extremities of the project.
- Establish initial erosion and sediment controls.
- Establish water supply points.
- Install several soil nails and undertake suitability testing – to inform design assumptions.
- Survey work and additional geotechnical investigations as required.
- Demarcation of clearing and site boundaries.
- Installing No Go signage for Environmental Sensitive Areas.
- Emergency helipads.
- Install anchor points.

Main Works

- Replacement of existing pipe culverts and installation of new pipe culverts.
- Open drain reinstatement.
- Installation of pits, headwalls, and scour protection for pipe culverts.
- Downslope slip remediation (Soil nail walls and gravity walls).
- Road maintenance and reinstatement.
- Use of existing local quarries to produce road gravels for road resurfacing.
- Replenishment of materials including concrete aggregates and sands, cement, grout, soil nails, fuels, oils.
- Periodic removal of construction waste and domestic waste from worker accommodation etc.
- Reinstate scour protection at nominated bridge abutments.
- Pavement reinstatement to pre-disaster condition.

Deliveries

Regular deliveries would mostly consist of materials and fuel for construction works, and supplies for the camp, such as: food, packaged products, laundry, water, and sewerage removal. Delivery quantities are difficult to quantify at the time of writing this REF. Where possible, reuse materials from the construction site would be prioritised over deliveries of new material. It is anticipated that deliveries would occur during the four days off roster period.

Excavated and reuse material

Where possible for the Activity, materials from onsite would be used/ reused over bringing new material from off-site. This material would include excavated material from the potential quarry sites, fill material retrieved when excavating for the culvert replacements, and any waste material that can be crushed are reused.

Security

Site security surveillance would occur during night shifts and when limited personnel are on site.

Primary testing

An onsite lab would be placed at the main compound to facilitate testing requirements, including concrete, soil, and pavement. The lab will be subcontracted to a NATA accredited contractor.

Emergency access

The key risks for emergency access are:

- Road being blocked due to open trenches or construction plant blocking the road.
- Minimum four-hour travel to closest hospital by road.

The contractor will have an Emergency Response Management Plan in place that would detail emergency procedures to be followed in various foreseeable scenarios including bushfire, flood, bomb/ terrorist threat, medical emergency etc.

Installation of emergency helicopter pads for emergency access will also be included in the project.

Water usage

Where possible and permissible, water would be extracted from the Macleay River for water usage related to the purpose of road construction.

The location of water extraction points is not known at this time. The water extraction points would ideally be arranged as follows:

- Construct access track from the road to the river.
- Install pump pad and pump, including self-bunded genset and ESC.
- Holding tanks would be adjacent to road with nominal 110 mm poly lines overland from pump to holding tanks.
- Pump at the river would be operated by a float valve on the tanks.
- Pump inlet protection would be in place to prevent sucking up any aquatic wildlife.

Designated concrete washout locations are included in the methodology and would be located at strategic locations along the project to ensure concrete agi's wash out in a controlled manner and any waste is captured and legally disposed.

3.3.2 Construction workforce

It is anticipated that the Activity would require a substantial number of workers to accommodate the scale of the project. A workers' camp has been included in the ancillary facility requirements that would allow up to 200 workers to stay onsite during the 10 days on work roster. The construction workforce would predominantly come from outside of the Activity area and travel to the remote location. Detailed workforce numbers are not known at the time of writing this REF, however, it could be assumed that fewer workers would be required for the Mobilisation and Construction Planning Phase, with a ramping up in the number of workers towards the start of the Main Works.

3.3.3 Construction hours and duration

Construction works would be undertaken during a 10/4 roster, with full construction occurring during the 10 days on and reduced activities occurring during the four days off. **Table 3.1** lists proposed activities during the roster.

Table 3.1 List of activities for 10 days on, 4 days off roster

10 Days on Activities	4 Days off Activities
Full scope of work construction, including: • Temporary Works. • Longitudinal Drains • Cross Drainage (Pipe & Box. Culverts). • Soil Nail Walls. • Scour Protection (Culverts and Bridges). • Unbound Pavement construction. • Plant refuelling and minor maintenance. • Survey work. • Travel from the site and camp. • Maintenance of environmental and safety controls (eg flagging, sed fence etc). • Survey work. • Site inspections. • Re-fuelling of equipment. • Daily Pre-starts/ toolboxes for personnel. • Daily Pre-starts for machinery. • Manual tasks.	• Camp still operational. • Personnel to manage deliveries to laydown areas/ batch plant/ camp (ie. Truck movements) including: – Aggregates, sand, cement. – Soil nail components. – Drainage components. – Quarry material. – Camp replenishments. – Plant and equipment refuelling and maintenance. • Maintenance of environmental and safety controls (eg flagging, sed fence etc). • Survey work. • Site inspections. • Plant and machinery maintenance. • Re-fuelling and replenishing fuel supplies. • Camp replenishment activities. • Travel to the site and camp. • Manual tasks.

During the 10 days on, the road would be subjected to full day closures with midday escorts on some days for partial passage. During the four days off, the road would be subjected to temporary "stop/ go" traffic control.

Construction hours for the project would include an additional hour on either side of the standard day (7 am to 6 pm) as daylight permits. **Figure 3.2** shows an indicative daily schedule during the 10 days on roster period. The project hours would therefore be:

- Monday – Friday (during 10 days on roster) 6 am to 7 pm
- Saturday and Sunday (during 10 days on roster) 6 am to 7 pm
- Saturday and Sunday (during 4 days off roster- reduced activities) 7 am to 6 pm
- Public Holidays no work*
- Days other than Saturday and Sunday of 4 days off roster 7 am to 6 pm
- Refuelling and maintenance 6 pm to 6 am

* In the rare occasion that a Public Holiday falls at an inconvenient time in the roster cycle, for example mid-cycle, the non-workday may be rescheduled. In those situations, community updates will advise residents that the road will be closed for works.

Where works would be located within 200 m of sensitive receivers during the 10 days on roster, the extended working hours of 6 am to 7 am and 6 pm to 7 pm would have restricted permissible activities during these times. The permissible activities for these locations and times would be the same reduced activities for the 4 days off schedule as per **Table 3.1**.

For all locations during the 10 days on roster extended working hours, being 6 am to 7am and 6 pm to 7 pm, no high noise generating activities would be allowable during the extended working day hours. Example of high noise generating activities as related to the Activity include:

- Saw cutting.
- Angle grinding.
- Rattle guns.
- Hydraulic hammering.
- Mulching vegetation.
- Stump grinding.
- Crushing plant (small).

There are large areas along the Activity alignment (mainly in western portion) where sensitive receivers are sparse and >200 m from the Activity boundary. For areas where sensitive receivers are >200 m, all construction activities would be permissible.

Figure 3.2 Indicative daily schedule during 10 day on roster

Source: Seymour Whyte ECI Construction Methodology

3.3.4 Plant and equipment

Plant and equipment would be sized based on the current road load limits and restrictions due to road geometry.

The main equipment and plant that would be used for the proposal would include, but is not limited to, the following:

- 4x4 concrete agitators, dual cab, or standard road agitators.
- Volumetric mixer trucks.
- Excavators up to 20 tonnes with attachments including bucket, air drill, rock hammer.
- Diggers smaller than 20 tonnes with attachments including bucket, air drill, rock hammer.
- Excavators with offset boom and flexible arm with attachments including bucket, rock hammer, vibrating plate compactor, ripper attachment.
- Tip trucks and site dump trucks (9T Swivel cab dump truck).
- Concrete pumps, grout pumps.
- Hand-held compaction equipment, jack hammers pneumatic hand drills, concrete saws, angle grinders, rattle guns.
- Graders.
- Watercarts.
- Rigid trucks with Hiabs.
- Cherry pickers and EWPs.
- Refuelling trucks and service vehicles.
- Generator.
- Compressor.
- Mobile cranes.
- Telehandlers.
- Crushing plant (small).
- Posi Track Grader.
- Compaction equipment including Vibratory padfoot roller, Smooth drum roller, Multi tyre roller.
- Front end loader.
- Road Sweeper.

- Bitumen spray truck.
- Semi-trailer (external deliveries).
- Crew bus.
- Light Vehicles.
- Pump 2 inch to 6 inch.
- Gensets (camp and water extraction points as min).

3.3.5 Earthworks

Earthworks for the Activity would include:

- Levelling of select sites for compounds and concrete batch plants.
- Removal of existing damaged culverts.
- Installation of new culverts.
- Slip remediation works and associated access tracks.
- Foundation preparation for gravity walls
- Scour protection works at select bridges.
- Installation of road drainage inlet and outlet structures.

The main compound site will require earthworks to level out the sites before a 150 mm DGB layer is placed to form the hardstand. A cut and fill strategy has been proposed to reduce the amount of fill required to be introduced to the site. The proposed cut and fill quantities for Site 0 have been provided at **Appendix B**. The Activity is subject to safeguards and management measures as described in **Section 6** and earthworks in particular have the potential to impact Aboriginal cultural heritage as described in **Section 6.6**.

3.3.6 Source and quantity of materials

Road base, gravel or rock would be sourced from on-site reuse as a priority and locally from licensed quarries where possible. Timber, concrete, steel, and all other materials would be commercially sought, certified uncontaminated, and environmentally safe.

Two existing on-site quarries along Kempsey Road would allow for rock and gravel material to be sourced locally. The ECI phase has estimated the existing footprints would provide the following:

- White Cliff – potentially up to 15,000 BCM.
- Smiths Creek - potentially up to 75,000 BCM.

A portion of the area of White Cliff quarry has been previously assessed under a separate REF (GeoLINK, 2019, ARC Kempsey Road Project 7 REF 3433-1015)). This REF is intended to supersede the 2019 REF as the entire quarry footprint has been included in the Activity boundary.

Pending the results of geotechnical investigations, it may be found that the existing quarries could be expanded to provide additional usable material or new potential quarry sites may be identified. In the case of expanding or adding additional quarries, an addendum to the REF may be required to assess additional impacts and expand the Activity boundary.

Material for road bases would be sourced from on-site quarries first to reduce the amount of off-site material required. However, the on-site quarries may not be sufficient for supplying all required materials for the Activity, or the materials may not meet the requirements of the specification. Separately, investigations are currently underway to identify any other material sources within the project limits that may prove suitable. These would be used in preference to imported material from outside the project due to reduced haulage costs. If insufficient quantity and/ or quality material is available on site, materials from external quarry sources would be needed.

Table 3.2 shows the predicted quantities for concrete required for the Activity.

Table 3.2 Concrete constituents estimated quantities

Constituent	Quantity	Unit of Measurement
Cement and Flyash	7,600	Tonnes
Coarse Aggregates	26,000	Tonnes
Fine Aggregates	12,300	Tonnes
Water	6,500	kL
Admixtures	15,000	Litres

3.3.7 Traffic management and access

Kempsey Road would be closed during the 10 days on roster during construction, with a midday opening to allow for partial travel. Stop/ go traffic control would be used during the four days off roster at specific locations when replenishing activities are undertaken. Gates will be used to close off the entry points to the site. When the road is open during the construction timeframe, Kempsey Road will only be opened to essential local traffic and emergency services, similar to the current road accessibility conditions. Brief descriptions of traffic management and access has been described below and described in more detail in **Section 6.4**.

Gates

Gates installed at the main entry points to the site at Big Hill, Blackbird Flat and Lower Creek Rd would be used to manage public access and safety.

Stop/ go traffic control

During the four days off roster period, localised stop/ go traffic control would be in place for facilitating truck deliveries, with "short-term closures".

Midday escorts

Midday escorts would be provided during the 10 days on roster period to allow for traffic to partially pass through the Activity site. Community consultation has occurred on the frequency of these midday escorts and consensus on initially having two days during the 10 days on period provided was reached (refer to **Appendix G**). The midday escorts would occur in the middle of the day and designated vehicles would escort waiting traffic through the construction site/ closed road. Note that vehicles would need to be at the pickup points at the nominated times for departure, and vehicles that miss the departure would not be able to travel. Passage through the whole site length would not possible during the midday escort. Each escort route would cover half the length of the road, with four escorts occurring simultaneously. Two escorts would be east bound and two escorts would be west bound. Ongoing consultation with the community about the two midday openings would occur for the duration of the Activity and the number of days would be increased based on feedback and/ or time of year as required.

Workers' camp

The on-site workers' camp would accommodate up to 200 people and parking would be located adjacent to the accommodations at the main compound. Traffic from workers would align with the 10 days on/ 4 days off roster.

Truck movements

Truck movements for deliveries is anticipated to range from 20 movements per day to a peak of 230 movements per day.

3.4 Ancillary facilities

Due to the elongated nature of the construction boundary, ancillary sites situated along the road would be required to deliver the Activity in a safe and efficient manner (refer to Error! Reference source not found.). The ancillary sites can be categorised as:

- Main compound site, including:
  - Main site offices.
  - Workers' Camp.

- Satellite Offices.
- Fuel Storage.
- Laydown/ Stockpile Sites.
- Concrete Batch Plant.
- Small Volumetric Concrete Mixers with associated stockpiles of concrete constituents.
- Quarries.

Main compound site

The proposed location for the main compound site is Site 0 (east of Flying Fox Cutting). The methodology to prepare Site 0 includes levelling off the area and placing a 150 mm DGB layer to form the hardstand with a sealed access road and carpark. This site would be the location for the main site office, workers camp, and potentially a concrete batch plant.

Post-construction remediation would be as per the landowner agreements and would likely include returning the land to the previous condition. The expectation is this would involve re-grassing for stabilisation. Rehabilitation has been discussed in more detail in **Section 6.3**.

Main offices

The main offices would house the construction and client teams in 6 m modular units. The office sizing is anticipated to be as per the below TableError! Reference source not found..

Table 3.3 Breakdown of main site offices

Contractor Team Office (60 person)	Client Team Offices (20 person)
• 24 x site offices (6 m x 3 m units) • 8 x meeting/ induction room (6 m x 3 m units) • 2 x male ablution (6 m x 3 m units) • 1 x female ablution (6 m x 3 m units) • 1 x first aid room (6 m x 3 m units) • 1 x prayer room (3.6 m x 3.6 m units) • 2 x waste tanks under ablutions • 1 x kitchen	• 4 x site offices (6 m x 3 m units) • 2 x meeting/ induction room (6 m x 3 m units) • 1 x male ablution (6 m x 3 m units) • 1 x female ablution (6 m x 3 m units) • 2 x waste tanks under ablutions • 1 x kitchen

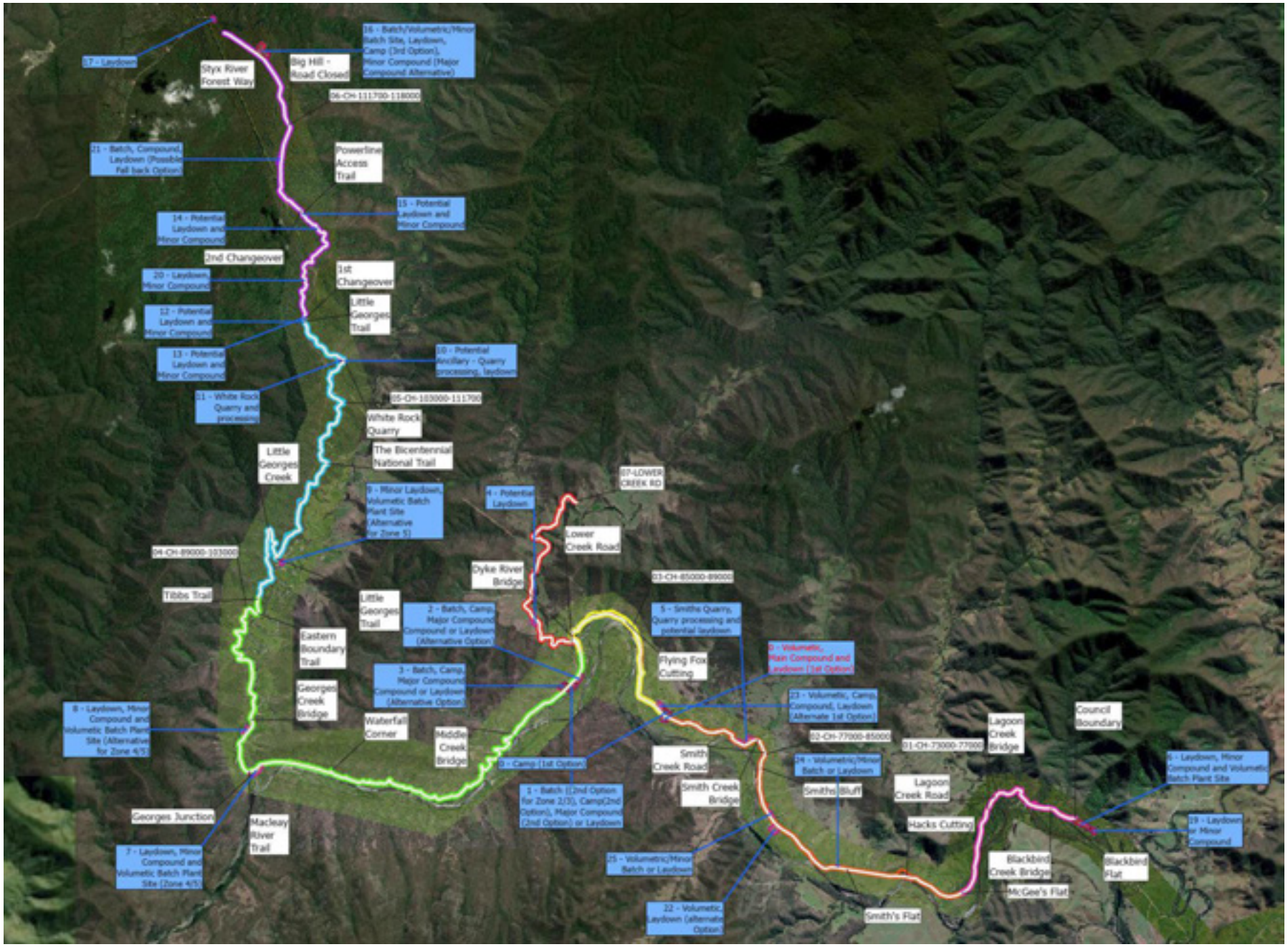


Figure 3.3 Map illustrating extent and proposed locations for ancillary sites along the Activity

Source: Detailed Construction Methodology authored by Seymour Whyte

Workers camp

Due to the remote location of the Activity site and logistical challenges related to travel times of workers, an on-site workers' camp was proposed during the ECI phase. The camp and the 10 days on 4 days off work roster would provide the following benefits:

- 450+ less vehicle movements per day to and from site.
- Half the amount of home to work travel required for workers over the duration of the Activity.
- Reduced fatigue.
- Responsible service and distribution of alcohol.
- More productive labour force.
- Less turnover of staff and labour.

The proposed location for the workers camp is at Site 0 (east of Flying Fox Cutting) as part of the main compound site.

Camp features would include:

- Individual rooms with ensuite (to accommodate up to 200 people).
- Laundry linen service.
- Dining halls.
- Wet mess.
- Gymnasium.
- Indoor and outdoor recreational areas.
- 3 x 30,000 L potable water storage tanks and pumps.
- Reverse Osmosis Sewage treatment system including storage tanks.
- Pre-packaged lunches.
- Wi-Fi access.

The accommodations would be constructed of prefabricated module units assembled on site. The proposed layout is shown in **Figure 3.4**. Features include:

- All conduits and pipework are above ground (no excavation or removal or trenches).
- Modular walkways and awnings (no installation and removal of decking, footpaths, and roofing systems).
- Skid mounted generators, STPs and water tanks (no concrete slabs).

It is currently proposed for the camp to have a wet mess and associated licensing and RSA in place.

The accommodation would be equipped with a bushfire protection system that would automatically be activated based on bushfire threat escalation algorithms. The system is able to detect small fires near the site and/ or a fire front over 250 m away, allowing for the sprinkler system to turn on and off without an on-site operator during a fire threat.

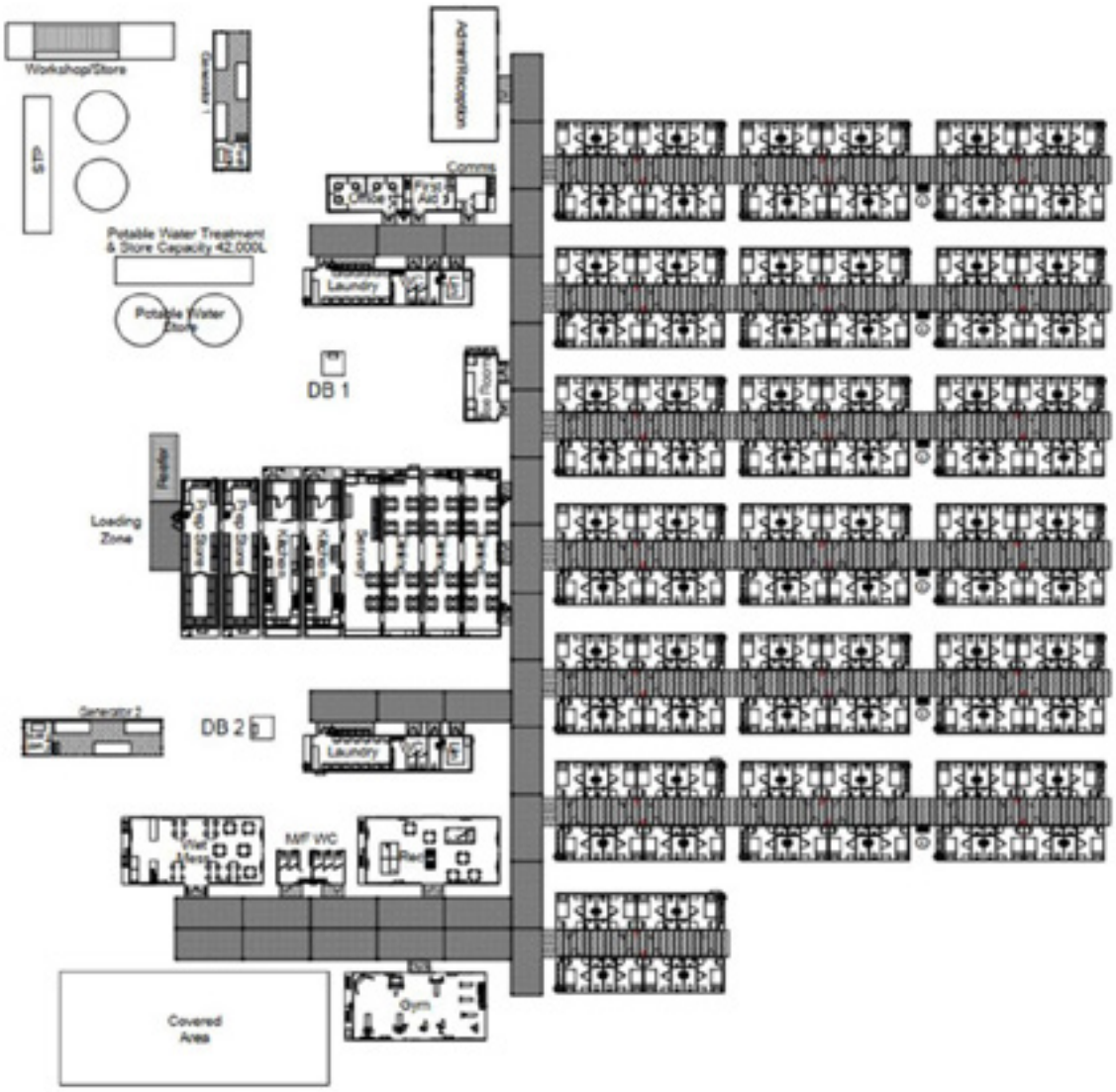


Figure 3.4 Proposed layout for workers' camp. Source: Detailed Construction Methodology authored by Seymour Whyte

Satellite offices

Satellite offices would be provided for the Activity. It is proposed these offices would be moved throughout the site to support west, central, and east teams as the Activity is delivered.

Fuel storage

It is estimated that approximately 10,000 L of fuel would be required per day. The fuel storage area is proposed to be located within the main site compound at Site 0 in the form of six 20,000 L storage tanks in a bunded hardstand. Plant and machinery would be re-fuelled during the day where possible and during out of hours (nights).

The proposed procedure for fuel delivery and storage is as follows:

- Fuel will be delivered from Newcastle to the suppliers' depot in Kempsey by semi tankers.
- Fuel will be transported from the Kempsey Depot to site by rigid tankers that have a capacity of 10,000L.
- The storage tanks shall be filled (120,000L).
- Re-topping of the storage tanks will generally occur on the first two days of the four day off cycle.

Laydown/ Stockpile sites

The proposed laydown and stockpile sites would be for storing and organising construction materials, equipment, and supplies during road construction. These would be in locations along Kempsey Road and Lower Creek Road that are clear of trees and accessible. To prepare an area as a laydown/ stockpile site, the area would be cleared of vegetation and the ground levelled with proper drainage to prevent water accumulation. Some laydown areas would include facilities, such as satellite office trailers, restrooms, handwashing stations, and storage containers. Proposed laydown locations along the road alignment are provided in the ECI design drawings at **Appendix A**. Some laydown and compound areas will need to be reconsidered during the design development as per safeguards and management measures detailed in **Section 6**.

Concrete batch plant

The supply of concrete for the project has been identified during the ECI phase as a potentially critical constraint for the Activity. Therefore, to improve the quality and working time of the concrete and reduce the need to haul concrete long distances from facilities far from the construction site, on-site concrete batching plant has been proposed. The main large batch plant would be supplemented by smaller volumetric mixers at separate locations. The appropriate location for the main batch plant would be determined during the design and construct contract with consideration of environmental impacts detailed in **Section 6**.

Small volumetric concrete mixers

Laydown areas across the project site would be nominated for smaller volumetric concrete mixers. The volumetric mixers have separate bins or compartments that are loaded with the concrete constituents (aggregate, sand, water, cement). These constituents are then added into a mixing bowl in measured quantities to give the required concrete type and strength. Once mixed, the concrete can be discharged via an auger and chute to the location requiring concrete. Alternatively, the volumetric mixer can mix the ingredients at the laydown area and then discharge into a small 4x4 concrete agitator for delivery to the required location. The restocking of materials at these areas would be mainly done during the four days off roster period.

Quarries

Onsite, existing Armidale Council owned quarries would be utilised, if possible, to produce, crush, and place materials for the unsealed sections of the road. This approach would offer logistical and program benefits for the Activity compared to importing material from off-site. Methodology for excavation of material would be restricted to methods using plant and equipment that is able to reach the quarry sites. No blasting would be used for material removal.

The two quarry locations for this project would be:

- White Rock Quarry – up to 15,000 bcm.
- Smith's Quarry – approximately 75,000 bcm.

Additional quarry sites identified for the Activity use would require assessment under a separate REF should the need arise.

The raw material would be processed either in the quarry or on an adjacent ancillary site, to be determined based on room at the quarry sites, and then delivered to the work sites.

3.5 Public utility adjustment

No public utility adjustment is required for the proposal.

3.6 Adjacent Landowners

Properties adjacent to the road reserve consist of a combination of private landowners and land managed/ owned by the following:

Table 3.4 Adjacent landowners (non-private)

Landowner	Location	Approximate chainage
Crown reserve with management devolved to ARC - Reserve number 89899	Lot 41 DP 751439	99300

Landowner	Location	Approximate chainage
Crown reserve with management devolved to ARC - Reserve number 91653	Lot 7005 DP 1056807	98100
Crown reserve with management devolved to ARC - Reserve number 62070	Lot 7011 DP 1060165 Lot 7001 DP 1060184	87700 - 88600
Crown reserve with management devolved to Kempsey Shire Council - Reserve number 90618	Lot 28 DP 752426 Lot 75 DP 752426	Before 73000
National Parks – Cunnawarra National Park	Along upper portion of Big Hill, close to northern end of Activity boundary (refer to pages 3 to 6 of **Illustration 1.2**).	109300 - 115600
National Parks – George's Creek Nature Reserve	Along portion of Big Hill, midway along north-south section of Kempsey Road (refer to pages 5 to 9 of **Illustration 1.2**).	102900 - 111700
Forestry Corporation of New South Wales – Styx River State Forest	Northern end of Activity boundary (refer to pages 1 to 3 of **Illustration 1.2**).	115600 - 118800
Thungutti Local Aboriginal Land Council	Site 1 and 3 in the ECI design drawings (refer to page 30 of **Appendix A**).	89700 - 89900

Where the Activity boundary shown in the ECI Design Drawings (refer to **Appendix A**) extends beyond the road reserve, the Activity would impact adjacent landowners. The impact areas on adjacent land shown in the ECI Design Drawings has been considered and assessed within this REF. The impact on adjacent landowners may be refined during the detailed design phase and additional assessment may be required if the changes occur outside the assessed Activity boundary. All adjacent landowners, including private and those listed in **Table 3.4**, where works will encroach on land outside of the road reserve will require consultation and agreements prior to works commencing. Refer to **Section 4.2**, **4.3**, and **7.3** for additional information on potential licences and formal agreement requirements.

3.7 Property acquisition

No property acquisition is required for the Activity. However, land outside of the road reserve would be required for temporary use. Landholder agreements would be required for private landholders and land owned by Thungutti Local Aboriginal Land Council. Approval/ authorisation by National Parks would be required prior to works occurring on National Parks estate/ land. Consultation with Kempsey Shire Council would be required prior to using the land located at the eastern end of the Activity boundary.

4. Statutory and planning framework

This chapter provides the statutory and planning framework for the Activity and considers the provisions of relevant state environmental planning policies, local environmental plans, and other legislation.

4.1 Environmental Planning and Assessment Act 1979

The Activity does not require development consent, however, it requires environmental assessment and approval pursuant to Part 5, Division 5.1 and Section 5.5 of the EP&A Act whereby determining authorities, when assessing activities under Division 5.1, must examine and take into account, to the fullest extent possible, all matters affecting or likely to affect the environment by reason of that activity. To ensure the Activity adequately addresses the requirements of Section 5.5, an assessment of the Activity's consistency with relevant Environmental Planning Instruments, including State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs), has been completed.

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Transport and Infrastructure) 2021

The Transport and Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across the State.

Section 2.109 of the Transport and Infrastructure SEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent. However, *such development may be carried out without consent on land reserved under the National Parks and Wildlife Act 1974 only if the development—*

(a) is authorised by or under the National Parks and Wildlife Act 1974, or

(b) is, or is the subject of, an existing interest within the meaning of section 39 of that Act, or

(c) is on land to which that Act applies over which an easement has been granted and is not contrary to the terms or nature of the easement.

The Kempsey Road Restoration project is for road and road infrastructure facilities and is to be carried out by or on behalf of ARC. As such it can be carried out without consent. However, parts of the Activity that encroach onto National Parks estate will require approval/ authorisation prior to commencement under the *National Parks and Wildlife Act 1974*. The development becomes an *activity* that is subject to environmental impact assessment under Division 5.1 of the EP&A Act.

Section 2.109(3) states that: *in this section and section 2.112, a reference to development for the purpose of road infrastructure facilities includes a reference to development for any of the following purposes if the development is in connection with a road or road infrastructure facilities—*

(a) construction works (whether or not in a heritage conservation area), including—
- *(i) temporary buildings or facilities for the management of construction, if they are in or adjacent to a road corridor, and*
- *(ii) creation of embankments, and*
- *(iii) extraction of extractive materials and stockpiling of those materials, if—*
  - *(A) the extraction and stockpiling are ancillary to road construction, or*
  - *(B) the materials are used solely for road construction and the extraction and stockpiling take place in or adjacent to a road corridor, and*
- *(iv) temporary crushing or concrete batching plants, if they are used solely for road construction and are on or adjacent to a road corridor, and*
- *(v) temporary roads that are used solely during road construction,*

(b) emergency works or routine maintenance works,
(c) alterations or additions to an existing road (such as widening, narrowing, duplication or reconstruction of lanes, changing the alignment or strengthening of the road),
(d) environmental management works if the works are in or adjacent to a road corridor.

In relation to the ancillary sites for the Activity, Section 2.109 of the Transport and Infrastructure SEPP identifies that temporary buildings or facilities for the management of construction are included provided they are in or adjacent to a road

corridor. Furthermore, Section 2.3(3) of the Transport and Infrastructure SEPP provides that the following works or activities are taken to be construction works if they are carried out for that purpose:

(a) Accessways.

(b) Temporary construction yards.

(c) Temporary lay-down areas for materials or equipment.

(d) Temporary structures.

(e) Investigations (including geotechnical and other testing, surveying and the placement of survey marks, and sampling).

(f) Clearing of vegetation (including any necessary cutting, pruning, ringbarking or removal of trees) and associated rectification and landscaping.

(g) Demolition.

(h) Relocation or removal of infrastructure.

(i) *Extraction of extractive materials at the construction site solely for the purpose of the construction.*

As such, temporary structures for the purpose of supporting the road and road infrastructure facilities, which would include the construction offices and workers' camp, are permissible without consent as part of the Activity and would not require development consent.

Pursuant to Section 2.109(3)(a)(iii) of the Transport and Infrastructure SEPP, extraction of extractive materials that are ancillary to road construction are included in the definition of road infrastructure facilities. As such, the use of the existing Council owned quarries is permitted as part of the Activity and can proceed without development consent.

The Activity does not require development consent or approval under State Environmental Planning Policy (Resilience and Hazards) 2021, State Environmental Planning Policy (Precincts - Regional) 2021, or State Environmental Planning Policy (Planning Systems) 2021.

Chapter 2 of Transport and Infrastructure SEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by Transport and Infrastructure SEPP (where applicable), is discussed in **Section 5** of this REF.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) came into force on 1 March 2022 and incorporated the repealed provisions of SEPP (Koala Habitat Protection) 2020, SEPP (Koala Habitat Protection) 2021, and the SEPP (Vegetation in Non-Rural Areas) 2017, amongst others.

On the basis of Section 60O of the *Local Land Services Act 2013* (LLS Act) (refer **Table 4.1**), and given the Activity is a Part 5 Activity, any vegetation clearing is authorised by way of compliance with Part 5 of the EP&A Act (preparation and determination of this REF). Consent under Chapter 2 (Vegetation in non-rural areas) of the Biodiversity and Conservation SEPP is not required.

Chapter 3 of the Biodiversity and Conservation SEPP applies to land zoned RU1 and RU3 in select Local Government Areas (LGA) in NSW, including the Armidale Regional area. However, Section 3.5 states that Chapter 3 of the Biodiversity and Conservation SEPP applies only to land 'in relation to which a development application has been made'. Section 2.109 of the Transport and Infrastructure SEPP precludes the Activity from requiring consent therefore Chapter 3 of the Biodiversity and Conservation SEPP does not technically apply. It is Council's responsibility however, to consider environmental issues relating to their works to the fullest extent possible, including impacts on Koalas.

Chapter 4 of the Biodiversity and Conservation SEPP does not apply to land zoned RU1, RU3 or land dedicated or reserved under the *National Parks and Wildlife Act 1974*.

The aims of koala habitat protection chapters are to encourage the conservation and management of natural vegetation and koala habitat. This includes helping reverse the decline of koala populations and supporting permanent free-living populations over their present range.

Whilst the Koala feed trees *Eucalyptus tereticornis* (Forest Red Gum) and *Eucalyptus microcorys* (Tallowwood) occur within the Activity boundary, vegetation removal associated with the Activity is unlikely to significantly affect Koala resources or opportunities for dispersal. Local Koala populations are unlikely to be significantly impacted by the Activity. Biodiversity impacts have been assessed further in **Section 6.1**.

State Environmental Planning Policy (Primary Production) 2021

State Environmental Planning Policy (Primary Production) 2021 aims to facilitate the orderly and economic use and development of rural lands for rural and primary production purposes. Part of the objectives relates to the maintenance of the social, economic, and environmental welfare of the state and the reduction of land use conflicts and support for primary production.

The proposal would not impose any significant impacts to local agricultural land or primary production and completion of the works would support transportation and access for primary producers.

4.1.2 Local Environmental Plans

Armidale Regional Local Environmental Plan 2012

The proposal is located on land governed by the Armidale Regional Local Environmental Plan (LEP) 2012, where the following zones apply:

- RU3 Forestry.
- C1 National Parks and Nature Reserves.
- RU1 Primary Production.

The proposal is not inconsistent with, nor would it hinder the objectives of these zones.

The proposal is precluded from requiring development consent under section 2.109 of the Transport and Infrastructure SEPP.

4.2 National Parks and Wildlife Act 1974

The Activity would be for road and road infrastructure associated with an existing road, which would be considered an "existing interest" and therefore the Activity would be considered permissible under the NPW Act.

Kempsey Road travels through and adjacent to the Cunnawarra National Park and Georges Creek Nature Reserve. The Activity has a portion of the works that occur within the road reserve adjacent to the National Parks estates and a small portion of the Activity footprint falls outside the formal road reserve and on land reserved under Part 4 of the *National Parks and Wildlife Act 1974* (NPW Act). The Activity within these areas would be for improving road safety through road construction, hazardous tree removal, excavation and replacement of culverts, and the stabilisation of the road. As the road is an existing road and there are no practical off-park options for these works to occur, the works within the National Parks estate land would be considered permissible due to the association with an existing interest. Where encroachment will occur, approval/ authorisation under the NPW Act must be firstly obtained. The National Parks estate land has been discussed in more detail and has been assessed further in **Section 6.2**.

4.3 Other relevant NSW legislation

Table 4.1 Lists other NSW legislation relevant to the assessment of the Activity and provides comment on the implications of the Activity.

Table 4.1 Other relevant NSW legislation

Legislation	Section(s)	Comment
Crown Land Management Act 2016		The Activity has three sites adjacent to Kempsey Road that are Crown reserves with management devolved to ARC (Reserve numbers 89899, 91653, and 62070). ARC use and occupation of these Crown reserves within the project footprint can proceed without further notification. One Crown reserve (Reserve number 90618) is located at the eastern end of the Activity boundary at Blackbird Flat and is a Council

Legislation	Section(s)	Comment
		community land management type managed by Kempsey Shire Council. ARC would need to consult with Kempsey Shire Council prior to using the Crown Lands at this site. Armidale Regional Council has a licence for part of Lot 7010 DP1057457 for stockpile and storage (RN 26791; file reference 20-09209) (refer to **Appendix C**). While Schedule 3 diagrams are omitted from the Licence for the subject lot, ARC has confirmation from Crown Lands that the licence covers the northern portion of the lot. ARC would need to obtain any additional relevant license/ permit to occupy and use the remainder of the lot that falls outside of the licence for Crown Lands at this site. Any other use of Crown Lands outside of an existing agreement/ licence or vested management would require consultation with Crown Lands to determine any associated licensing requirements.
Fisheries Management Act 1994	Sections 198-202	Local government authorities require a permit (under s200) from the Minister for Department of Primary Industries (DPI) (Fisheries) for dredge and reclamation works on land that is periodically inundated by water. The Activity would involve dredge and reclamation works within mapped key fish habitat for select bridge and culverts works. A Part 7 Fisheries permit would be obtained by ARC prior to such works commencing.
	Sections 219-220	A permit is required when barriers to the movement of fish including water course crossings are to be constructed or modified. The Activity (which includes the use of silt curtains) would not involve obstructing fish passage; therefore, a permit is not required. If works had the potential to block fish passage, a Part 7 Fisheries permit would need to be obtained by ARC prior to such works commencing.
	Sections 204-205	The Activity is not within a marine environment and no marine vegetation would be affected.
	Schedules 4, 4A, 5 and 6	The Activity is considered unlikely to have a significant impact on any threatened aquatic species or communities listed under Schedules 4, 4A, 5 and 6 of the FM Act.
Heritage Act 1977		There are no listed State or local heritage items at or near the site. The proposal is considered unlikely to have any impact on the nearest heritage item, which is a locally listed "Comara Butchery and slaughterhouse" (I12, Kempsey LEP) situated approximately 1.2 km east of the eastern extent of works. The next nearest heritage item, locally listed as "Styx River Bridge" (I228, Armidale LEP), is situated approximately 4 km north of the northern extent of works.
National Parks and Wildlife Act 1974	Sections 87(1), 90	The Due Diligence assessment concluded that the proposed ancillary work areas along the Kempsey Road are located within landform areas which have the potential to contain Aboriginal archaeological sites. However, additional investigation would be not required provided the recommended safeguards and management measures are implemented. Refer to **Section 6.6** for more details. If works are required that do not follow the recommended safeguards and management measures, then additional investigations and an AHIP may be required. Works must cease immediately if an artefact or place/ item of significance is disturbed or encountered during the proposed work and the Local Aboriginal Land Council (LALC), Heritage NSW, and Armidale Regional Council Project Manager would be notified immediately. Pending the outcome, an AHIP may be required.
Biosecurity Act 2015		In NSW, the administration of weed control is the responsibility of the Minister for Primary Industries under the *Biosecurity Act 2015*. The Act is implemented and enforced by the Local Control Authority for the area, usually local government or NSW Agencies. ARC is

Legislation	Section(s)	Comment
		therefore required to control declared weeds on land under their control. Nine biosecurity risk weed species occur at the site (Fireweed, Annual Ragweed, Lantana, Noogoora Burr, Cat's Claw Creeper, Maderia Vine, Small Leaf Privet, Blackberry, and Tropical Soda Apple). The regional recommended measures for this species would be applied.
Protection of the Environment Operations Act 1997		Environment Protection Licences (EPL) would be required pursuant to the *Protection of the Environment Operations Act 1997* (PoEO Act) for relevant scheduled activities associated with undertaking the Activity; Activities, as listed in Schedule 1 of the PoEO Act, that may be triggered by these works include the following; however, this will depend on the final works package for the project: • POEO Schd 1 Item 6 – Cement or Lime Works (for concrete production works on site) • POEO Schd 1 Item 13 – Concrete Works (for concrete production works on site) • POEO Schd 1 Item 15 – Contaminated Soil Treatment (if any contaminated soil is found during construction) • POEO Schd 1 Item 16 – Crushing, Grinding or Separating (if Council decides to maintain the quarry operations at designated locations for supply of material other than the KARRP) • POEO Schd 1 Item 19 – Extractive Activities (if Council decides to maintain the quarry operations at designated locations for supply of material other than the KARRP) • POEO Schd 1 Item 35 – Road Construction (if extracting and processing more than 150,000 tonnes of material over the course of the construction work – this will be determined at detailed design phase) • POEO Schd 1 Item 36 – Sewage Treatment (if the camp decides to treat and release wastewaters) It is the Contractor's responsibility for determining which EPLs will be required for the works and acquiring and managing the EPLs. ARC and/ or contractors working on behalf of ARC are required to notify NSW Environmental Protection Authority (EPA) and Department of Planning and Environment (DPE) when a 'pollution incident' occurs that is likely to impact upon the environment.
	Section 115	It is an offence to negligently dispose of waste in a manner that harms the environment. Waste would be managed in accordance with the *Waste Avoidance and Resource Recovery Act 2001*. The proposal would aim to reduce the environmental impact of dumping waste and include mechanisms to recover resources and reduce the production of waste where possible.
	Section 120	It is an offence to pollute any waters of the State. The REF includes safeguard and mitigations measures to ensure that the Activity does not result in pollution of waters.
	Section 143	A signed s.143 Notice must be submitted prior to transporting waste generated by or for ARC to a place that is not owned or managed by ARC and is not a licensed landfill or resource recovery facility. The Activity would not require disposal of waste to a place that is not owned or managed by ARC or is not a licensed landfill or resource recovery facility.
Biodiversity Conservation Act 2016	Section 7.8	For Part 5 activities, the Biodiversity Offset Scheme (BOS) thresholds of the BC Act do not apply. Proponents must instead apply the test of significance (as required). If this results in a decision that the activity will significantly affect threatened species, then:

Legislation	Section(s)	Comment
		a Species Impact Statement is required (with concurrence from EES); or the proponent may instead 'opt in' to the BOS. Section 7.3 of the BC Act requires a test of significance ('five-part test') for determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. Schedules of threatened species and communities were reviewed and are unlikely to be significantly impacted upon by the Activity (refer to **Section 6.1**). An Assessment of Significance (Five-part test) was completed (refer to **Appendix D**) for relevant species.
	Schedules 1, 1A, 2 and 3	The proposal would incrementally contribute to the Key Threatening Process (KTP) of Anthropogenic Climate Change, through the generation of carbon dioxide during operation of machinery and vehicles and associated fuel consumption as well as clearing of native vegetation through the select removal of trees.
Water Management Act 2000	Section 91 (2) Section 41 of the Water Management (General) Regulation 2018.	Work within water lands or those comprising of extraction or management of water may be subject to approval if they constitute a 'controlled activity'. However, public authorities are exempt from a controlled activity approval. Water for road works are exempt. A water supply work approval may be required for water use at the main compound (workers' camp). The contractor would need to correspond with the NSW Department of Planning and Environment – Water. If extraction of water is proposed for use in the camp, an access licence may be required under s56.
Local Land Services Act 2013	Part 5A Land Management (native vegetation)	Provisions of the Act apply to clearing native vegetation in rural parts of the State and also contains provisions with regard to clearing that is authorised under other legislation. Pursuant to Section 60O (Clearing authorised under other legislation) the following is applicable: (b) Other planning authorisation - The clearing was: (ii) an activity carried out by a determining authority within the meaning of Part 5 of that Act after compliance with that Part, or (iii) authorised by an approval of a determining authority within the meaning of Part 5 of that Act granted after compliance with that Part. As the Activity is a Part 5 Activity, vegetation clearing is authorised by way of compliance with that part of the EP&A Act.
Environmental Planning and Assessment Regulation 2021	Section 171	Environmental factors contained with the Guidelines for Division 5.1 Assessments (DPE2022), as required by under Section 171(1), have been considered to assess the likely impacts of the Activity on the natural and built environment (refer to **Appendix E**). It is not expected that the Activity would result in a significant impact relating to any of these factors during construction or operation.
Native Title (NSW) Act 1994	Section 103	Notification is required to any representative Aboriginal/ Torres Strait Islander bodies for an area concerned where an act is to take place. One active claimant (Gomeroi People) is listed in the Armidale Regional LGA; however, it is not mapped in proximity to the Activity (located approximately 80 km west of the site). The Activity is not located within an area under Native Title determination.
Forestry Act 2012	Part 4, Division 2	A clearing licence or a small quantity authorisation may be required prior to the removal of trees within a State Forest. The contractor would need to correspond with the Forestry Corporation of New South Wales prior to undertaking the works outside the road reserve in State Forest.

4.4 Commonwealth legislation

4.4.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *EPBC Act*, a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in **Appendix E** and **Section 6** of the REF.

Potential impacts to these biodiversity matters are also considered as part of **Section 6.1** of the REF and **Appendix D**.

Findings - matters of national environmental significance

The assessment of the Activity's impact, on matters of national environmental significance and the environment of Commonwealth land, found that there is unlikely to be a significant impact on relevant matters of national environmental significance or on Commonwealth land. Accordingly, the Activity has not been referred to the Australian Government Department of Climate Change, Energy, the Environment and Water under the *EPBC Act*.

Findings - nationally-listed biodiversity matters (where the strategic assessment applies)

The assessment of the Activity's impact on nationally listed threatened species, endangered ecological communities and migratory species found that there is unlikely to be a significant impact on relevant matters of national environmental significance. **Section 6** of the REF describes the safeguards and management measures to be applied.

4.4.2 Native Title Act 1993

The *Native Title Act 1993* recognises and protects native title. The Act covers actions affecting native title and the processes for determining whether native title exists and compensation for actions affecting native title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements, and the National Native Title Register. Under the Act, a future act includes proposed public infrastructure on land or waters that affects native title rights or interest.

A search of the Native Title Tribunal Native Title Vision website was undertaken, with one active Native Title holders/ claimants identified. The Gomeroi People (Tribunal File No NCD2011/006) is within Armidale LGA; however, it is not mapped in proximity to the Activity (located approximately 80 km west to the Activity site). Council would abide by any relevant native title requirements, including if notification was required, as necessary under the *Native Title Act 1993*.

4.5 Confirmation of statutory position

The Activity is categorised as development for the purpose of a road and road infrastructure facilities, including ancillary facilities, and is being carried out by or on behalf of a public authority. Under Section 2.109 of Transport and Infrastructure SEPP the Activity is permissible without consent. The Activity is not State significant infrastructure or State significant development. The Activity can be assessed under Division 5.1 of the *EP&A Act*.

ARC is the determining authority for the Activity. This REF fulfils ARC's obligation under section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the Activity.

5. Consultation

This chapter discusses the consultation undertaken to date for the Activity and the consultation proposed for the future.

5.1 Consultation strategy

ARC have been undertaking and continue to undertake consultation as per the following strategy objectives:

- To inform the local community and other key stakeholders about the Activity in an effective and timely manner.
- To keep the local community and other key stakeholders regularly updated with relevant information.
- To provide the opportunity for local community and other key stakeholders to provide feedback and input into the Activity during relevant stages.
- To consult with key stakeholders to meet statutory consultation requirements.
- To consult and communicate with other stakeholders regarding other developments proposed or occurring within the Activity area.

5.2 Community involvement

Preliminary community consultation occurred with Transport for NSW prior to Council's involvement of the project. ARC became involved and took over consultation in 2021. ARC undertook consultation in various forms, including:

- Stakeholder meetings/ drop-in sessions.
- Emails and web updates.
- Project updates/ flyers /print material.
- Project information signage.
- Electronic messaging boards.
- Surveys.
- Social media posts.

A full list of previous community consultation and communication done by ARC is provided at **Appendix F**.

Outcomes of ARC community consultation has resulted in:

- Designated single point of contact for project inquiries and feedback via email and phone.
- Stakeholders informed about the status of works, load limits, traffic access restrictions and timely notifications regarding road closures during bushfires, rain events, road slips and other emergencies.
- Increased community awareness about emergencies affecting the road.
- Opportunity to participate in surveys to provide feedback about usual direction of travel and how often, medical requirements, traffic windows, travel requirements for work or education.
- Informed the work program methodology and traffic access arrangements.
- Participation in stakeholder meetings to raise issues with the project team and provide and receive feedback.
- Establishment of a broader network of regional display locations to inform motorists about the status of the road closure.
- Increased number of stakeholders informed about the project's progress and road restrictions.
- Improved relationship with the Lower Creek Local Area Committee.

Community surveys were conducted in April and October 2023 and included questions regarding the work roster and road closures. The April survey responses were used to inform the ECI proposal, including traffic windows and working roster. The survey found that most residents in the Activity area more frequently travel to Kempsey than to Armidale. A majority of residents (80%) did not support full day closures of the road from 7 am to 5 pm, however, 70% of the community did support the 10/ 4 roster. A project information flyer circulated in June, which has the survey results, has been provided at **Appendix G**.

The October community survey asked the community to consider three options for the midday escort traffic window. Option one was to keep the initially proposed midday escort on all days during the 10 days on roster period. The second option was for a midday escort to occur west of Lower Creek for three of the 10 days and an escort to occur east of Lower Creek for five of the 10 days. The last option was for the midday escorts to occur on two of the 10 days during the 10 days on roster period. The result of the survey was to select the two days during the 10 days as the preferred midday traffic access window

(refer to **Appendix G**). Continuing community consultation should occur throughout the Activity so that adjustments to the two-day schedule can be made based on community feedback and/ or the time of year.

Issues raised have been considered during the ECI design of the Activity and included in this REF. Ongoing consultation with the community will continue by means of the ARC website, newsletters, and the ARC Customer Contact Centre hotline and email address.

5.3 Aboriginal community involvement

Consultation with the Aboriginal community has occurred throughout the life of the project and has been listed in **Table 5.1** below. These consultations were for previous reports that are superseded by this REF and the Aboriginal Cultural Heritage Assessment by Heritage Management & Planning dated October 2023 (refer to **Section 6.6** and **Appendix H**).

Table 5.1 Summary of previous Aboriginal community consultation

Date	Location	Purpose	LALC Consulted
August 2020	• Various.	Landslips and culvert repairs (emergency works).	Thungutti LALC
November 2020	• Orchard TSR (above Georges Junction). • Georges Junction Campground. • Lower Creek-Kempsey Road. • Blackbird Flat Campground and flats.	Material stockpiles and site compounds.	Thungutti LALC
November 2021	• Various.	Site compounds. Upgrades/ replacement – damaged culverts.	Thungutti LALC Armidale LALC
May 2023	• Jeogla. • Lower Creek. • McCormacks Flat. • Blackbird Flat.	Ancillary work areas and site compounds.	Thungutti LALC Armidale LALC Iwatta Aboriginal Corporation

Armidale LALC was contacted for a site visit and consultation for the Aboriginal Cultural Heritage Assessment by Heritage Management & Planning dated October 2023 (refer to **Appendix H**), however, Armidale LALC was not available. Consultation with the Aboriginal community is not required under point 5 (p. 3) of the document *Due Diligence Code of practice for the protection of Aboriginal Objects 2010,* however previous consultations were considered in the assessment (refer to **Section 6.6**).

5.4 Transport and Infrastructure SEPP consultation

As per the requirements of the State Environmental Planning Policy (Transport and Infrastructure) 2021, consultation with the following agencies has occurred:

- The Biodiversity and Conservation Division (BCD) of the NSW Department of Planning and Environment (previously known as the Office of Environment and Heritage), have been consulted as per the requirements of Section 2.15(2)(a) and (b) of the Transport and Infrastructure SEPP due to development adjacent to land reserved under the *National Parks and Wildlife Act 1974* and development on land in Zone C1 National Parks and Nature Reserves.
- The NSW State Emergency Service (SES) have also been consulted as per the requirements of Section 2.13 of the Transport and Infrastructure SEPP due to the Activity occurring on flood liable land.
- Transport for NSW - Maritime Division have been consulted as per the requirements of section 2.15 (2)(c) of the TISEPP due to the potential impacts of a fixed or floating structure in or over navigable waters.

As ARC is the proponent and determining authority, the Division 1 consultation requirements of SEPP Transport and Infrastructure with councils do not apply. No other consultation was required under Division 1.

Key findings of the consultation informed this REF, the assessment of potential impacts, and required impact avoidance or management measures. A summary of the results of the Transport and Infrastructure SEPP consultation is included in **Table 5.2** with records of Transport and Infrastructure SEPP consultation included in **Appendix I**.

Table 5.2 Issues and advice raised through Transport and Infrastructure SEPP consultation

Agency	Issue raised	Response/ where addressed in REF
BCD	The NPWS recognises that only a portion of the overall Project affects NPWS estate, either sharing an immediate interface, or encroaching on reserved land due to the road alignment or the project's ancillary requirements, as shown on Sheets 12 to 19 of the consultation/ notification letter (Geolink 13 October 2023). Where encroachment will occur approval/ authorisation under the NPW Act must be firstly obtained.	Encroachment of the Activity boundary onto reserved land, Cunnawarra National Park, and Georges Creek Nature Reserve, have been identified in **Section 6.2** of this REF. These locations have been identified as no-work zones until approval/ authorisation is obtained prior to construction works.
	The proponent should ensure the REF will be sufficiently comprehensive to enable unambiguous assessment of all direct and indirect impacts of the proposed activity and we anticipate the REF will include consideration of: 1. The direct and indirect impacts of the proposal on the significant biodiversity values of the area including, but not limited to the following threatened species that have been recorded within or in close proximity to the Kempsey Road corridor: • Koala (Phascolarctos cinereus). • Greater glider (Petauroides volans). • Hastings River mouse (Pseudomys oralis). • Spotted-tailed quoll (Dasyurus maculatus). • Southern myotis (Myotis Macropus). • White-bellied sea-eagle (Haliaeetus leucogaster). • Masked owl (Tyto novaehollandiae). • South-eastern glossy black-cockatoo (Calyptorhynchus lathami lathami). • Eastern osprey (Pandion cristatus). • Speckled warbler (Chthonicola sagittata). • White-throated needletail (Hirundapus caudacutus). • Scrub turpentine (Rhodamnia rubescens). 2. The specific NPWS REF recommendations included in Attachment 1 of the BCD response letter (refer to **Appendix I**).	1. GeoLINK has assessed the impacts of the proposal on the species with potential occurrence, including those species listed, in a Biodiversity Assessment Report (refer to **Appendix D**) and in the REF (refer to **Section 6.1**). 2. GeoLINK has assessed the impacts of the Activity against Attachment 1 of BCD's response (refer to **Appendix I**) in this REF. Permissibility of the Activity under the *National Parks and Wildlife Act 1974* for areas within Cunnawarra National Park and Georges Creek Nature Reserve have been considered and discussed in **Section 4.2** of this REF, with additional discussion of impacts in **Section 6.2**. Section D, point 5 of BDC's response (refer to **Appendix I**) request related to a road adjustment is not relevant under a Review of Environmental Factors and would need to be discussed and negotiated directly between ARC and NPWS. Note: when consultation was initiated with National Parks the scope of works included the consideration of a concrete batching plant (at Site 16; refer to page 74/ 75 of **Appendix A**). On receiving feedback, Site 16 within the National Park Estate was removed from the project scope and is not included in the Activity. Therefore, some of the feedback in the letter is referring Site 16 and should be disregarded. As noted in **Section 3**, although Site 16 is shown in the ECI Design Drawings (refer to **Appendix A**), the site is not included in the Activity scope of works as per **Illustration 1.1** and **Illustration 1.2**.
SES	Consider the impact of flooding on the infrastructure up to and including the Probable Maximum Flood (PMF).	Impacts related to hydrology and flooding have been identified and addressed in **Section 6.7** of this REF.
	During site works, check the Bureau of Meteorology website prior to start of the workday for any Flood Warnings, and consider closing the worksite prior to the	Weather and flood monitoring are included as management measures in **Section 6.7**.

Agency	Issue raised	Response/ where addressed in REF
	start of the working day if there is a risk of riverine flooding.	
	Pursue, if relevant, site design and stormwater management that minimises any risk to the community.	Site design and stormwater management would be developed further in the detailed design phase.
	Ensure workers and people using the site during and after the upgrades are aware of the flood risk, for example by using signage.	Signage requirements for flood risks is included as a management measures in **Section 6.4** and **6.7**.
	If the construction phase of the upgrades causes disruption to the operation of local roads, this may impact the ability for emergency vehicles to use these routes. The NSW SES requests that notification be provided where there are likely to be significant delays in the operation of the roads affected by the upgrades.	Consultation with Emergency Services is to be undertaken in accordance with requirements of specification G36 and the Communication Plan. This is included as a management measure in **Section 6.4**, respectively.
TfNSW – Maritime Division	It is recommended that any items or objects that may cause obstruction or hazard during the works be directly supervised and removed on completion of the work.	Safeguards and management measures around obstructions and hazards have been included in **Section 6.7**.
TfNSW – Maritime Division	Notification of the work should be made to TfNSW Maritime at least 28 prior to commencing by email.	Notification requirements have been included as a management measure in **Section 6.7**.

5.5 Ongoing or future consultation

Ongoing community consultation is proposed regarding the scope of work, during detailed design as required, and proposed traffic disruptions. Planned traffic disruptions during the proposed work will be advised through advertising using the ARC website, as well as other means identified via the Consultation Strategy developed for the Activity.

Ongoing community consultation is proposed regarding the midday traffic access window during the 10 days on roster period. This will allow Council to adjust the number of days the midday escort occurs based on community feedback. Flexibility in the number of days as the Activity progresses would allow for fluctuations in requirements based on the time of year and community needs and assist with potential construction fatigue in the later years of the Activity.

Ongoing stakeholder and community consultation would be undertaken in accordance with the ARC's communication strategy and methods during the development and implementation of the Activity. Consultation would include:

- NSW DPI Fisheries;
- NSW DPI Crown Lands and Water Division;
- TfNSW (Maritime);
- National Parks;
- Forestry Corporation of New South Wales;
- LALCs;
- residents and local businesses; and
- emergency services organisations.
    - NSW SES.
    - NSW RFS.
    - FRNSW.
    - Police.
    - Ambulance.

6. Environmental assessment

This section of the REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the Activity. All aspects of the environment, potentially impacted upon by the Activity, are considered. This includes consideration of:

- Potential impacts on matters of national environmental significance under the EPCB Act.
- The factors specified in the *Guidelines for Division 5.1 Assessments* (DPE 2022) approved under Section 170, and as per Section 171(1), of the EP&A Regulation and the *Roads and Related Facilities EIS Guideline (DUAP 1996*). The environmental factors specified in the Guideline as per section 171 of the Environmental Planning and Assessment Regulation 2021 are also considered in **Appendix E**.

Site-specific safeguards and management measures are provided to mitigate the identified potential impacts.

6.1 Biodiversity

6.1.1 Methodology

A specialist Biodiversity Assessment was completed for the proposal by GeoLINK and is provided at **Appendix D**. The methodology used for the biodiversity assessment included:

- searches of relevant databases;
- literature review; and
- field surveys utilising the following methodology:
  - Vegetation assessment and mapping including identifying vegetation communities to BioNet Plant Community Types (PCTs).
  - Targeted surveys for threatened flora (as identified in BioNet searches).
  - Identification of TECs.
  - Opportunistic survey for all fauna based on visual or aural observations.
  - Identification and survey (by GPS) of any hollow-bearing trees.
  - Microbat assessment and survey of drainage structures via direct torch observation.
  - Opportunistic searches for Koala scats beneath mature Eucalypt trees.

6.1.2 Existing environment

Vegetation

Vegetation at the site comprises of the following Plant Community Types (PCTs) (refer to **Appendix D**):

- PCT 3205 - Northern Escarpment New England Blackbutt-Tallowwood Wet Forest.
- PCT 4073 - Lower North Hinterland River Oak Forest.
- PCT 3251 - Northern Gorges Diverse Grassy Forest.
- PCT 3240 - Lower North Escarpment Red Gum Grassy Forest.

A variety of rainforest species are present sporadically along gully lines within these communities and comprise Giant Stinging Tree (*Dendrocnide excelsa*), Tulip Satinwood (*Rhodosphaera rhodanthema*), Native Quince (*Alectryon subcinereus*), Rusty Fig (*Ficus rubiginosa*), Rough-leaved Elm (*Aphananthe philippinensis*), White Cedar (*Melia azedarach*), Red Kamala (*Mallotus philippensis*), Native Hibiscus (*Hibiscus heterophyllus*), Creek Sandpaper Fig (*Ficus coronata*), Cheese Tree (*Glochidion ferdinandi*), Sweet Pittosporum (*Pittosporum undulatum*), Wonga Wonga Vine (*Pandorea pandorana*) (yellow flowered Macleay form) and Wombat Berry (*Eustrephus latifolius*).

Exotic-dominated roadside verge vegetation occurs along the immediate roadside verge across the site. Common species include Purpletop (*Verbena bonariensis*), Scarlet Pimpernel (*Lysimachia arvensis*), Blackberry Nightshade (*Solanum nigrum*), Sida (*Sida rhombifolia*), Annual Ragweed (*Ambrosia artemisiifolia*), Fireweed (*Solanum madagascariensis*), Tobacco Bush (*Solanum mauritianum*), Lantana (*Lantana camara*) and Common Sowthistle (*Sonchus oleraceus*). A similar suite of species is also present in disturbed areas of understorey within the other communities occurring at the site. This vegetation is not indicative of any PCT.

Weeds

The site includes a number of agricultural and environmental weeds as well as the following Priority Weeds as listed in the *Biosecurity Act 2015*:

- Fireweed (*Senecio madagascariensis*) - minor infestation in the roadside verge.
- Annual Ragweed (*Ambrosia artemisiifolia*) - minor infestation in the roadside verge.
- Lantana (*Lantana camara*) - minor infestations in all communities.
- Noogoora Burr (*Xanthium occidentale*) - common in the roadside verge, particularly close to the river.
- Cat's Claw Creeper (*Dolichandra unguis-cati*) - minor to moderate infestation in between CH 78200-73100 in PCT 4073, gully vegetation and rock cut batter vegetation.
- Madeira Vine (*Anredera cordifolia*) - minor to moderate infestation in PCT 4073 gully vegetation.
- Small-leaved Privet (*Ligustrum sinense*) - minor occurrence in gullies.
- Blackberry (*Rubus fruticosus spp. agg*.) - minor occurrence throughout the site.
- Tropical soda apple (*Solanum viarum*) - minor occurrence throughout the site.

There is work proposed on private properties and a number of unfenced private properties in the proposed Activity area, so biosecurity issues may present a risk for heavy machinery, heavy vehicles, and light vehicles accessing these private properties; as such, the Contractor will need to adequately manage biosecurity risks as part of the development of the Construction Environmental Management Plan (CEMP). It is also recommended that the Contractor liaise with the Local Weeds Authority on development of appropriate mitigation and management measures for the CEMP.

Threatened flora

No threatened flora species listed under the BC Act or EPBC Act were recorded in the study area during the site assessment.

Based on the desktop analysis and habitats present, the following threatened flora species have at least a moderate potential to occur at the site (refer to potential occurrence assessment included in the BAR (**Appendix D**):

- White-flowered Wax Plant (*Cynanchum elegans*).
- Slender Milkvine (*Marsdenia longiloba*).
- Cryptic Forest Twiner (*Tylophora woollsii*).
- Nightcap Plectrathus (*Plectranthus nitidus*).
- Trailing Woodruff (*Asperula asthenes*).

Fauna habitat values

The site has limited habitat features for native fauna given the disturbed nature of the vegetation occurring adjacent to Kempsey Road and Lower Creek Road. This vegetation has been subjected to past disturbances including clearing, weed infiltration, stock grazing and road construction and maintenance. Nonetheless, some foraging and breeding habitat for native fauna is present (including potential habitat for several threatened fauna species) as part of a broader area of habitat.

Hollow-bearing trees

Up to 31 hollow-bearing trees (HBTs), two trees containing stick nests and one tree containing a fissure would be affected by the works. Refer to **Appendix D** for summary table.

Culverts – Microbat assessment

A total of 193 culverts were assessed for potential microbat habitat (refer to **Appendix D**). Thirty-seven could not be located and surveyed. Based on the expected location, these culverts are likely buried and of low habitat value or previously removed.

Key findings from the microbat assessment include:

- Ten culverts offer conservation/ habitat value as opportunistic roosting sites for microbats and are listed in **Appendix D**.
- Only one culvert was occupied at the time of the inspection (culvert DM01007), which supported five Southern Myotis (Myotis Macropus). This species is listed as a threatened species under the NSW BC Act.
- Five culverts did not contain microbats, however showed evidence of usage (guano, bat bugs/ staining).
- No culverts showed evidence of significant microbat roosting or likely breeding usage.

With the implementation of relevant safeguards, the Activity is expected to have a low risk of injury/ mortality to native fauna during culvert works; and habitat values would be retained by maintained culvert lift holes and cell joins in new culverts or installed artificial habitat structures.

Threatened fauna

One threatened fauna species, Southern Myotis (*Myotis macropus*) was identified at the site during the survey with five individuals located within a culvert. This species is listed as vulnerable under the BC Act. A small amount of available habitat for this species occurs as part of the existing culverts comprising joint gaps and lift holes. This habitat is likely to accommodate only small numbers of bats and whilst Southern Myotis breeding could occur in these culverts the low carrying capacity of the site contribute to these structures being of low conservation significance.

Aquatic habitat

Waterways at the site range from lower order creeks and gullies (1st and 2nd order streams) to higher order rivers (>4). The site is largely in proximity to the Macleay River (within 100 m) which is a >4th order waterway. Select waterways are mapped as DPI Key Fish Habitat (Northern Rivers Region) and a subset of these are mapped as potential habitat for the Purple Spotted Gudgeon (*Mogurnda adspersa*). No other species, populations or ecological communities listed under FM Act were recorded at, or in proximity to the site. A total of 20 waterways mapped as FM Act Key Fish Habitat occur at the site.

6.1.3 Potential impacts

Removal of native vegetation

The Activity would require the removal of native vegetation from four PCTs, consisting of:

- PCT 3205 - Northern Escarpment New England Blackbutt-Tallowwood Wet Forest - removal of up to 4.03 ha across CH 113300-118800 (Kempsey Road).
- PCT 4073 - Lower North Hinterland River Oak Forest - removal of up to 2.59 ha across CH 75200-99400 (Kempsey Road) and CH 3600 (Lower Creek Road).
- PCT 3251 Northern Gorges Diverse Grassy Forest - removal of up to 15.24 ha across CH 83800-113500 (Kempsey Road) and CH400-4600 (Lower Creek Road).
- PCT 3240 - Lower North Escarpment Red Gum Grassy Forest - removal of up to 27.11 ha across CH 73300-98600 (Kempsey Road) and CH 2800 (Lower Creek Road).

Regarding the above impacts, 0.26 ha of PCT 3205 and 0.56 ha of PCT 3251 proposed for removal is within the NPWS Estate.

Aquatic habitat

In-stream works would impact aquatic habitat (refer to **Appendix D**). There is a risk of erosion and sedimentation impacts during the construction phase of the project, particularly when working in proximity to riparian zones and drainage features (e.g. culverts). Standard erosion and sediment controls would be implemented during construction, particularly where excavation is required in proximity to waterways.

While works are proposed in the waterways for the purpose of scour protection and culvert works, any potential impacts to the waterways can be managed by way of effective implementation of erosion and sediment controls.

Removal of threatened fauna habitat

The results of the threatened fauna potential occurrence assessment indicated several threatened fauna species were considered potential occurrences within the study area and therefore have potential to be impacted by the proposal.

In relation to specific fauna habitat features, the Activity would remove:

- 46.38 ha of sclerophyll forest (PCTs 3205, 3251, 3240).
- 2.59 ha of riparian woodland (PCT 4073).
- 31 hollow-bearing trees, two trees containing stick nests and one tree containing a fissure.
- 193 culverts (temporary impact only as new culverts would be installed).

- Localised instream works at seven waterways.

The site constitutes a linear area along an existing road corridor. The fauna habitats within the site are associated with larger areas of riparian or forest habitats in the broader locality. Based on the desktop analysis and habitats present on site, the following threatened fauna species have at least a moderate potential to occur at the site (refer to **Appendix D**):

- Waterways provide foraging and breeding habitat for the following frogs: Davies' Tree Frog, Glandular Frog, Stuttering Frog, and Sphagnum Frog.
- Foraging and nesting habitat for the following birds: Speckled Warbler, Brown Treecreeper, Varied Sittella, Little Lorikeet, Black-chinned Honeyeater (eastern subspecies), Scarlet Robin, and Flame Robin.
- Foraging habitat for the following birds: Regent Honeyeater, Glossy Black-Cockatoo, and Wompoo Fruit Dove.
- Foraging habitat for the following forest owls: Masked Owl, Powerful Owl, Barking Owl, and Sooty Owl.
- Broadly suitable habitat with high use Koala food trees available in the study area (NSW Office of Environment and Heritage 2018). However, no evidence of usage at the site (scat searches/ scratches on trunks).
- Foraging habitat for birds of prey: White-bellied Sea Eagle, Square-tailed Kite, and Eastern Osprey. No nests occur on or adjacent to the site.
- Foraging habitat for the Spotted-tailed Quoll (as part of a much larger foraging home range).
- Foraging and/ or roosting habitat for the following microbats: Greater Broad-nosed Bat, Golden-tipped Bat, Eastern Coastal Free-tailed Bat, Yellow-bellied Sheathtail Bat, Eastern Cave Bat and Eastern False Pipistrelle.
- Foraging habitat for the Grey-headed Flying-fox.
- Foraging and denning habitat for the Yellow-bellied Glider, Greater Glider, Squirrel Glider, and Brush-tailed Phascogale.
- Potential habitat for New Holland Mouse and Hastings River Mouse.
- Foraging and roosting habitat for the Large and Little Bent-winged Bat (non-breeding) and Southern Myotis within culvert structures.
- Potential habitat for Parma Wallaby, Brush-tailed Rock Wallaby, and Long-nosed Potoroo.

The habitats on site are not significant in the context of the surrounding habitat and it is unlikely that any local threatened species populations would be exclusively dependant on the habitat at the site to satisfy their lifecycle needs.

Injury and mortality

The proposal may result in a minor risk of fauna injury/ mortality through:

- Vegetation removal if the impacted vegetation is occupied at the time of clearing. This is mainly a risk to nesting or non-flying species.
- Existing culvert removal if culverts are occupied at the time by roosting microbats.
- Vehicle strike during construction for a range of fauna species which have potential to occur at the site.

Conclusion on significance of impacts

A Biodiversity Assessment Report (BAR) was prepared to assess for potential significant impacts on threatened species and communities, and their habitat, as is required under the *Biodiversity Conservation Act, 2016* (BC Act) and *Fisheries Management Act 1994* (FM Act) (refer to **Appendix D**). Additionally, an assessment of Matters of national environmental significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* was completed.

Based on the potential occurrence assessments for threatened species, five-part tests of significance were conducted (refer to **Appendix D**) and concluded that the Activity would be unlikely to have a significant impact on any threatened species or ecological communities listed under the BC Act or FM Act. Therefore, a *Species Impact Statement* or Biodiversity Development Assessment Report is not required.

The assessment of MNES concluded that the Activity is not likely to significantly impact threatened species, ecological communities or migratory species, within the meaning of the *EPBC Act* (refer to **Appendix D**).

6.1.4 Safeguards and management measures

Table 6.1 Safeguards and management measures - Biodiversity

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	A Flora and Fauna Management Sub-Plan (FFMSP) will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP). The FFMSP will generally follow the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024).	Contractor	Detailed design/ Pre-construction	QA *G36 Environment Protection*
Biodiversity	Pre-clearing surveys will be undertaken in accordance with *Guide 1: Pre-clearing process* of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024)**.**	Contractor	Pre-construction	Biodiversity Assessment Report (**Appendix D**)
Biodiversity	An Environmental Work Method Statement would be prepared for any instream works. It would include: • Assessment of the need for aquatic fauna salvage by a licenced aquatic ecologist. • Methods to manage water quality risks. • An erosion and sediment control plan.	Contractor	Pre-construction	Biodiversity Assessment Report (**Appendix D**)
Biodiversity	The works limit would be clearly delineated to prevent impacts to native vegetation and fauna habitat outside of the approved works footprint.	Contractor	Pre-construction	Biodiversity Assessment Report (**Appendix D**)
Biodiversity/ Climate Change / Surface water/ Soils	Vegetation clearing/ trimming is to be kept to the minimum extent needed to carry out the works.	Contractor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
Biodiversity	The 10 culverts listed in **Table 4.3** in the BAR would be subject to ecologist microbat inspections prior to commencing works to: • Determine the presence/ absence of microbats, and if present, the number of animals, species and breeding status; and appropriate management option. • Remove and exclude microbats if present. • Prior to construction phase, install exclusion devices to prevent microbat access and roosting opportunities within the culvert (such as one-way valves, curtains and filling gaps and voids). The ecologist would be responsible for managing the animals' welfare and providing advice as appropriate. Key requirements include: • If breeding colonies are detected, works at that culvert may be delayed until outside of that species' breeding	Contactor	Pre-construction	Biodiversity Assessment Report (**Appendix D**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	period (October to mid-April inclusive for the Southern Myotis). • Microbats would not be displaced during periods of torpor, cold or windy conditions. • Exclusion may need to be installed at night after flyout if >10 animals are present. • Consideration of availability and potential need for alternative roosting habitat.			
Biodiversity	In new concrete culverts over 0.75 m diameter, the culvert cell joins, and internal lift holes would be left open (i.e. not grouted), to retain microbat roost habitat post completion of the works. If not, achievable artificial microbat habitat would be installed a minimum of one month prior to microbat exclusion and this would be completed in consultation with an ecologist regarding appropriate design and location.	Contactor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
Biodiversity	Pruning of mature trees is to be in accordance with Part 5 of the Australian Standard 4373-2007 Pruning of amenity trees.	Contactor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
Biodiversity	Declared weeds are to be managed according to requirements under the *Biosecurity Act 2015* and *Guide 6: Weed Management* of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024), where required. The Contractor will need to adequately manage biosecurity risks as part of the development of the FFMSP within the CEMP. It is also recommended that the Contractor liaise with the Local Weeds Authority on development of appropriate mitigation and management measures for the CEMP.	Contactor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
Biodiversity	Fauna handling must be carried out in accordance with the requirements *Guide 9: Fauna Handling* of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024).	Contactor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
Biodiversity	If unexpected, threatened fauna or flora species are discovered, stop works immediately and follow the procedure in *Guide 1: Pre-clearing process* of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024).	Contactor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
Biodiversity	All pathogens (e.g. Chytrid, Myrtle Rust and Phytophthora) are to be managed in accordance with *Guide 7: Pathogen Management* of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024) and *DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora).*	Contactor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)

6.2 National Parks estate

6.2.1 Existing Environment

Kempsey Road travels adjacent to and through Cunnawarra National Park and Georges Creek Nature Reserve, being the area between chainage 102900 and 118600.

There is a known mapping discrepancy with the cadastral maps available for the Activity area. Available GIS mapping shows the existing road footprint does not match the cadastral mapping of the road reserve and the cadastral maps have been confirmed to be unsurveyed maps. Consultation with National Parks has confirmed that the existing road reserve adjacent to Cunnawarra National Park is measured 10 m from the existing road centreline and 50 m from the existing road centreline adjacent to George's Creek National Reserve. The boundaries for the National Parks estates have been updated to these measurements for the illustrations included in this REF.

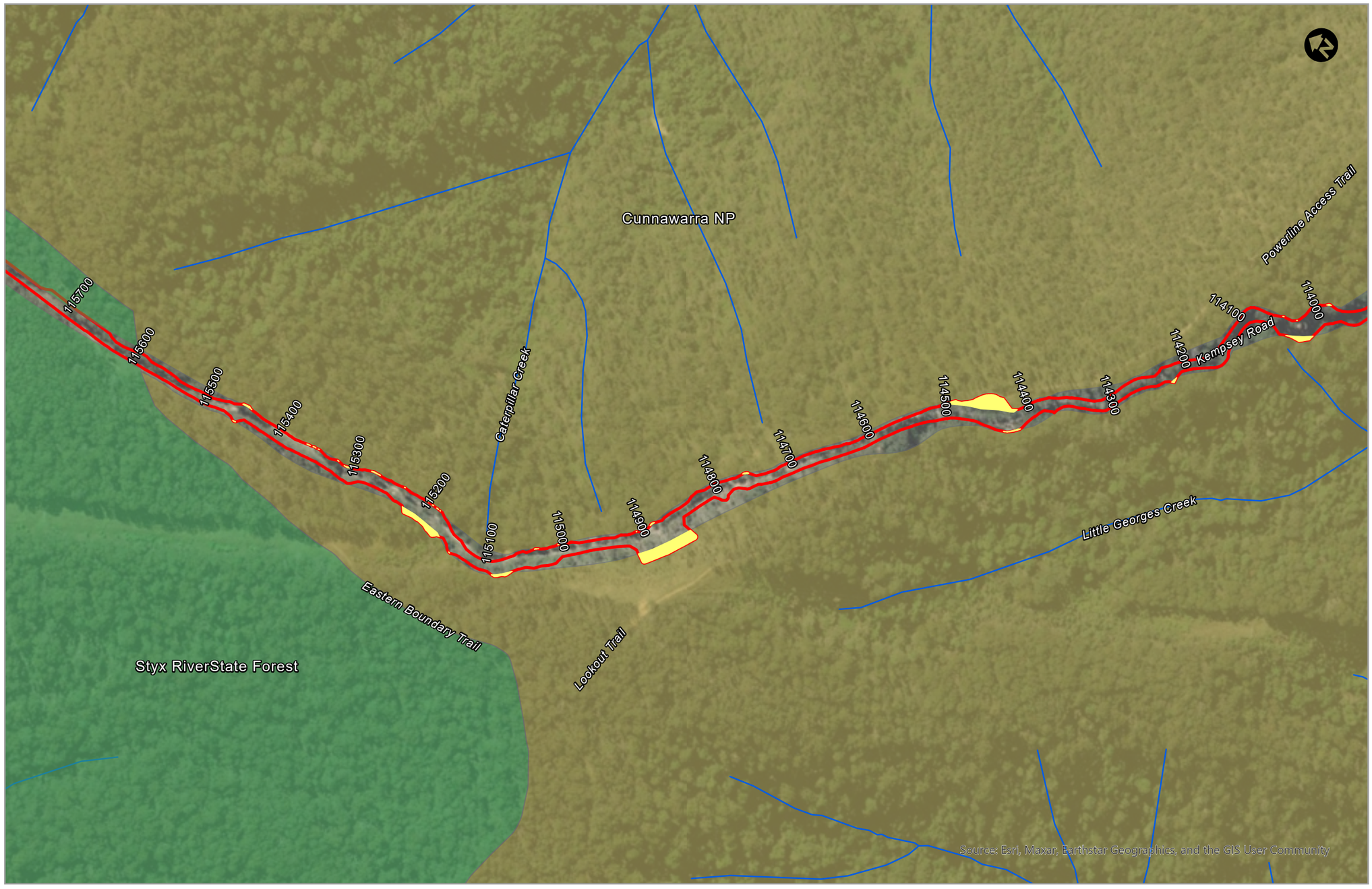
The Activity boundary would result in some overlapping with National Parks estate land, including tree removal and pruning, replacement/ installation of culverts and drainage, and slop stabilisation works. Early consultation with National Parks (refer to **Appendix J**) outlined assessment requirements for the National Parks estate overlap as follows:

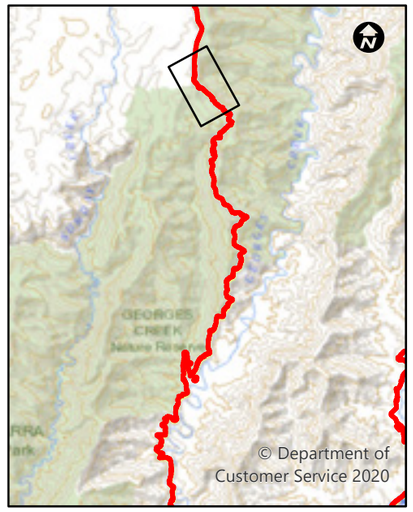
- A comprehensive description of the scope of works.
- Park boundaries to be accurately depicted on all maps.
- Identification of laydown/ minor compound ancillary areas.
- Assessment by an arborist (at least Cert IV) to identify tree-fall hazard trees.
- Justification for tree removals.
- Consideration of the extent and nature of impacts on the National Park and downstream areas.
- Appropriate safeguards and offsets for unavoidable impacts.

This REF has addressed these requirements in this section and throughout the report. The Activity has been considered and assessed in reference to the publications Develop*ments adjacent to National Parks and Wildlife Service lands Guidelines for consent and planning authorities* (DPIE, 2020) and *The Guidelines for preparing a Review of Environmental Factors* (DPE 2022).

Using the updated road reserve, Activity areas that encroach on land reserved under Part 4 of the NPW Act have been identified in **Illustration 6.1**. The construction works are considered temporary for the purpose of construction and not a permanent use of land outside the road reserve.

Three existing fire trails meet up with the Activity boundary. At approximate Lower Creek Rd chainage 4100, the fire trail along Petroi Road meets with the Activity on Lower Creek Road (refer to **Figure 6.1**). The second fire trail along Through Road-Eastern Boundary Trail meets up with Kempsey Road between chainages 115600 and 115700 (refer to **Figure 6.2**). And the last fire trail, on Styx River Forest Way-Through Road, meets up with Kempsey Road at approximate chainage 118700 (refer to **Figure 6.3**).





Map Sheet Location

LEGEND

- Activity boundary
- Approval required prior to works commencing
- National Park reserve
- State Forest
- Watercourse

0 100 Meters

National Parks Estate Encroachment Areas
Illustration 6.1 - Sheet 1 of 7

GeoLINK environment | engineering | planning | design

Review of Environmental Factors – ARC Kempsey Road Restoration
4055-1073

Information shown is for illustrative purposes only
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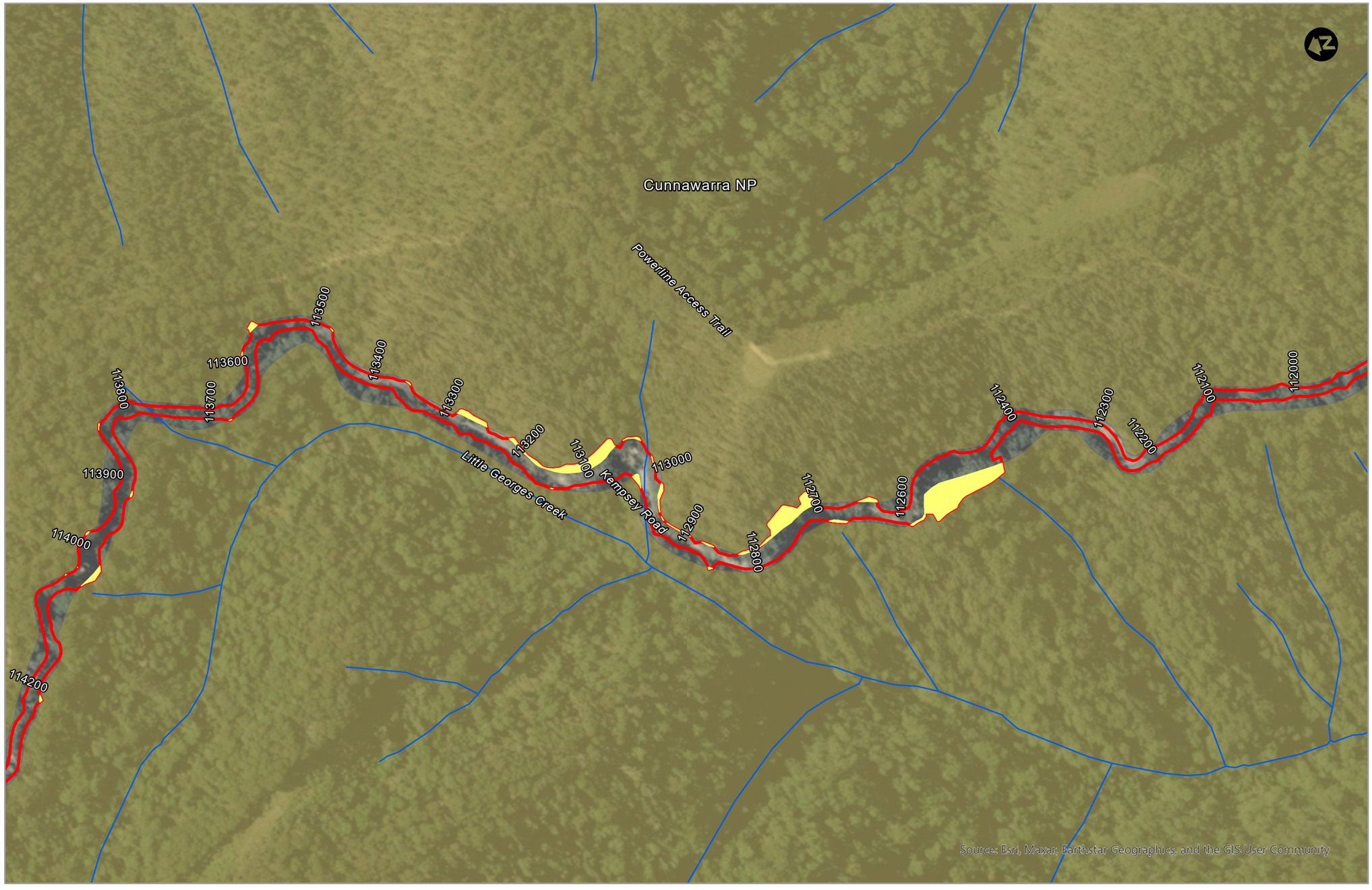
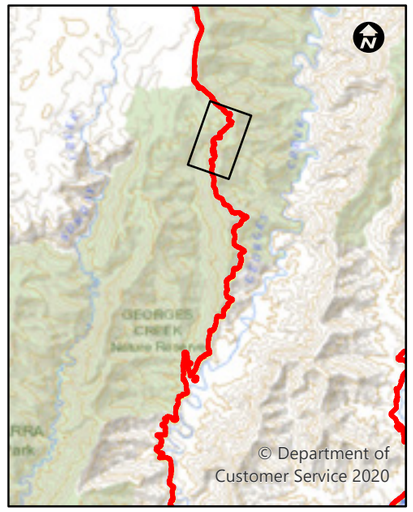
Source of base data: ESRI World Imagery
Date: 27/11/2023
Revision: D





Map Sheet Location

LEGEND

- Activity boundary
- Approval required prior to works commencing
- National Park reserve
- Watercourse

0 100 Meters

National Parks Estate Encroachment Areas
Illustration 6.1 - Sheet 2 of 7

Information shown is for illustrative purposes only
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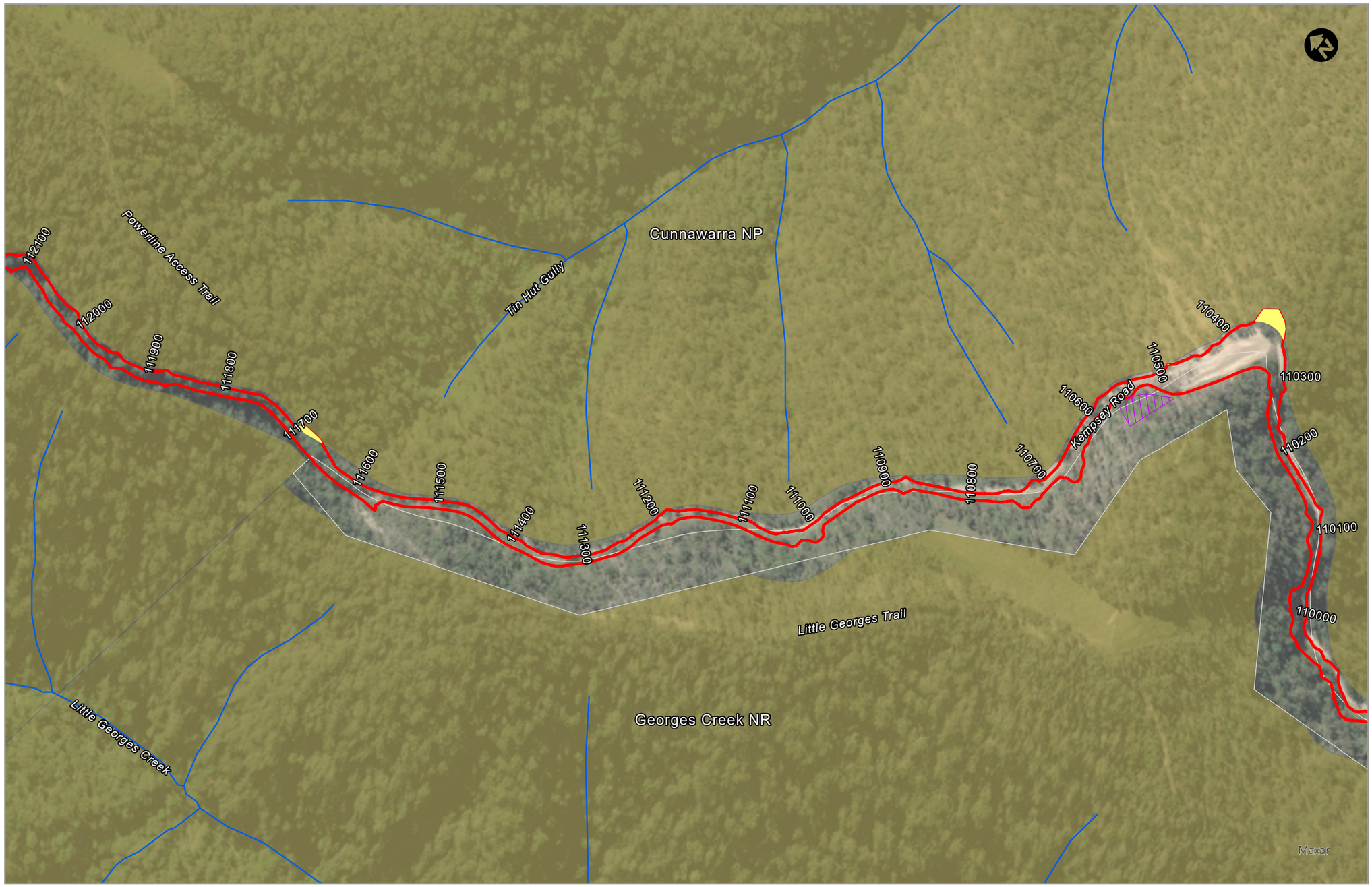
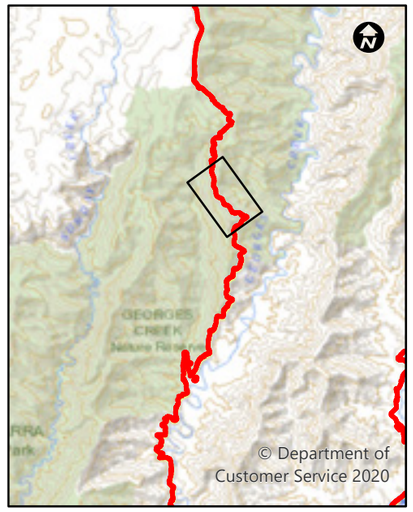
Source of base data: ESRI World Imagery
Date: 27/11/2023
Revision: D





Map Sheet Location

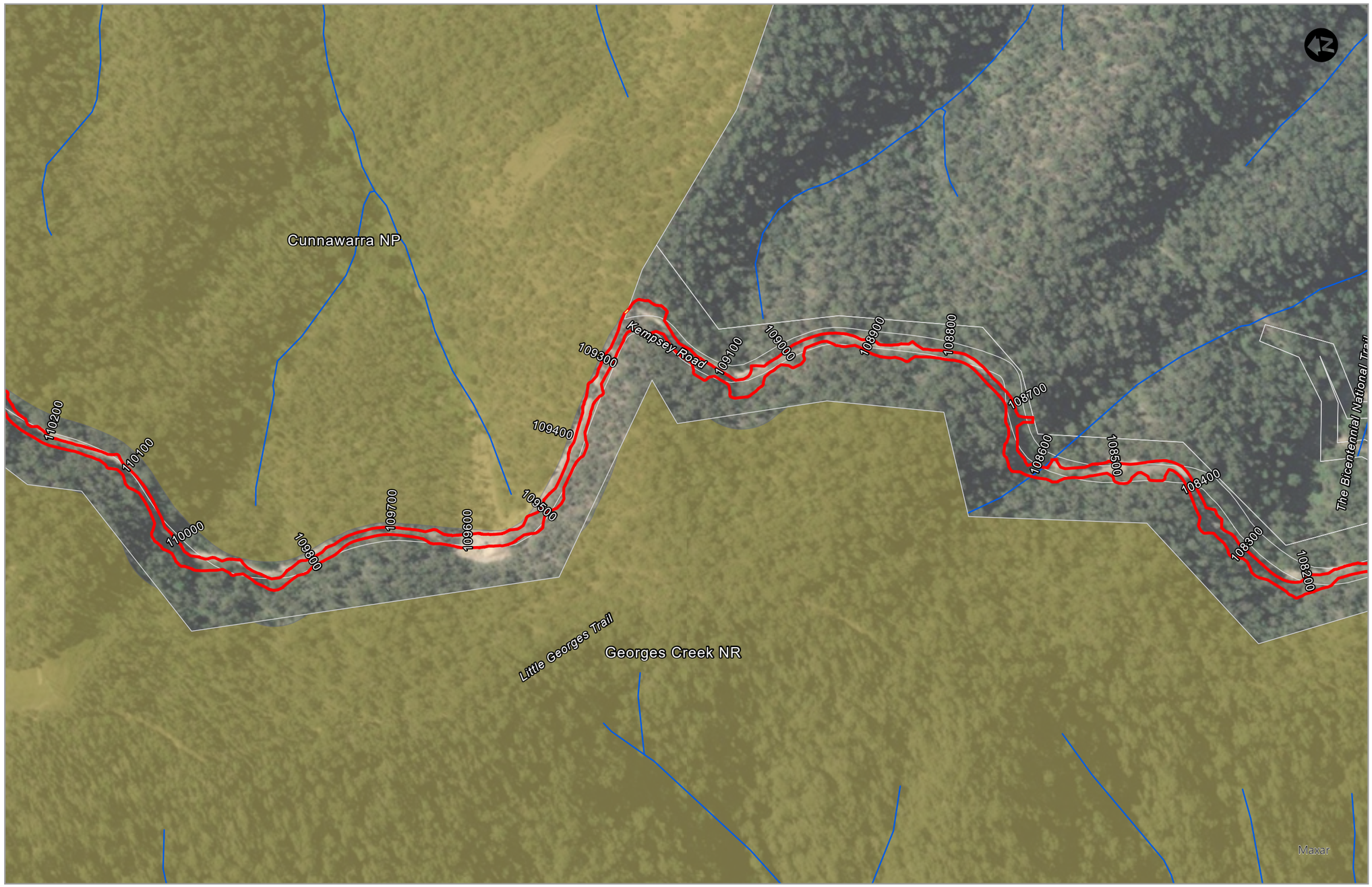
LEGEND

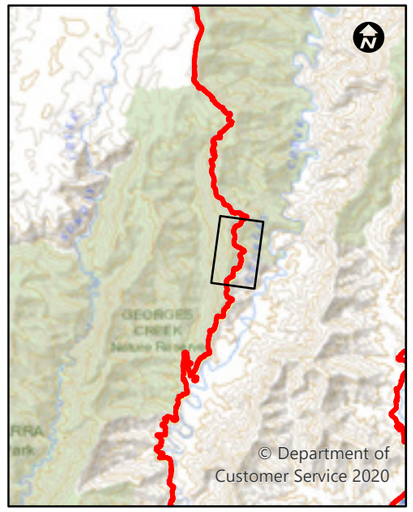
- Activity boundary
- Cadastre
- White Cliff Quarry
- Approval required prior to works commencing
- National Park reserve
- Watercourse

0 100 Meters

National Parks Estate Encroachment Areas
Illustration 6.1 - Sheet 3 of 7

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: ESRI World Imagery
Date: 27/11/2023
Revision: D





Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Approval required prior to works commencing
- National Park reserve
- Watercourse

0 100 Meters

National Parks Estate Encroachment Areas
Illustration 6.1 - Sheet 4 of 7

GeoLINK environment | engineering | planning | design

Review of Environmental Factors – ARC Kempsey Road Restoration
4055-1073

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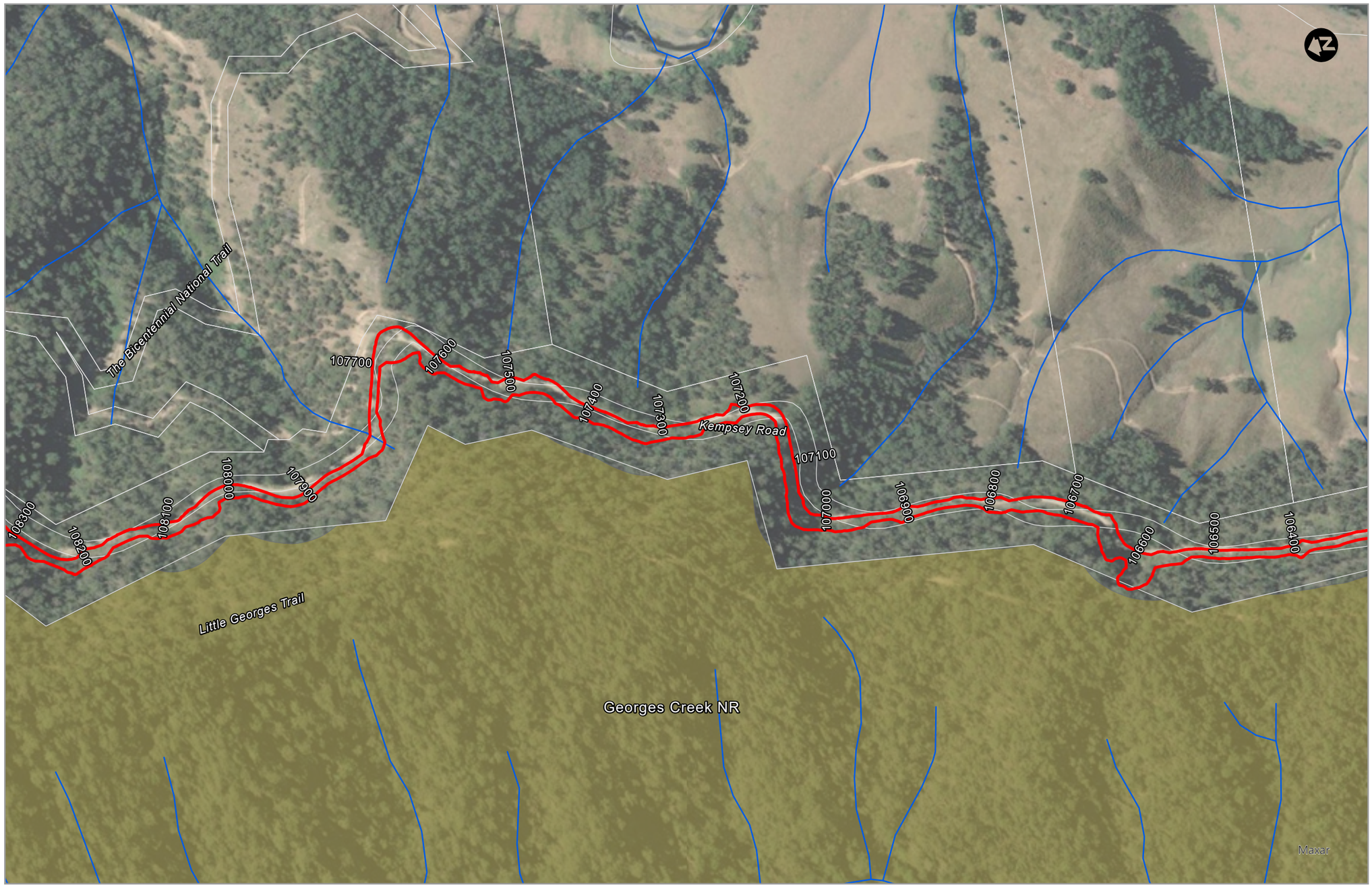

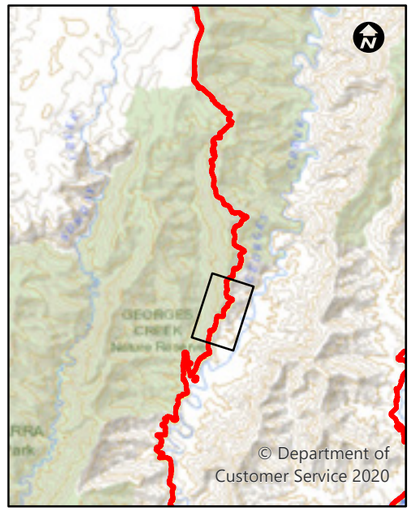

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- National Park reserve
- Watercourse

0 100 Meters

National Parks Estate Encroachment Areas
Illustration 6.1 - Sheet 5 of 7

Information shown is for illustrative purposes only
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Date: 27/11/2023
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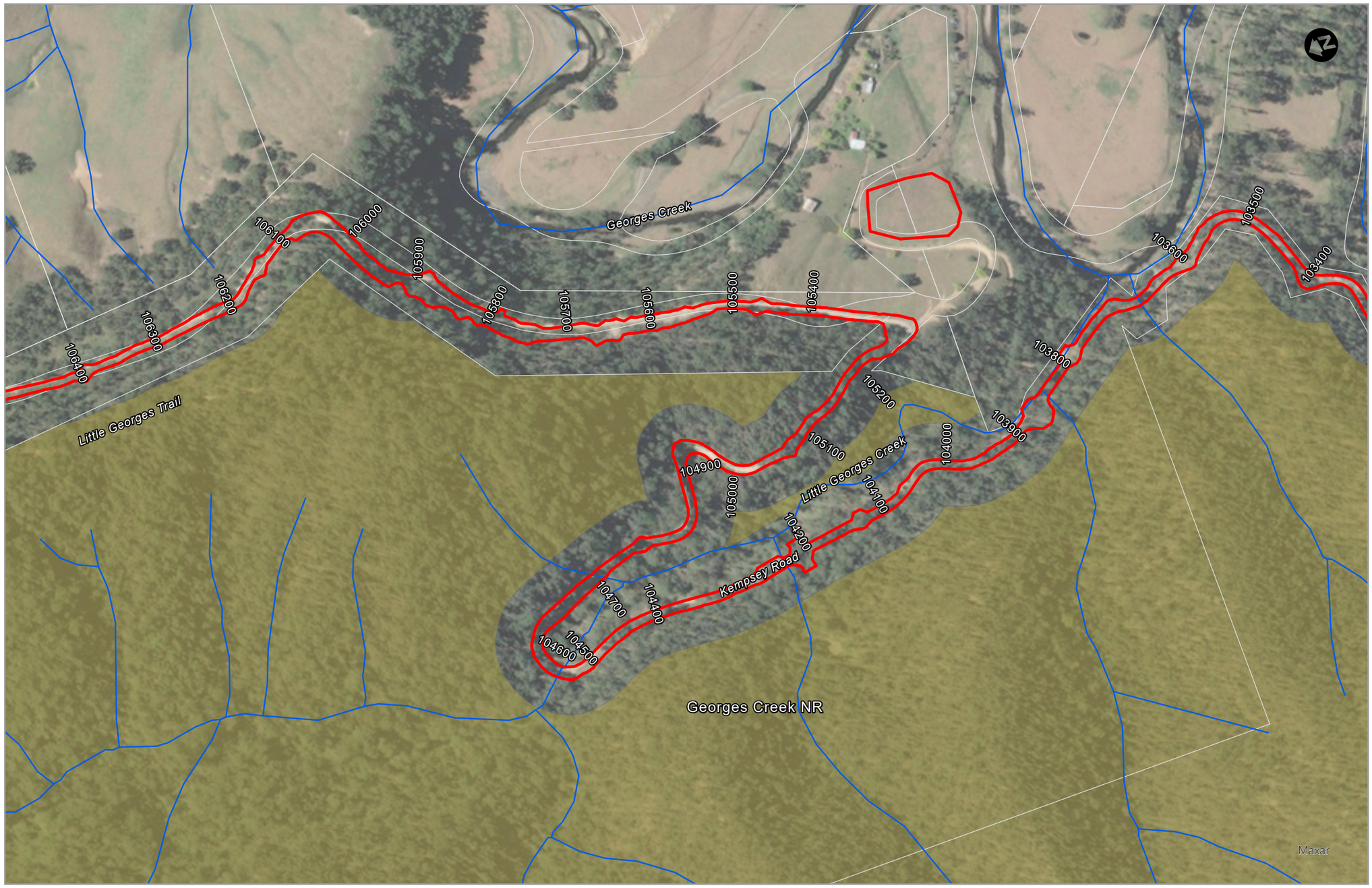

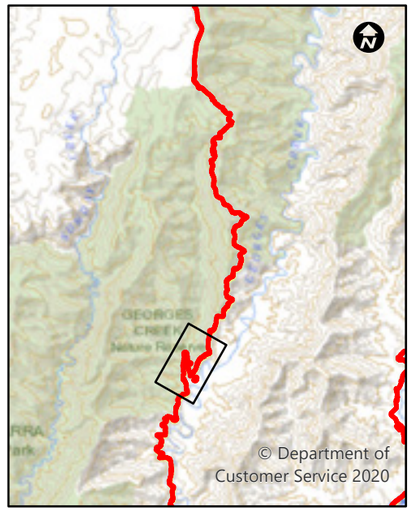

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- National Park reserve
- Watercourse

0 100 Meters

National Parks Estate Encroachment Areas
Illustration 6.1 - Sheet 6 of 7

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: ESRI World Imagery
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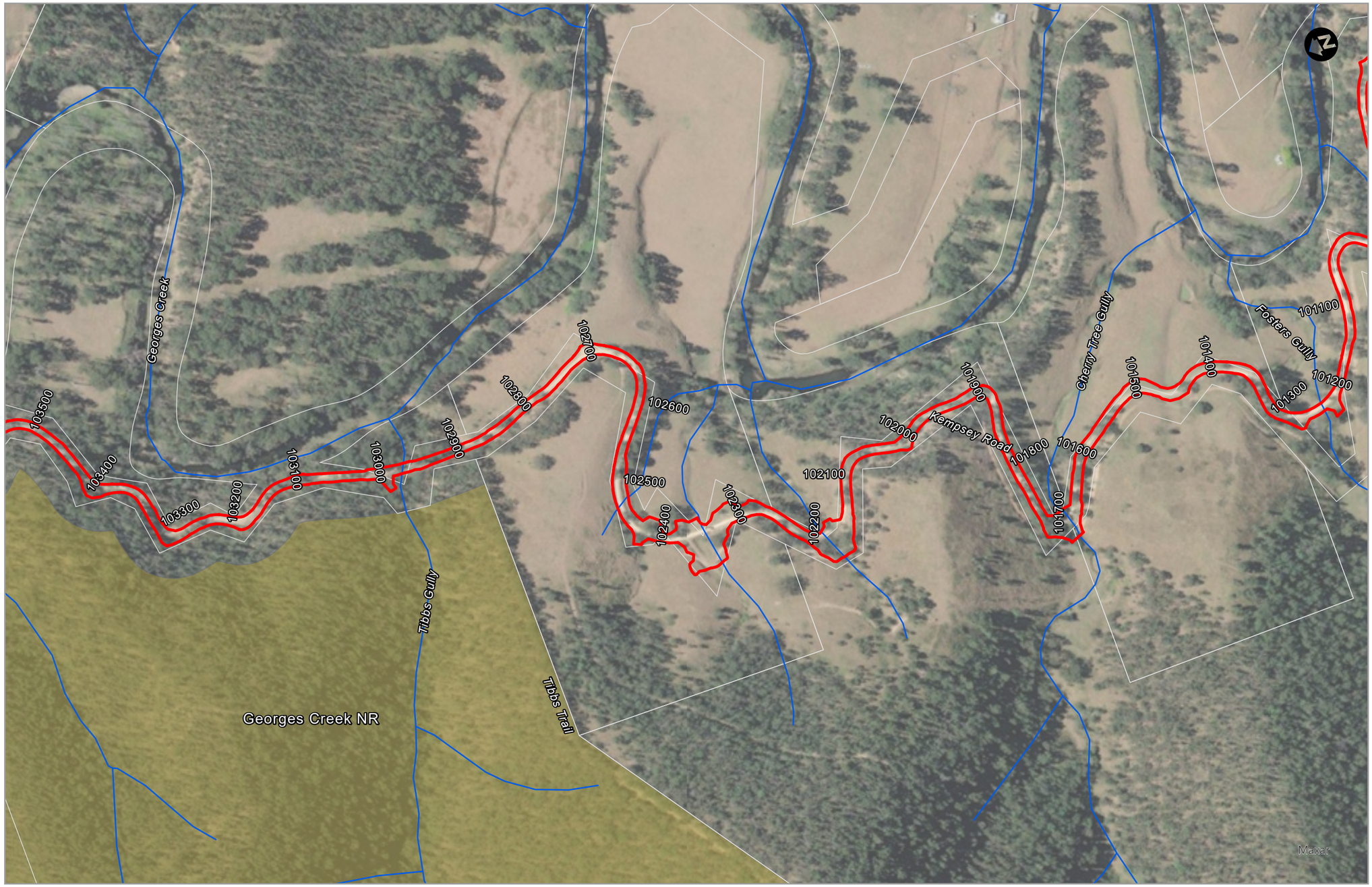

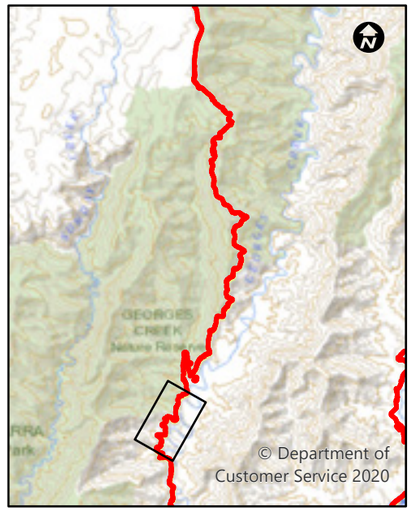

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- National Park reserve
- Watercourse

0 100 Meters

National Parks Estate Encroachment Areas
Illustration 6.1 - Sheet 7 of 7

Information shown is for illustrative purposes only
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Source of base data: ESRI World Imagery
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Figure 6.1 Fire trail - Petroi Rd off Lower Creek Road

Figure 6.2 Fire trail - Through Road-Eastern Boundary Trail

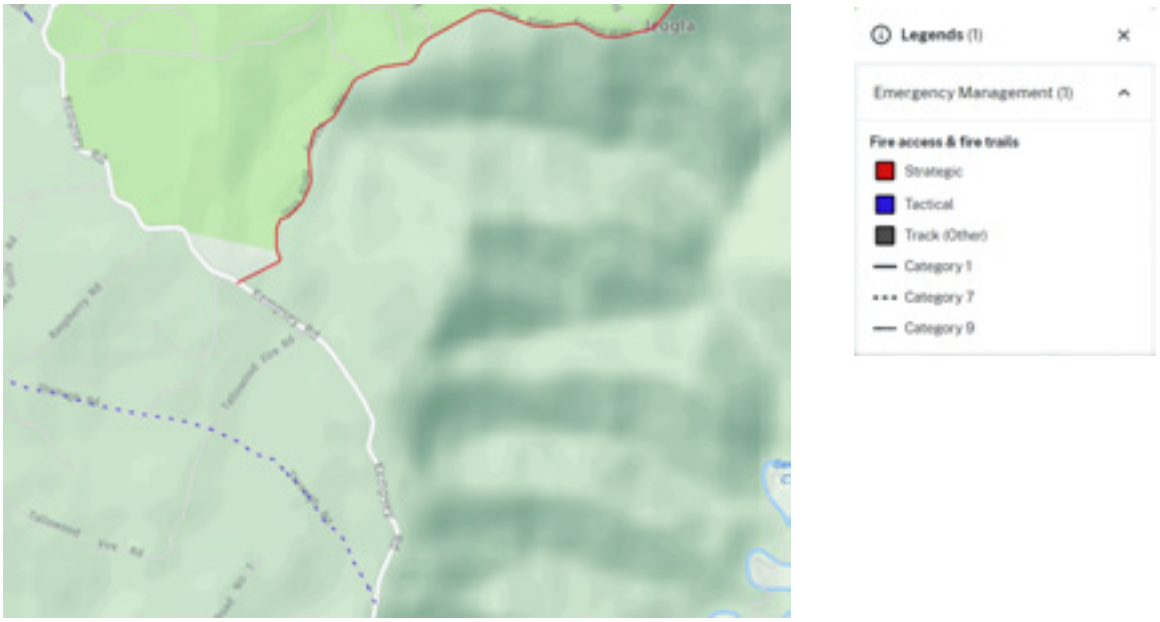


Figure 6.3 Fire trail - Styx River Forest Way-Through Road

6.2.2 Potential Impacts

The removal of hazardous trees along the Activity boundary was highlighted as a safety concern during the ECI phase. Therefore, to improve the safety and reduce tree fall risks for workers during construction of the Activity an assessment was undertaken to identify hazardous trees for removal prior to the start of construction. A Tree Assessment Report was prepared by McArdle and Sons Arboricultural Services for this REF and is provided at **Appendix K**.

The assessment of hazardous trees along Kempsey Road, in proximity to Cunnawarra National Park and Georges Creek Nature Reserve, was conducted on 31 October and 1 November 2023 by AQF 5 Consulting Arborist Dan McArdle and Jim McArdle, both qualified in Tree Risk Assessment Qualified (TRA), Quantified Tree Risk Assessment (QTRA) & Tree Contractors Association of Australia (TCAA) Visual Tree Risk Assessment (vTRA®). This meets the requirements outlined in consultation with National Parks (refer to **Appendix I** and **Appendix J**) for tree-fall hazard trees to be assessed by at least a Cert IV arborist.

Hazardous trees outside of the NPWS Estate were not included in the assessment. The requirement for an Arborist report was requested as part of the Biodiversity and Conservation consultation under the Transport and Infrastructure SEPP (refer to **Appendix I**) and therefore undertaken for the NPWS Estate land only. Hazardous tree identification for the remainder of the project would fall under the scope of the contractor. Any trees within the Activity boundary have been assessed as part of the Biodiversity Assessment Report (refer to **Appendix D**). Trees identified outside of the Activity boundary would require additional assessment and possibly require an addendum to this REF.

The tree-fall hazard inspection included the assessment of 132 trees/ groups (160 individual) on site and in the adjacent surrounding area between the chainages 103500 and 118200. Of these, 118 trees were assigned a High 1 risk rating, which is a tree-risk rating that may cause substantial personal injury, moderate to high value property damage, or considerable disruption. Another 13 trees were assigned a Medium risk rating, which are those that may cause minor personal injury, low-to-moderate value property damage, or small disruption of activities.

The Tree Assessment Report recommends removing 98 trees and the pruning of 30 trees to reduce tree-fall hazards within the identified area (refer to **Appendix K**). Three trees have been identified as an option to prune or remove, and three trees are to be monitored. Safeguards and management measures have been included to minimise the impact of hazardous trees.

Encroachment areas of the Activity on the National Park estate (refer to **Illustration 6.1**) are mostly for the replacement/ installation of culverts and slop stabilisation works, as identified in the ECI design drawings (refer to **Appendix A**). The environmental impacts on these areas have been included in the relevant impact discussions in the other sections of this REF (refer to **Section 6**). Details on site remediation and rehabilitation of these areas have been included in **Section 6.3**.

Five areas identified in the ECI design drawings (refer to **Appendix A**) are shown as potential laydowns and minor compounds within the encroachment areas. These are located:

- Between chainages 110300 – 110400.
- At chainage 111700.
- Between chainages 112400 – 112600.
- At chainage 113600.
- Between chainage 113800 – 113900.

The publication *Developments adjacent to National Parks and Wildlife Service lands Guidelines for consent and planning authorities* (DPIE, 2020) states that NPWS land is not to be used to store materials, equipment, workers' vehicles, or machinery. Therefore, to comply with the publication, the locations of the above-mentioned potential laydowns and minor compounds will need to be adjusted to sit within the road reserve or on other land.

The encroachment areas of the Activity will require approval/ authorisation under the NPW Act to be obtained before construction can occur within National Park land. This requirement has been included in the safeguards and management measures.

The response from the Transport and Infrastructure SEPP consultation with National Parks (refer to **Appendix I**) noted that the Activity must comply with the relevant Fire Access and Fire Trail Plan and egress standards under the NSW Fire trail Standards if and where the Roads subject to the Activity intersect with park fire trail connections. There are three areas where fire trails connect with the Activity, being Petroi Road off Lower Creek, Through Road-Easter Boundary Trail off Kempsey Road, and Styx River Forest Way-Through Road off Kempsey Road (refer to **Figure 6.1** through **Figure 6.3**). Detailed design and construction works for the Activity at these intersections will need to take into account maintaining or providing alternative access for the fire trails. Safeguard and management measures have been included to minimise impacts to the fire trails.

6.2.3 Safeguards and management measures

Table 6.2 Safeguards and management measures – National Parks estate

Impact	Environmental safeguards	Responsibility	Timing	Reference
National Parks estate	Prior to finalising the remediated road design, slope stability engineering requirements, location of ancillary facilities, and hazardous tree removal, as it affects the Cunnawarra National Park and Georges Creek Nature Reserve, the proponent must consult with NSW NPWS via: • NPWS Coffs Coast Area: Manager Glenn.Storrie@environment.nsw.gov.au, Team leader Rangers simon.hemer@environment.nsw.gov.au and Ranger kath.crowe@environment.nsw.gov.au. • NPWS New England Area: Manager Aaron.Simmon@environment.nsw.gov.au, Team Leader Rangers peter.berney@environment.nsw.gov.au and Ranger adam.baillie@environment.nsw.gov.au.	ARC/ Contractor	Detailed design/ Pre-construction	Transport and Infrastructure SEPP consultation Biodiversity and Conservation response (refer to **Appendix I**)
National Parks estate	A suitability qualified arborist is to be engaged to do the tree pruning and removal. Tree contractors must have a minimum AQF Level 3 Certificate in arboriculture and work in accordance with Australian Standard® AS 4373-2007 – Pruning of Amenity Trees, the *Work Health & Safety (WHS) Act 2011* and the WHS Regulations 2017, the Safe Work Guide to Managing Risks of Tree Trimming and Removal Work 2016 and the Code of Practice for The Amenity Tree Industry 1998. Work near powerlines should be carried out in accordance with the Code of Practice for Work Near Overhead Power Lines. Tree contractors shall be members of Tree	Contractor	Pre-construction/ Construction	Tree Assessment Report (**Appendix K**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Contractors Association Australia (TCAA) or Arborists Australia (AA) and hold Workers Compensation and Public Liability Insurance. Tree contractors must liaise with the consulting arborist to ensure that tree pruning, and removal works are completed according to specification.			
National Parks estate	An AQF Level 5 Arborist must annually monitor (during the Activity) the health and structural condition of trees on site. Trees require monitoring by on-site staff after severe weather events such as lightning, heavy rain, or extreme winds. It is important that staff and children are not under trees when winds are greater than 35 km/h. A virtual weathervane may be a useful tool in determining wind categories.	Contractor	Construction	Tree Assessment Report (**Appendix K**)
National Parks estate	Daily check on the trees for changes in their condition for example, broken and hung or suspended branches or failed section including stump plate or soil disturbance. It is recommended as part of the WH&S procedures and reviewed prior to the days start of work on sites where there is a daily constant occupation.	Contractor	Construction	Tree Assessment Report (**Appendix K**)
National Parks estate	Areas of encroachment of the Activity boundary onto National Parks estate land are considered No-Go zones until approval/ authorisation has been provided by National Parks. Construction in No-Go zones are not to commence until approval/ authorisation has been granted. If construction is being undertaken adjacent to a No-Go zone prior to approval/ authorisation, then the No-Go zone is to have a temporary barrier and signage erected to delineate the boundary.	Contractor	Pre-construction/ Construction	
National Parks estate	Where the Activity boundary is adjacent to or within National Parks land, a temporary barrier will be erected to delineate the boundary. The contractor is responsible for regular monitoring of the boundary to ensure it remains in place for the duration of the construction within the area.	Contractor	Pre-construction/ Construction	
National Parks estate	Encroachment areas of the Activity boundary onto National Parks estate land are not to be used for the storing of materials, equipment, workers' vehicles, or machinery. Locations of laydowns and minor compounds are to be reconsidered to areas within the road reserve or on land outside of the National Park and Nature Reserve.	Contractor	Detailed design/ Pre-construction	Developments adjacent to National Parks and Wildlife Service lands Guidelines for consent and planning authorities (DPIE, 2020)
National Parks estate/ Bushfire	Any works at the intersections of the Activity and fire trails will need to: a. Minimise the time the intersection is disrupted. b. Provide alternative access arrangements to the fire trail while works are undertaken when the intersection will be disrupted for an extended period. c. Ensure that the intersections with the fire trail are reinstated in accordance with the RFS Fire Trail Standards, Section 2.2 for the relevant Category of Fire Trail.	Contractor	Detailed design/ Pre-construction/ Construction	NSW RFS Fire Trail Standards

6.3 Rehabilitation

6.3.1 Existing environment

The Activity would occur along 45.8 km of Kempsey Road and 5 km of Lower Creek Road through multiple terrain and land types. The rehabilitation for areas would be dependent on the land that is being impacted, which can be divided into:

- Road reserve.
- Land adjacent to the road.
- Road reserve adjacent to and land within National Parks estate.

The biodiversity impacts of the Activity have been described and discussed in **Section 6.1** and **Appendix D**.

6.3.2 Rehabilitation Strategies

Areas within the Activity boundary would require the removal of vegetation and reshaping of the land to accommodate the ancillary sites and temporary construction sites required to deliver the Activity. To reduce impacts to soil and water values in the area it will be required that these areas are suitably remediated on completion of individual work activities.

Due to the extensive Activity boundary and variable landscape, different strategies are required for appropriate site remediation/ rehabilitation.

6.3.2.1 Road reserve

Rehabilitation along the road reserve would need to consider the biodiversity along the road and incorporate the appropriate native vegetation diversity. **Section 6.1** and **Appendix D** map out the biodiversity and plant community types located adjacent to the road reserves. Care would be taken to manage weeds during the rehabilitation process to minimise their spread. It is expected that the post-rehabilitation would result in vegetation and biodiversity to a similar level and quality, or better, than pre-construction.

6.3.2.2 Land adjacent to the road

Land adjacent to the road reserve, that would be used for ancillary purposes and temporary construction, mostly consists of grazing land and pockets of vegetation. Disturbance of open land areas would be preferred as an option over heavily vegetated areas and locations would be finalised to reduce vegetation clearing as much as possible. Consultation and negotiations with the appropriate landowners, which could be private, State Forest, or Crown Land managers, would influence the rehabilitation of their land. Therefore, the post-rehabilitation may not be the same as the pre-construction state; however, it is expected that the quality is to be similar or better.

6.3.2.3 Road reserve adjacent to and within National Park estate

A portion of the Activity occurs in the road reserve that is adjacent to and on land within the National Park estate, being Cunnawarra National Park and Georges Creek Nature Reserve. The National Parks estate rehabilitation would need to consider the biodiversity along the road and the adjacent areas and incorporate the appropriate native vegetation diversity. Rehabilitation would need to include management of weeds during the process to minimise their spread. The expectation is that the post-rehabilitation would result in vegetation that supports the National Parks mandate and be of a similar level and quality, or better, than pre-construction. Consultation with National Parks would be required to confirm the appropriate rehabilitation strategy and process, which at a minimum is expected to include a schedule of saplings.

6.3.3 Safeguards and management measures

Table 6.3 Safeguards and management measures - Rehabilitation

Impact	Environmental safeguards	Responsibility	Timing	Reference
Rehabilitation	The CEMP is to include site specific rehabilitation plan for each work area. This is to include at a minimum: • Rehabilitation criteria. • Rehabilitation action plan and schedule. • Planting types.	Contractor	Pre-construction/ Construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• Topsoil quantity, quality, and any testing requirements. • Weed management. • Erosion and soil loss management. • Establishment and maintenance regimes for rehabilitated areas. • Monitoring, reporting, and auditing processes.			
Rehabilitation	Where reshaping the land, such as cut and fill, is required to accommodate construction works, the topsoil and subsoil will be recovered from surfaces and stockpiled (separately) until required for rehabilitation of the areas. Stockpiles will include measures to maintain separation from other materials, protect soil health, and reduce loss from erosion and soil runoff. Measures will be included to minimise the infiltration of weeds and invasive species from establishing in the stockpile.	Contractor	Construction	
Rehabilitation	As feasible, the Activity is to be staged to reduce the amount of surface area stripped of topsoil and subsoil and exposed at any one time.	Contractor	Construction	
Rehabilitation	Where possible, stockpiled topsoil and subsoil are to be reused within the same area/ location as they were removed from.	Contractor	Construction	
Rehabilitation	Rehabilitation on land that is adjacent to or on National Parks estate land is to include consultation with National Parks prior to the completion of the rehabilitation plan for the area.	Contractor	Pre-construction/ Construction	
Rehabilitation	Rehabilitation on land adjacent to the road is to include consultation with and agreement of the appropriate landowners and the rehabilitation outcomes are to reasonably take into consideration the landowners' requirements. Formal agreements are to be completed and signed by all parties (landholder, contractor, ARC).	Contractor	Pre-construction/ Construction	
Rehabilitation	Rehabilitation is to be scheduled to occur as the Activity progresses to minimise the amount of time stripped land is exposed at any given time.	Contractor	Pre-construction/ Construction	
Rehabilitation	Cleared vegetation that has been mulched is to be stockpiled on site (in accordance with TfNSW *G40 Specification*) and re-used in the site rehabilitation process.	Contractor	Construction	
Rehabilitation	Imported topsoil may be used to make up for any shortfall in the quantity of topsoil available from site. Imported organic topsoil must be a weed-free "organic type" soil mix that conforms to AS 4419:2018 and suitable for the culture of plant material in landscape areas. It must: (a) be of a friable porous nature; (b) contain no refuse or materials toxic to plant growth;	Contractor	Construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
	(c) contain no stumps, roots, clay lump or stones larger than 25 mm in size; (d) have an organic content of at least 15% to 20% by mass as determined by the method specified in AS 1289; (e) have a pH in the range of 5 to 6.5; (f) have a soluble salt content not exceeding 0.06% by mass; (g) be suitable for phosphorus sensitive plants; and (h) be free of weed and weed refuse material. A copy of soil testing certificate must be provided to ARC.			

6.4 Traffic and transport

Increasing heavy vehicle traffic on local roads can impact road safety, road quality and condition as well as increase overall noise associated with road use.

A traffic impact assessment has been completed to identify potential road impacts associated with the Activity.

6.4.1 Methodology

A Traffic Impact Assessment has been completed by GeoLINK for the Activity and is included in **Appendix L** of this report.

In order to determine the extent of traffic impacts that may result from the Activity, the following steps were completed to make a full assessment:

- a site visit was conducted by GeoLINK on 21 September 2023 to determine the current pavement condition at the site;
- project construction information was obtained from ARC along with existing road traffic data in complete traffic impact calculations for the project; and
- safety risks assessment of traffic movements during the Activity was completed utilising Austroads and Queensland Department of Transport and Main Roads documentation.

6.4.2 Existing environment

Kempsey Road and Lower Creek Road are narrow, unsealed single lane roadways that predominately accommodate a combination of local, forestry, agricultural and tourist traffic; they also provide a critical connection between Armidale and Kempsey.

The condition of Kempsey Road varies across its extent and consists of both sealed and unsealed sections with varying widths. There are numerous sections of Kempsey Road that are extremely narrow, with cliff drop off on one side and cliff face on the other, and road width is restricted to 3.5 m in several sections (refer to **Plate 6.1**) with no opportunity for safe vehicle passing for extended periods (greater than 0.5 km). There are six bridge crossings on Kempsey Road, and some are very narrow (maximum 4 m width) without traffic controls (e.g. stop or give way signage) present to allow safe movement for single vehicles.

The sealed sections of Kempsey Road are in relatively good condition in most sections; however, the seam between the seal and unsealed section is generally poor and prone to heavy wear from vehicular traffic. The unsealed sections are showing signs of deterioration with loose aggregate (refer to **Plate 6.2**), poor drainage and holding water in wet conditions rather than free draining (refer to **Plate 6.3**), generally slippery during wet conditions, and extensively dusty during dry conditions (refer to **Plate 6.4**).

To determine the level of road safety that currently exists for Kempsey Road, interactive crash reports were obtained from NSW Centre for Road Safety (NSW Government, 2023b). The number of road accidents for the western side, Kempsey Road,

is quite minimal with five accidents recorded over a five-year period in the NSW database. The eastern side, Armidale Road, has substantially more traffic accidents with thirty traffic accidents recorded over the five-year period, including one fatality.

The majority of accidents recorded along Kempsey Road over the reporting period were associated with light vehicles that had left the road by overshooting a bend, which would indicate that there are potential issues with the road design layout and the allocated speed limit for this road.

Plate 6.1 Kempsey Road - Lower Creek - Narrow Access

Plate 6.2 Protruding aggregates/ rocks and loose materials – North of Falls Road

Plate 6.3 Kempsey Road – Road not free draining and slippery conditions

Plate 6.4 Kempsey Road – Dust Generation on Unsealed Roads

6.4.3 Potential impacts

The Annual Average Daily Traffic (AADT) volume of traffic on Kempsey Road and most of Armidale Road is typically under 1,000 vehicles. The AADT volume of traffic on Armidale Road increases to just under 2,000 vehicles approximately 10 km west of Kempsey (refer to **Appendix L**). During construction, construction associated traffic will increase the AADT on the eastern portion of Kempsey-Armidale Road (Armidale Road) by approximately 227% and on the western portion of Kempsey-Armidale Road (Kempsey Road) by approximately 147%.

The unsealed pavements along Kempsey-Armidale Road are in poor condition with many areas showing signs of:

- coarse texture where the aggregates/ rock are protruding from the pavement surface and noticeably loose;
- corrugations;
- loose powdery materials;
- rutting;
- channel erosion;
- potholes; and

- shoving.

- Infrastructure Risk Rating (IRR) is a road assessment methodology designed by Austroads Ltd to assess road safety risk at a network level (Zia et al., 2019). The Infrastructure Risk Rating (IRR) calculated for Kempsey-Armidale Road indicates that it is a 'High' risk road in terms of safety. The condition and types of the pavement is a factor in the road's safety issues; however, the majority of the safety issues are due to the narrow design and poor sight distance on numerous sections of the road.
- The Traffic Impact Assessment for the Activity has identified that the number of vehicles associated with the construction works will result in a significant increase in vehicle traffic on the entirety of Kempsey-Armidale Road, thus impacting the existing road users.
- The increased construction traffic will impact the existing pavements which will have detrimental impacts to the already poor condition unsealed pavements on both the eastern and western side of the proposed works area.

Construction

The Activity would generate increased traffic associated with site establishment, work crews' movements, and material delivery within the locality during the construction period.

Over the construction period, delays would be experienced by traffic along the Activity's stretch of Kempsey-Armidale Road. The road would be open for travel during the overnight period and for a partial escort at midday on select days during construction to allow for local traffic flow. Traffic into the work site area will be heavily restricted and no access will be available to road users outside the designated opening periods.

Traffic management impacts include:

- increased heavy vehicle traffic on Kempsey-Armidale road;
- traffic delays due to logistical movements of heavy vehicles to and from the site and also restricted road opening times for access to any properties within the works section;
- speed limit reductions;
- traffic delays from traffic control measures to provide road safety during construction;
- increased visual impediment on unsealed roads due to extra traffic movements and increased dust generation; and
- increased potential for traffic incidents due to higher traffic loads on narrow roads with poor sight distance.

Traffic should be managed according to TfNSW's Traffic Control at Work Sites Manual (Transport for NSW, 2022). A site-specific Traffic Management Plan (TMP) will need to be prepared, detailing the specifics of the work and any hazards and constraints. Construction works should not commence until the plan is approved and strategies to manage traffic within and around the work site are in place.

Any proposed traffic disruptions, access restrictions, or changes in road conditions should involve liaison with local road users using the TfNSW communication protocols.

Appropriate traffic management measures will need to be implemented to ensure safety of all road users during the period of construction. Management measures may include:

- Reducing the speed limit of Kempsey-Armidale Road (outside the construction area) in sections that are narrow, winding, unsealed, or have obstructed sight distances to appropriate speeds that are safe for road users.
- Installing give way signage and road markings (sealed sections only) on sections of road that are narrow but have good sight distance of oncoming traffic (e.g. Styx River Crossing bridge).
- Installing automated temporary traffic lights on sections that are narrow and have poor sight distance of oncoming traffic.
- Restricting construction traffic to designated periods of the day when existing traffic volumes are low.
- Pre-planning heavy vehicle movements and implementing convoy tactics with manned traffic control at appropriate locations to manage normal traffic movements.
- Regular dust management of unsealed roads.

It is recommended that Council consider:

- repairing existing defects (e.g. rutting, corrugations, etc.) along the subject roads prior to construction; and
- establishing a maintenance regime throughout construction to assess the condition on regular intervals with intervention levels for repair of defects created during construction.

The pavement of Kempsey-Armidale Road will deteriorate with the additional traffic movements over the construction period. Pre-planning by ARC and Kempsey Shire Council to ensure road maintenance works are planned strategically after the Activity has concluded would be advantageous and reduce future vehicle hazards.

The Activity could not be undertaken without the work and associated construction delays. As such, the proposed disruptions to traffic movements on this road are justifiable and can be reasonably managed.

Operation

The Activity would have no negative impacts on local traffic post-construction.

6.4.4 Safeguards and management measures

Table 6.4 Safeguards and management measures - Traffic and transport

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	A Traffic Management Plan and Safety Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Transport *Traffic Control at Work Sites Manual* (Transport for NSW, 2022)and *D&C Specification G10 Traffic Management* (Transport for NSW, 2020). The TMP will include: • Confirmation of haulage routes. • Measures to maintain access to local roads and properties. • Site-specific traffic control measures (including signage) to manage and regulate traffic movement, both inside the construction area and outside the construction area (i.e. east and west side of Kempsey-Armidale Road approaching the construction site). • Measures to maintain pedestrian and cyclist access (where relevant). • Requirements and methods to consult and inform the local community of impacts on the local road network. • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads or causing safety issues for local road users. • A response plan for any construction traffic incident. • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic. • Logistical management of heavy load movements into and out of the site. • Monitoring, review, and amendment mechanisms.	Contractor	Detailed design/ Pre-construction	*G10 – Traffic Management*
Traffic	All traffic closures/ disruptions/ changed road conditions would be communicated to road users in accordance with Council via suitable means/ media.	Project Manager	Pre-construction/ Construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic	Consultation with all emergency services, including Fire and Rescue NSW, Police and Ambulance, NSW SES and NSW RFS will be undertaken where the construction phase of the upgrades would cause disruption to the operation of the road and may impact the ability for emergency vehicles to use this route.	Project Manager	Construction	*G36 Environmental Protection*
Traffic	Reducing the speed limit of Kempsey-Armidale Road in sections that are narrow, winding, unsealed, or have obstructed sight distances to ensure road speed is safe for road users.	Contractor	Construction	Traffic Impact Assessment (**Appendix L**)
Traffic	Installing give way signage and road markings on sections of road that are narrow but have good sight distance of oncoming traffic (e.g., Styx River Crossing bridge).	Contractor	Construction	Traffic Impact Assessment (**Appendix L**)
Traffic	Installing automated temporary traffic lights on sections that are narrow and have poor sight distance of oncoming traffic.	Contractor	Construction	Traffic Impact Assessment (**Appendix L**)
Traffic/ Flooding	Flood risk signage will be addressed in the CEMP for the works and permanent signage is to be considered during detailed design for operation.	Contractor/ ARC	Detailed design/ Pre-construction/ Construction	Transport and Infrastructure SEPP consultation SES response (refer to **Appendix I**)
Traffic	Restricting construction traffic to designated periods of the day when existing traffic volumes are low.	Contractor	Construction	Traffic Impact Assessment (**Appendix L**)
Traffic	Pre-planning heavy vehicle movements and implementing convoy tactics with manned traffic control at appropriate locations to manage normal traffic movements.	Contractor	Pre-construction/ Construction	Traffic Impact Assessment (**Appendix L**)
Traffic/ Air quality	Regular dust management of unsealed roads. Dust suppression techniques will be utilised to minimise the potential for dust generation/ dispersal during works, as required.	Contractor	Construction	Traffic Impact Assessment (**Appendix L**)

6.5 Noise and vibration

6.5.1 Methodology

A Noise and Vibration Assessment has been completed by Bridge Acoustics for this REF and provided at **Appendix M**.

The noise and vibration assessment for this Activity has been completed in accordance with:

- NSW Road Noise Policy (DECC, 2011);
- Interim Construction Noise Guideline (DECC, 2009);
- Draft Construction Noise Guideline (NSW EPA, 2020);
- NSW Noise Policy for Industry (NSW EPA, 2017); and
- Assessing vibration: a technical guideline (DECC NSW, 2006).

The assessment included:

- identification of sensitive receivers;
- establishment of noise and vibration assessment criteria;

- prediction of potential construction noise and vibration and operational noise;
- assessment of potential noise and vibration impacts by comparing predictions against relevant criteria; and
- providing mitigation, where required.

6.5.2 Existing environment

6.5.2.1 Noise

A detailed survey of existing noise levels was not completed for this assessment; this assessment was based on typical background noise levels similar to other rural areas in NSW.

The project site is located in a relatively remote rural area between Kempsey and Armidale. Kempsey-Armidale Road carried low traffic volumes before the fire and flood damage occurred and has carried lower traffic flows since the road was reopened to only local traffic. Intermittent traffic noise, with long periods of relative quiet between car pass by events, is unlikely to occur for a sufficient proportion of each 15-minute assessment period to affect the background noise level. Other sources of environmental noise would depend on the location, time of day, and on different rural activities that may occur from time to time.

Audible noise sources during the day would include occasional traffic, birds, insects, domestic animals, the effect of wind on trees and other foliage, and use of farm equipment such as tractors during some periods. Background noise levels during the day are likely to remain in the range 25 to 30 LA90,15min on most days. Occasional days over 30 LA90,15 min would occur due to consistent winds, more active insects, or consistent use of tractors and similar equipment for ploughing, planting, or harvesting.

Evening background noise levels would usually be affected by increased insect activity and are commonly higher than the day background levels, particularly in the warmer months when insects are more active. In the absence of significant insect noise, particularly in the cooler months, evening background levels would typically reduce to the range 20 to 25 LA90,15min. Other audible sources during the evening typically include intermittent traffic and domestic animals and may include farm equipment maintenance or similar activity.

Night background levels would be similar to the evening levels, although with less traffic and farm equipment activity. Night background levels may drop below 20 LA90,15min in the cooler months in the absence of nearby insects. Background noise levels typically increase in the last hour or two of the night, before 7 am, as birds and other animals begin the day's activity at dawn.

6.5.2.2 Vibration

A detailed survey of existing vibration levels was not completed for this assessment.

The only significant existing source of ground vibration for residences and other buildings would be intermittent road traffic, excluding agricultural activities and other sources near each residence that are under residents' control. Building vibration can also be caused by strong wind gusts, road traffic noise, aircraft noise, and thunderstorms, although these sources produce vibration in the walls and roof of a residence via low frequency airborne noise rather than transmit vibration via the ground.

Higher vibration levels are generally caused by heavy vehicles with stiffer suspension, heavy live axles rather than independent suspension and high tyre pressures. Vibration levels will generally be higher in the absence of faults in the rock layers between the road and the residence and for shallow soil depths, and dry soil will generally transmit less vibration than soil with a high-water content.

Vibration is generally most noticeable when the vibration frequency coincides with the natural frequency of a section of floor or other part of a residence. In the case of a residence built on a concrete slab floor, resonance effects are generally insignificant as ground vibration is transmitted directly to the floor.

Vibration levels at a residence are affected by a wide variety of factors and are difficult to accurately predict and can change significantly from one vehicle pass-by event to the next. Vibration levels produced by road traffic are generally imperceptible at distances greater than 50 m from the road, although that may not be the case for all residences near the Activity boundary.

6.5.3 Potential impacts

All works associated with the Activity will result in some noise generation as such noise and vibration assessment has been segregated into the specified work sections, in accordance with the Seymour Whyte Construction Methodology (SWC, 2023).

Noise and vibration would be associated with the construction phase and not endure for the long-term beyond construction. Noise and vibration are expected from construction activity and the use of a variety of construction vehicles, machinery, and equipment as part of the Activity (refer to **Appendix M** Noise and Vibration Assessment Report). Noise will also be generated by the laydown and stockpile areas, compounds, and the camp. The compound and camp will have continuous ongoing noise for the entirety of the Activity, with noise predominantly from sources such as air conditioning units and generators.

Other potential noise sources during the Activity include the operation of the quarries in proximity to the Activity area, which will provide a substantial quantity of materials for the Activity.

The Activity has potential to affect 37 sensitive receivers as shown in **Table 6.5** and **Illustration 6.2**. A detailed description of the potential impacts is provided at **Appendix M** Noise and Vibration Assessment Report.

Table 6.5 Sensitive receivers

Receptor Number	Address	Section Location	Distance from Activity Works (m)	Level of Impact	Ground Vibration Management Required
R1	7380 Kempsey Rd	1	65	Exceeds the 'noise affected' level within standard construction hours	Yes
R2	7458 Kempsey Rd	1	20	Exceeds the 'highly noise affected' level	Yes
R3	290 Lagoon Creek Rd	2	45	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R4	7885 Kempsey Rd	2	90	Exceeds the 'noise affected' level within and outside standard construction hours	No
R5	8007 Kempsey Rd	2	590	Exceeds the 'noise affected' level within and outside standard construction hours	No
R6	8148 Kempsey Rd	2	70	Exceeds the 'noise affected' level within standard construction hours	Yes
R7	Smiths Creek Rd	2	370	Exceeds the 'noise affected' level within and outside standard construction hours	No
R8	8314 Kempsey Rd	2	130	Exceeds the 'noise affected' level within standard construction hours	No
R9	8404 Kempsey Rd	2	210	Exceeds the 'noise affected' level within and outside standard construction hours	No
R10	8421 Kempsey Rd	2	40	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R11	8476 Kempsey Rd	2	70	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R12	8493 Kempsey Rd	2	90	Exceeds the 'noise affected' level within and outside standard construction hours	No
R13	8573 Kempsey Rd	2	260	Exceeds the 'noise affected' level within and outside standard construction hours	No

Receptor Number	Address	Section Location	Distance from Activity Works (m)	Level of Impact	Ground Vibration Management Required
R14	8574 Kempsey Rd	3	50	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R15	8574 Kempsey Rd	3	140	Exceeds the 'noise affected' level within and outside standard construction hours	No
R16	8853 Kempsey Rd	3	130	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R17	8851 Kempsey Rd	3	80	Exceeds the 'noise affected' level within standard construction hours	Yes
R18	4 Lower Creek Rd	3	250	Exceeds the 'noise affected' level within and outside standard construction hours	No
R19	8899 Kempsey Rd	3	30	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R20	8919 Kempsey Rd	3	50	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R21	8929 Kempsey Rd	4	110	Exceeds the 'noise affected' level within and outside standard construction hours	No
R22	8937 Kempsey Rd	4	80	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R23	8937 Kempsey Rd	4	70	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R24	8920 Kempsey Rd	4	100	Exceeds the 'noise affected' level within and outside standard construction hours	No
R25	9400 Kempsey Rd	4	40	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R26	9400 Kempsey Rd	4	80	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R27	9829 Kempsey Rd	4	35	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R28	9950 Kempsey Rd	4	25	Exceeds the 'noise affected' level within standard construction hours	Yes
R29	10039 Kempsey Rd	4	10	Exceeds the 'noise affected' level within and outside standard construction hours; and Exceeds the 'highly noise affected' level	Yes
R30	10550 Kempsey Rd	5	200	Exceeds the 'noise affected' level within and outside standard construction hours	No
R31	237 Lower Creek Rd	7	50	Exceeds the 'noise affected' level within standard construction hours	Yes

Receptor Number	Address	Section Location	Distance from Activity Works (m)	Level of Impact	Ground Vibration Management Required
R32	333 Lower Creek Rd	7	30	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R33	367 Lower Creek Rd	7	20	Exceeds the 'noise affected' level within and outside standard construction hours; and Exceeds the 'highly noise affected' level	Yes
R34	400 Lower Creek Rd	7	100	Exceeds the 'noise affected' level within and outside standard construction hours	No
R35	478 Lower Creek Rd	7	30	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R36	478 Lower Creek Rd	7	45	Exceeds the 'noise affected' level within and outside standard construction hours	Yes
R37	500 Lower Creek Rd	7	100	Exceeds the 'noise affected' level within and outside standard construction hours	No

Noise impacts of note from the proposed work schedule for the Activity are:

- the proposed roster includes a 10-day working period and 4-day break period which will result in some work outside the standard construction hours recommended in the Interim Construction Noise Guideline and Draft Construction Noise Guideline; and
- operating re-fuelling equipment and other servicing at night.

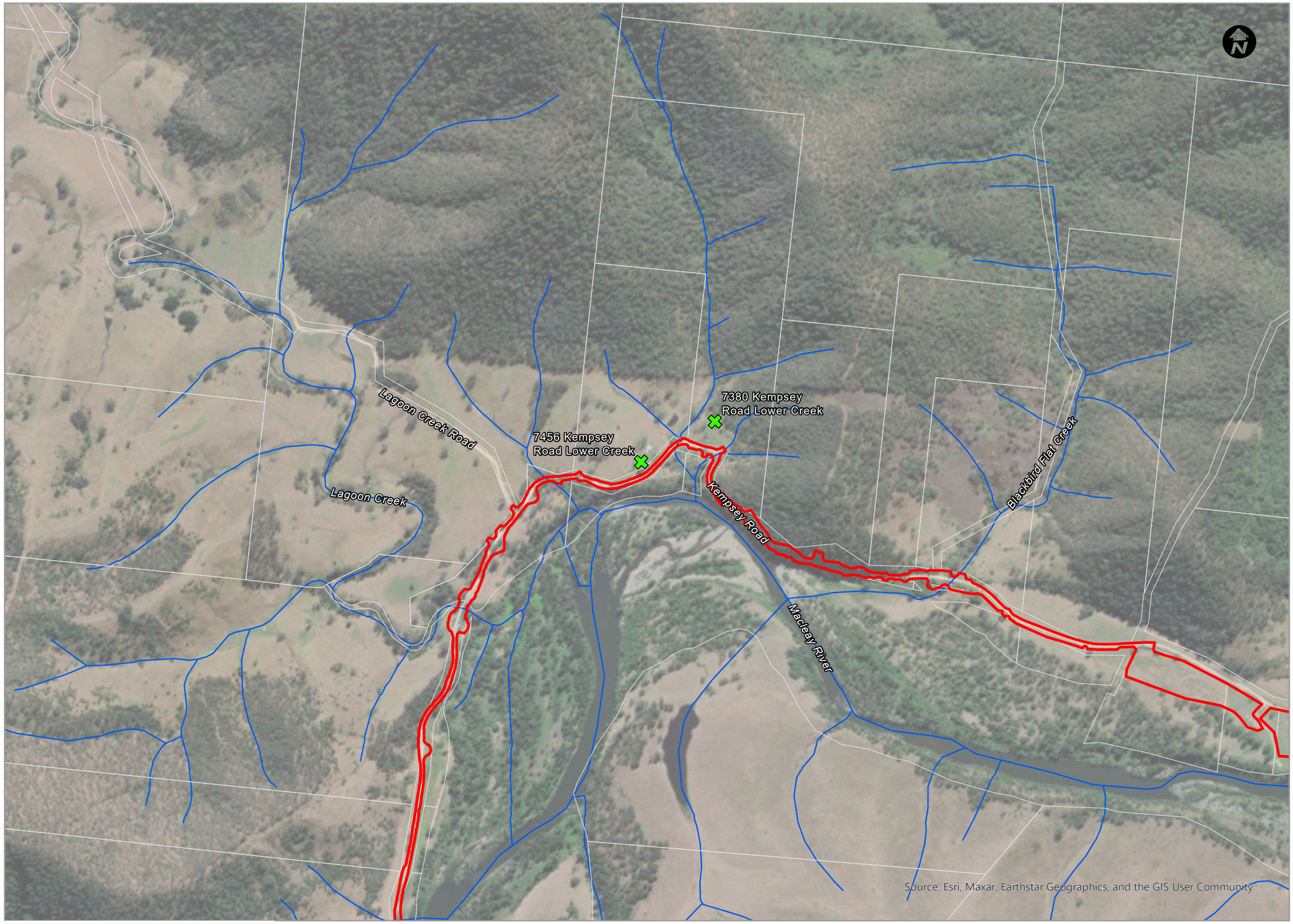
The Construction Methodology states this schedule was developed based on community consultation, implying the community prefers the proposed traffic restrictions and work on weekends rather than a longer period of construction, noise and traffic disruptions (refer to community consultation in **Section 5.2**).

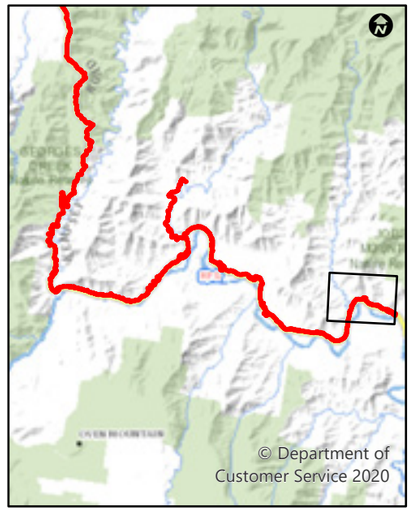
The majority of residences are expected to receive noise levels over the 'noise affected' level of 45 LAeq,15 min for a number of construction activities. Noise control and management measures are recommended for this project.

Residents are generally not expected to receive significant vibration for an extended period of time; sources of vibration associated with the Activity include:

- An excavator with rock hammer or dozer ripping and removing rock.
- A large excavator or dozer travelling over hard ground.
- A grader ripping or grading existing hard pavement, whether sealed or unsealed.
- A loaded truck travelling over uneven ground, particularly at relatively high speed.
- A vibrating compactor.
- A vibrating roller.
- A rock saw.

While the Activity is expected to require a few years to complete, significant vibration levels are expected at each residence for a total of a few hours as the pavement restoration crew passes the residence. Residences near a culvert restoration site may experience vibration for a longer period due to an excavator and potentially rock hammer during excavation, and vibrating compactor during backfill, although such work would not generally occur for more than a few days in total.





Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Watercourse
- Sensitive receiver

0 200 Meters

Sensitive Receivers
Illustration 6.2 - Sheet 1 of 11

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Review of Environmental Factors – ARC Kempsey Road Restoration
4055-1076

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10550 Kempsey Road Jeogla

Kempsey Road

7885 Kempsey Road Lower Creek

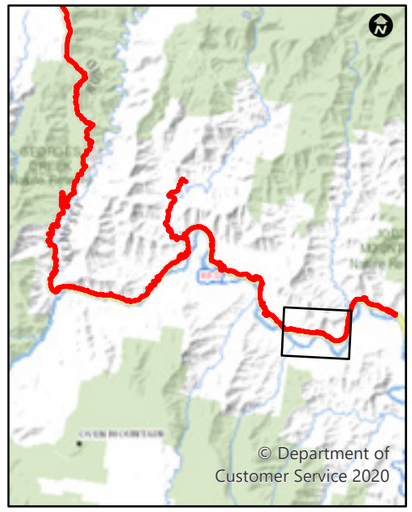
Macleay River

290 Lagoon Creek Road Lower Creek

Dry Fetters Creek

Fetters Creek

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Watercourse
- Sensitive receiver

0 200 Meters

Sensitive Receivers
Illustration 6.2 - Sheet 2 of 11

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Review of Environmental Factors – ARC Kempsey Road Restoration
4055-1076

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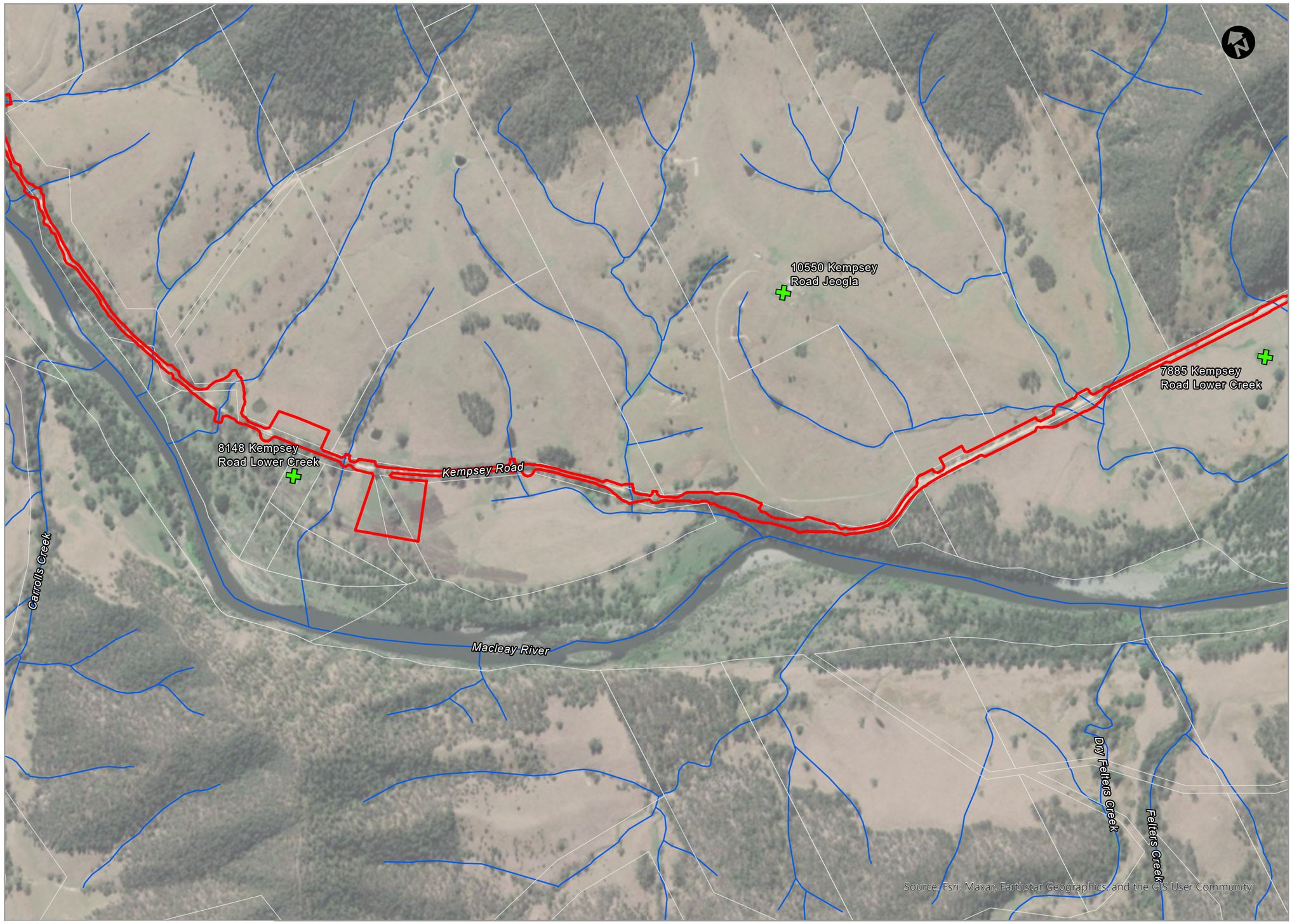

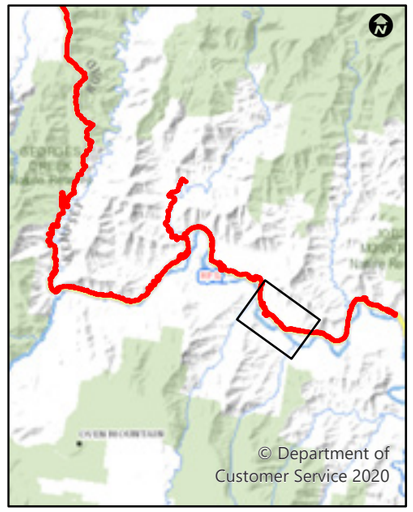

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Watercourse
- Sensitive receiver

0 200 Meters

Sensitive Receivers
Illustration 6.2 - Sheet 3 of 11

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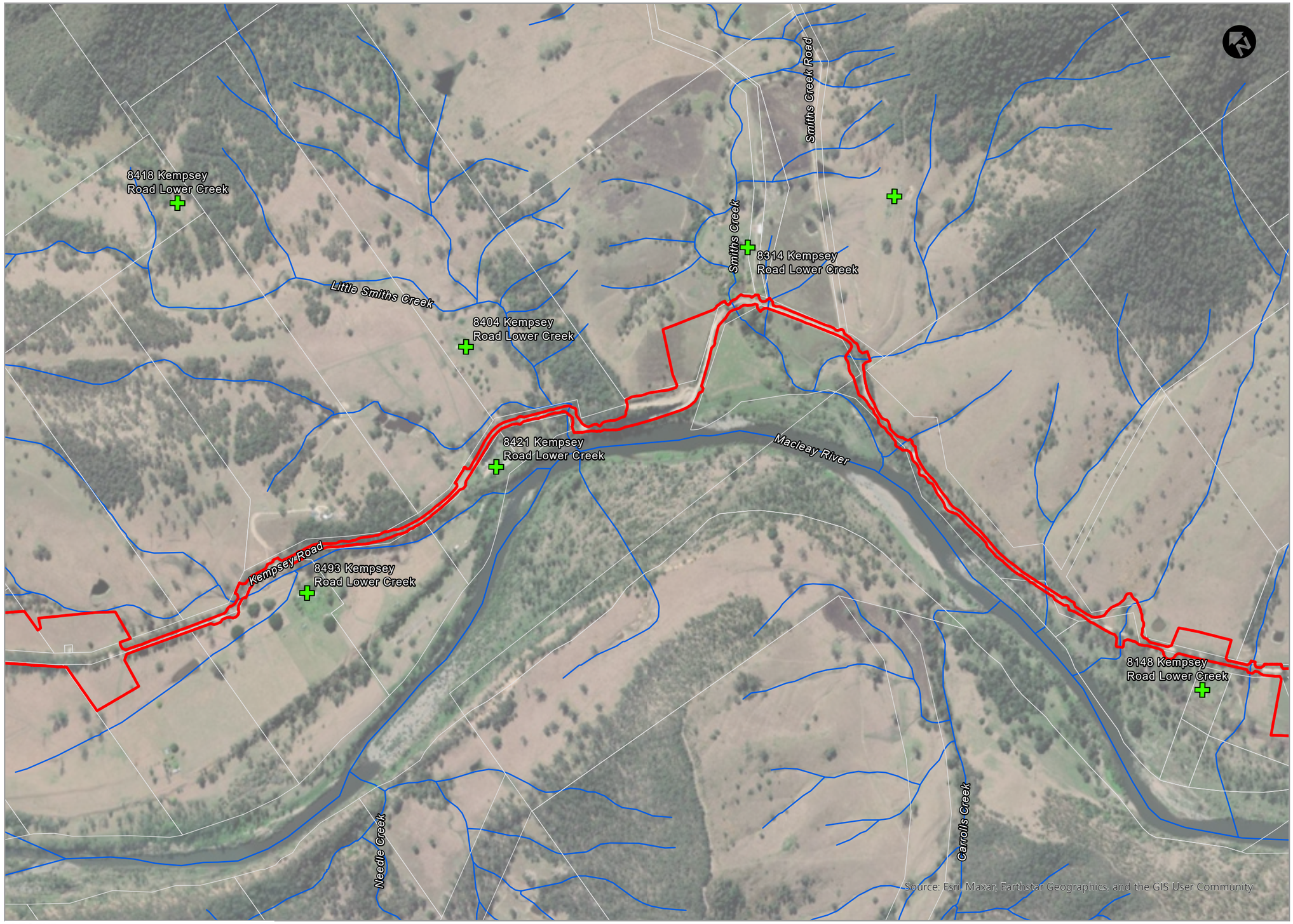

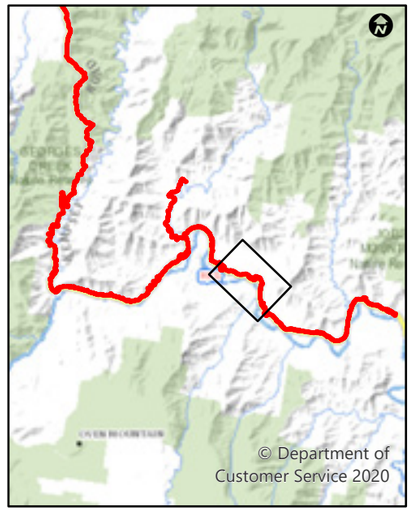

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Watercourse
- Sensitive receiver

0 200 Meters

Sensitive Receivers
Illustration 6.2 - Sheet 4 of 11

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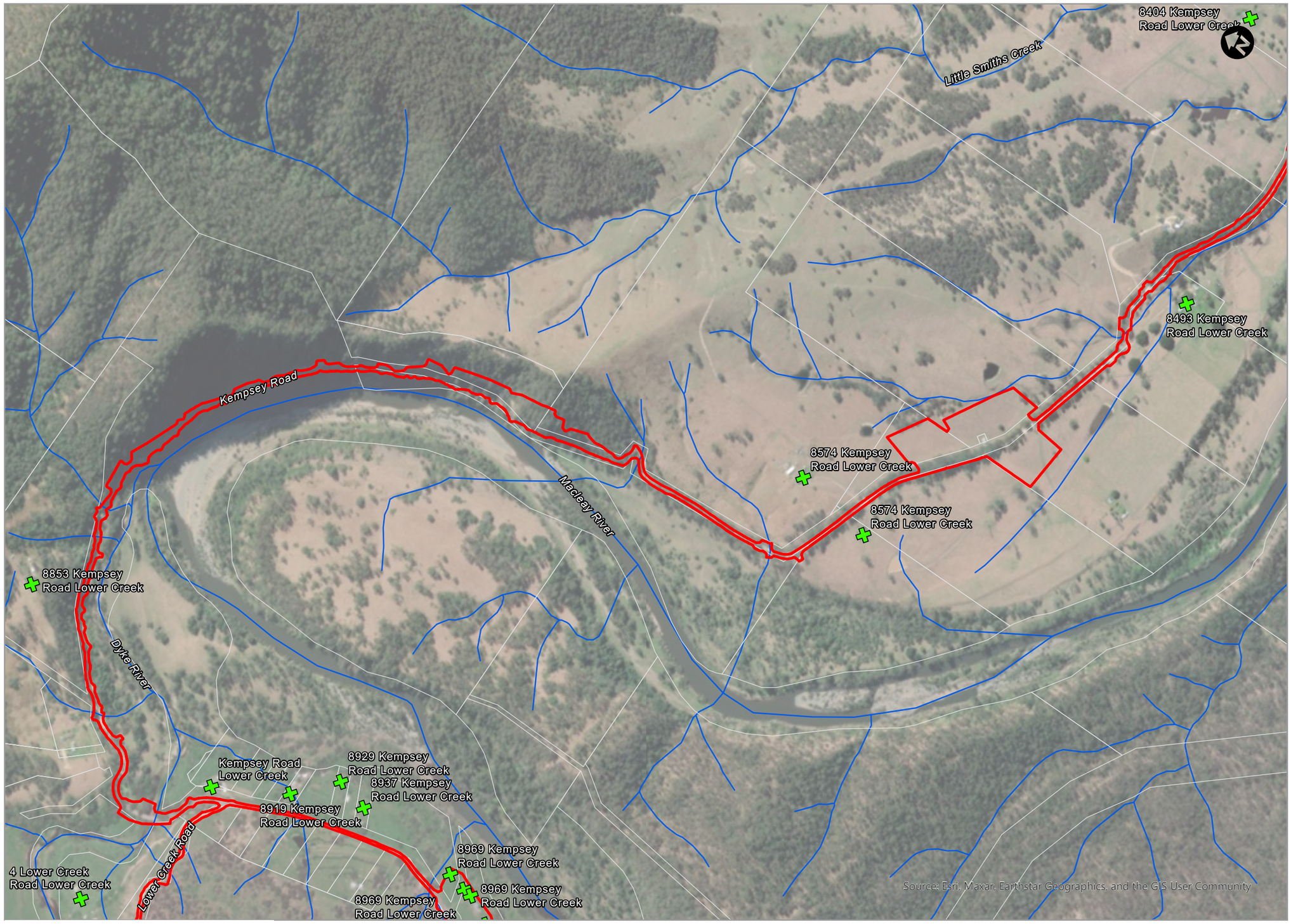

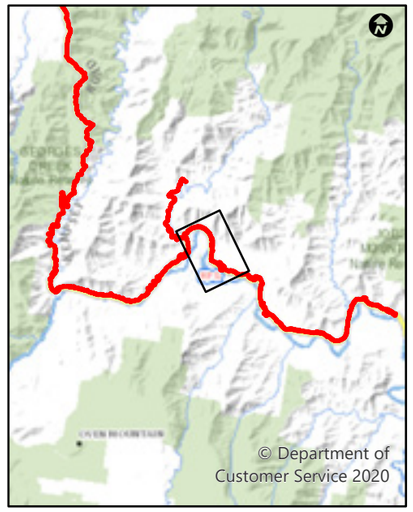

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Watercourse
- Sensitive receiver

0 200 Meters

Sensitive Receivers
Illustration 6.2 - Sheet 5 of 11

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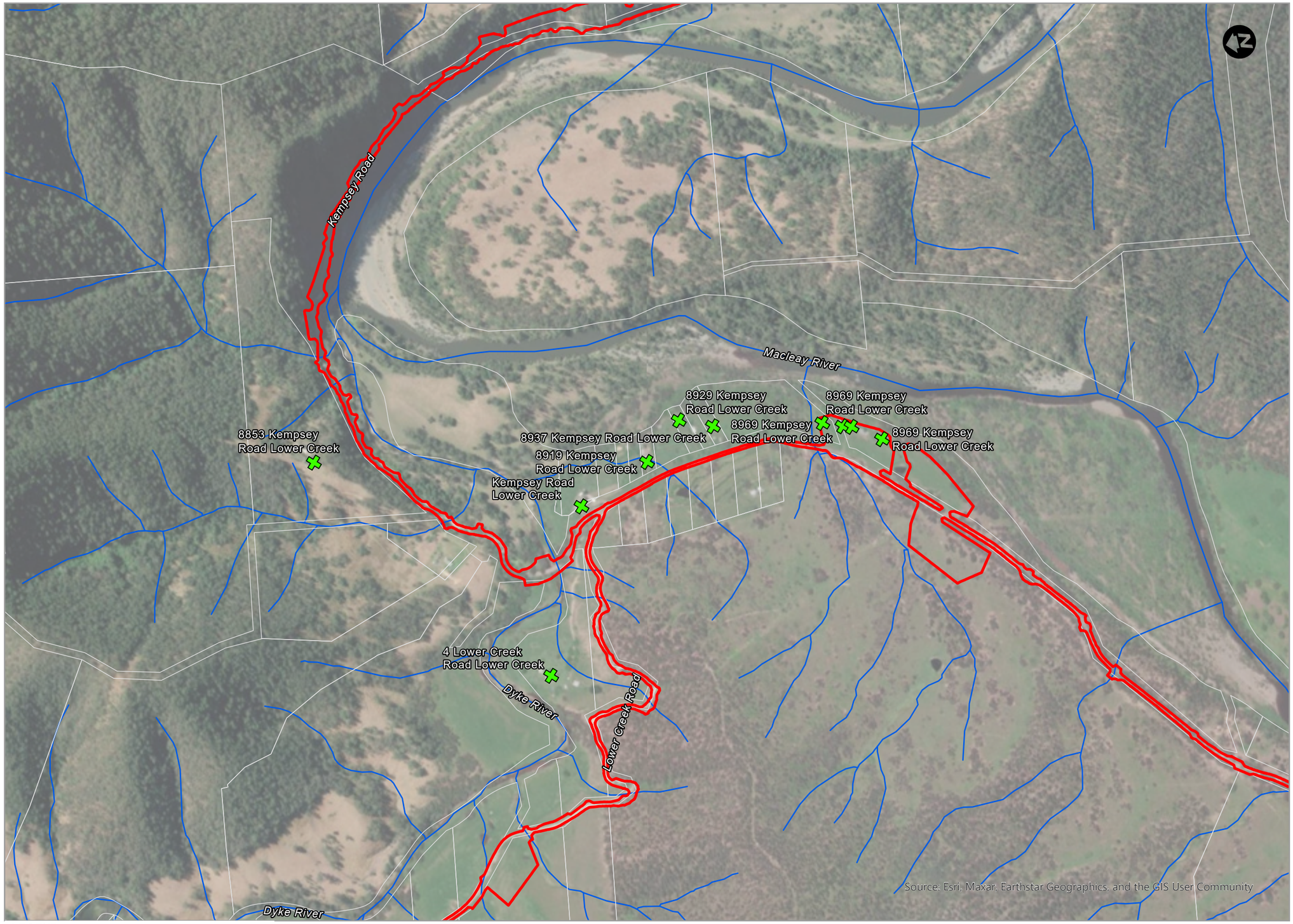

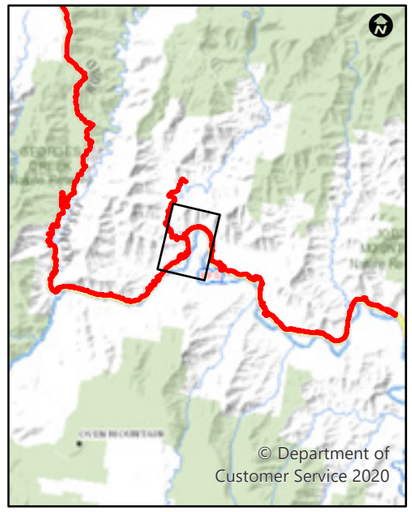

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Watercourse
- Sensitive receiver

0 200 Meters

Sensitive Receivers
Illustration 6.2 - Sheet 6 of 11

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Review of Environmental Factors – ARC Kempsey Road Restoration
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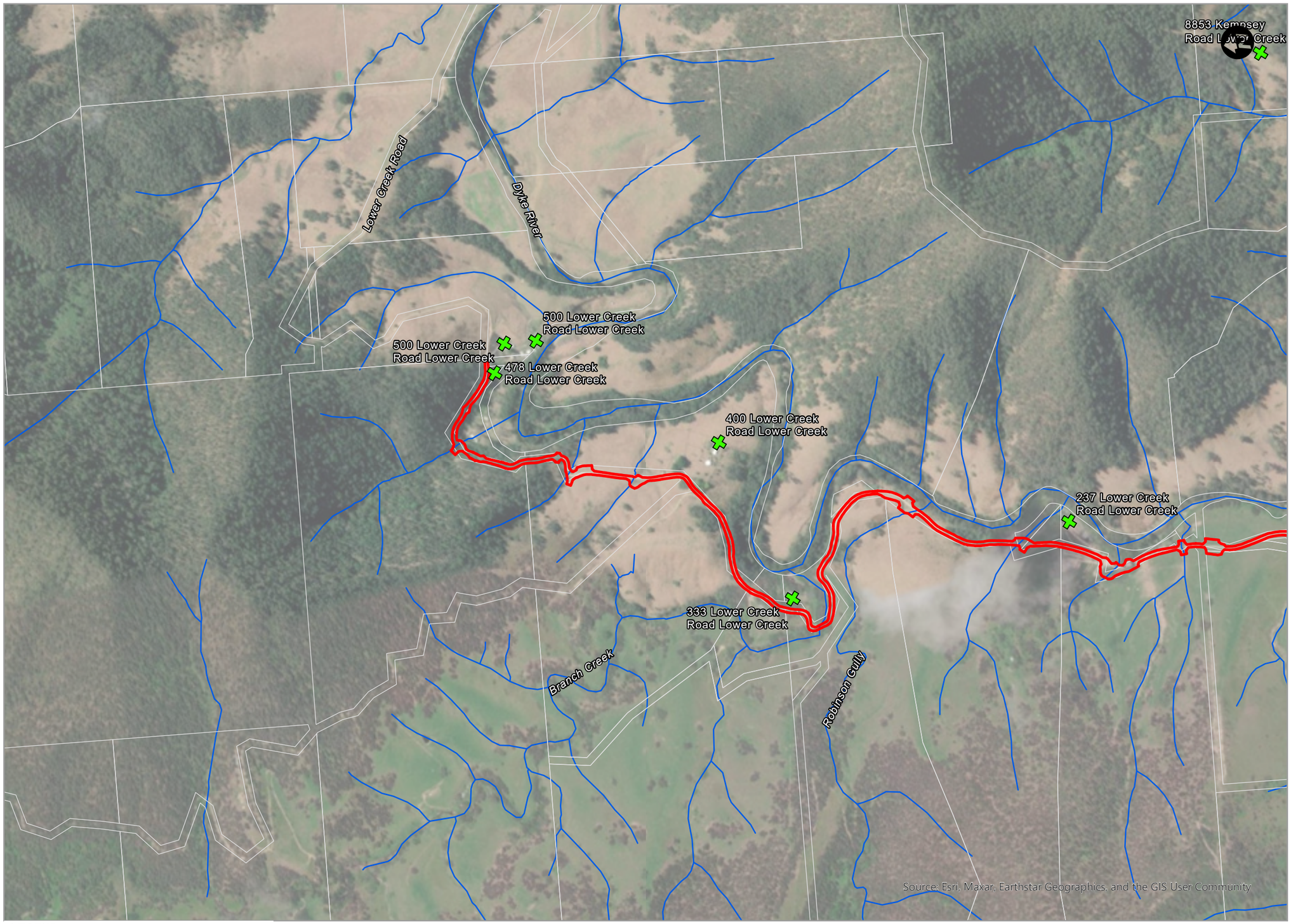

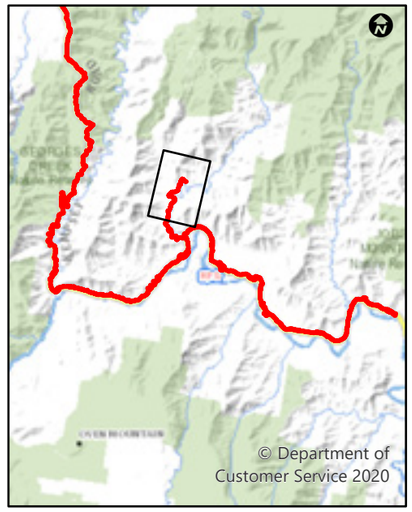

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Watercourse
- Sensitive receiver

0 200 Meters

Sensitive Receivers
Illustration 6.2 - Sheet 7 of 11

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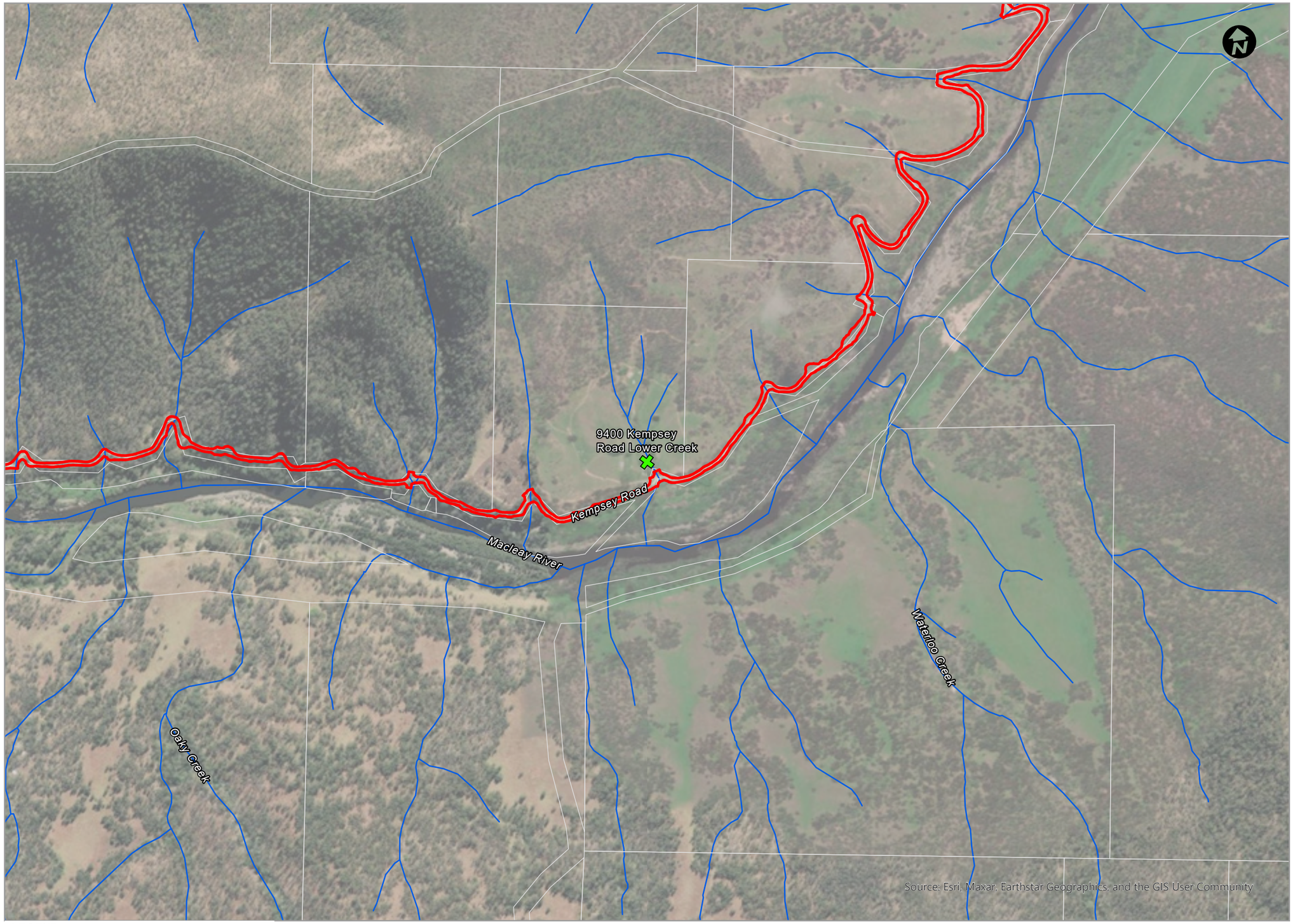

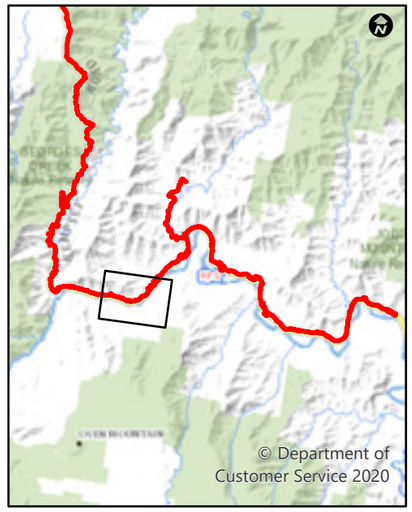

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Watercourse
- Sensitive receiver

0 200 Meters

Sensitive Receivers
Illustration 6.2 - Sheet 8 of 11

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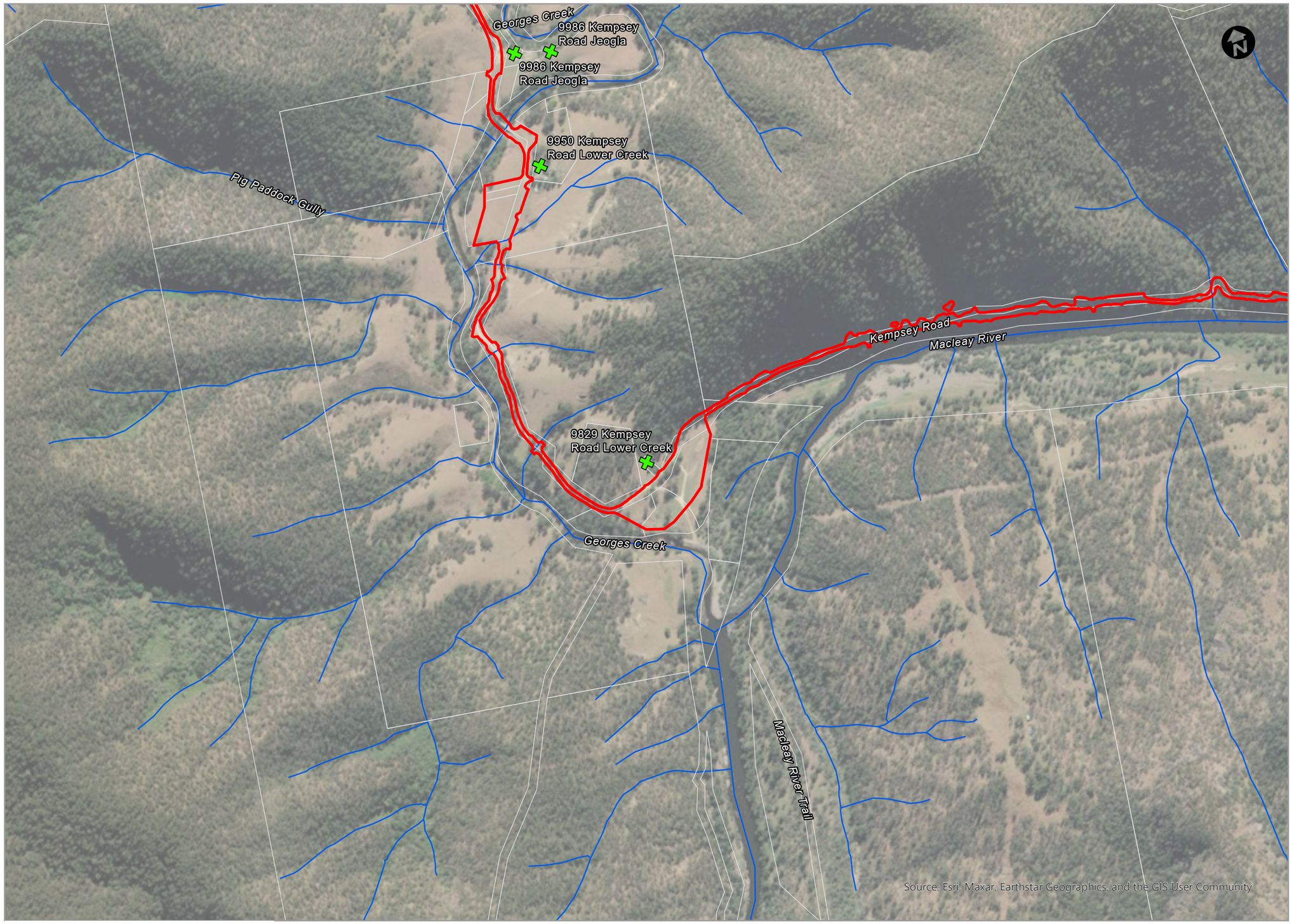

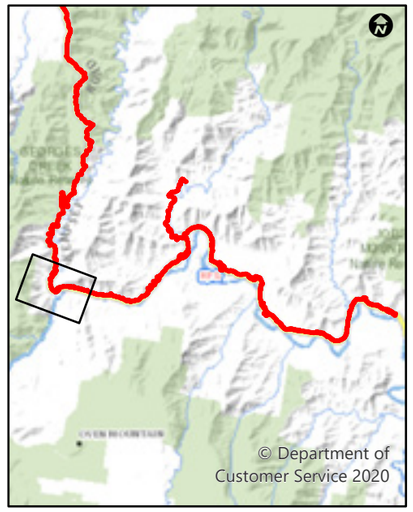

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Watercourse
- Sensitive receiver

0 200 Meters

Sensitive Receivers
Illustration 6.2 - Sheet 9 of 11

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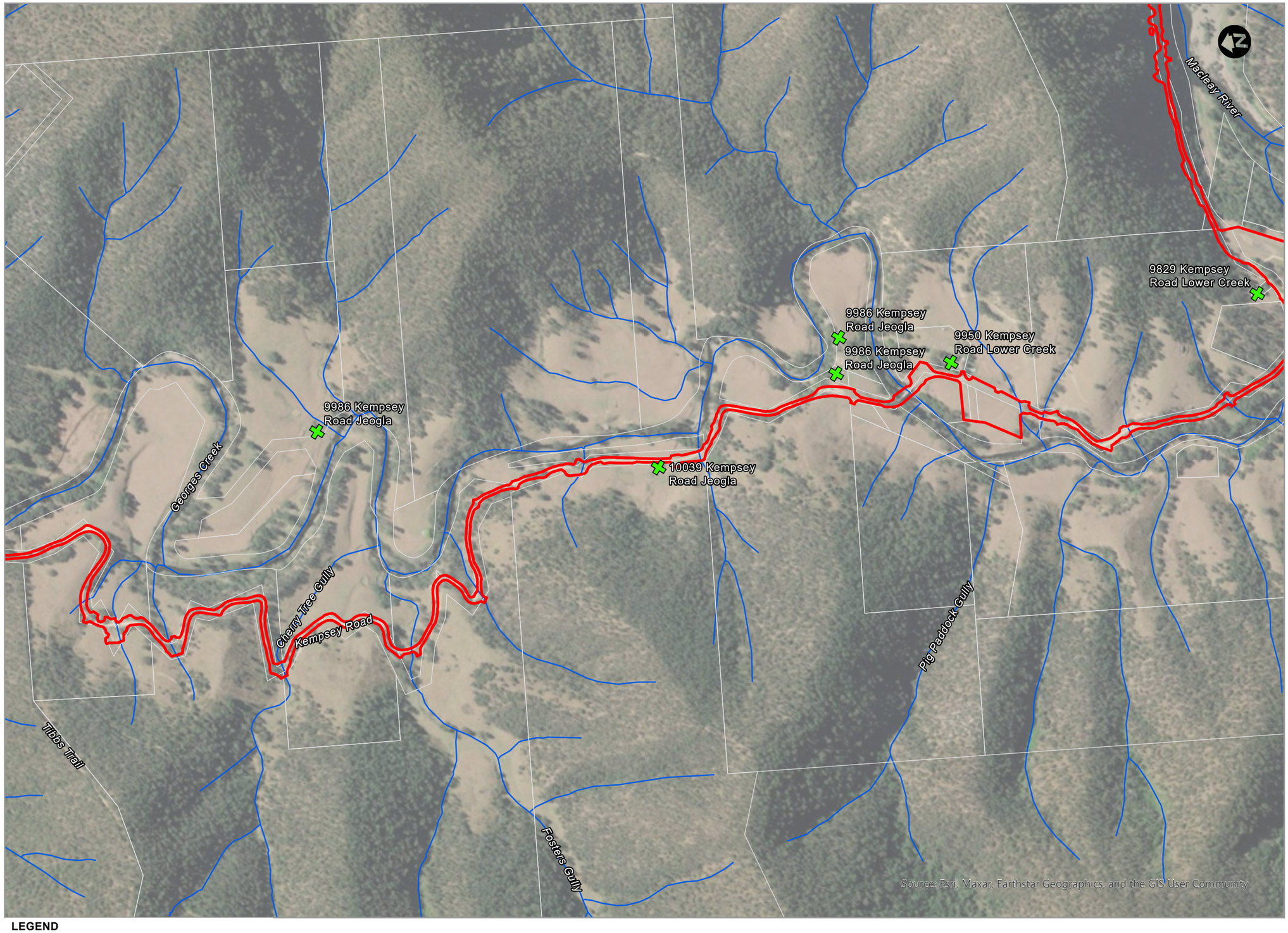

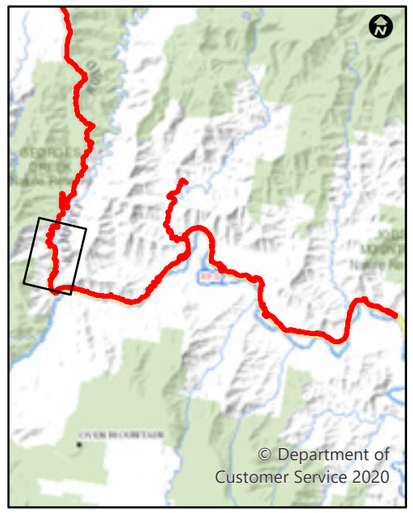

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Watercourse
- Sensitive receiver

0 200 Meters

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Review of Environmental Factors – ARC Kempsey Road Restoration
4055-1076

Sensitive Receivers
Illustration 6.2 - Sheet 10 of 11

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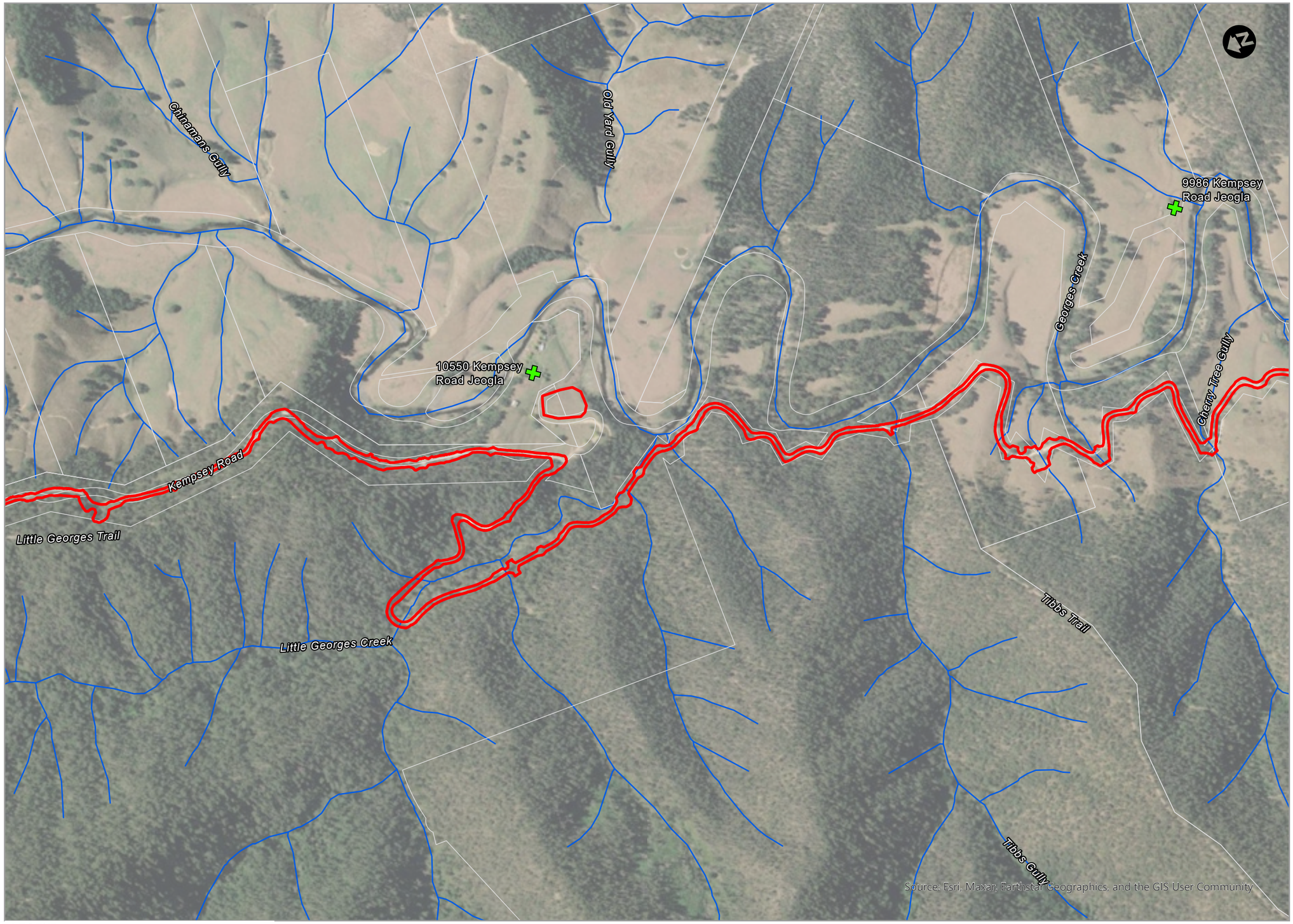

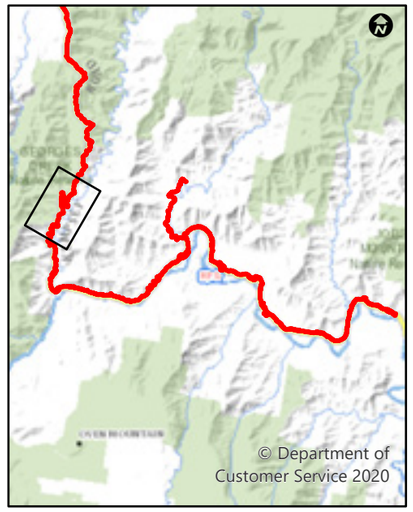

Map Sheet Location

LEGEND

- Activity boundary
- Cadastre
- Watercourse
- Sensitive receiver

0 200 Meters

Sensitive Receivers
Illustration 6.2 - Sheet 11 of 11

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4055-1076

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Operation

The Activity would not alter the alignment of the road nor is likely to lead to an increase in the number of vehicle movements. As such there is unlikely to be any change to the traffic noise level post construction.

6.5.4 Safeguards and management measures

Table 6.6 Safeguards and management measures - Noise and vibration

Impact	Environmental safeguards	Responsibility	Timing	Reference
Noise and vibration	A Noise and Vibration Management Sub-Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim Construction Noise Guideline (ICNG) (DECC, 2009) and identify: • All potential significant noise and vibration generating activities associated with the Activity. • Feasible and reasonable safeguards and management measures to be implemented, taking into account Beyond the Pavement: urban design policy, process and principles (Transport, 2014). • A monitoring program to assess performance against relevant noise and vibration criteria. • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures. • Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Contractor	Detailed design/ Pre-construction	Section 4.6 of QA *G36 Environment Protection*
Noise and vibration	All sensitive receivers (e.g., schools and local residents) likely to be affected will be notified at least seven days prior to commencement of any works associated with the Activity that may have an adverse noise or vibration impact. The notification will provide details of: • The project. • The construction period and construction hours. • Contact information for project management staff. • Complaint and incident reporting. • How to obtain further information.	Contractor	Detailed design/ Pre-construction	
Noise	The best available technology that is economically achievable is to be used for each construction task.	Contractor	Pre-construction/ Construction	Noise and Vibration Impact Assessment (**Appendix M**)
Noise	The quietest equipment that is available and economical for each task will be used and that equipment is to be located appropriately, including:	Contractor	Construction	Noise and Vibration Impact Assessment (**Appendix M**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• maintaining all equipment in good condition, with particular emphasis on noise control devices such as engine exhaust silencers, to minimise noise from each machine; • replacing all tonal reverse alarms with broadband reverse alarms, and adjusting the noise level of reverse alarms to the lowest practical level to minimise noise without compromising worker safety; • selecting the quietest available power generators, air conditioners and other camp and compound equipment, particularly for equipment that operates at night within audible range of a residence; and • arranging the layout of camps and compounds to minimise noise to residences with particular consideration for noise sources that operate at night (generators, air conditioners) and high noise level sources (earthmoving equipment, volumetric mixing equipment, and trucks).			
Noise	Equipment will be managed to minimise noise, including: • switching diesel powered or other machines off when not being used, rather than leaving machines idling for an extended period; • use of mild engine speed and power where possible, rather than full speed, to minimise engine and exhaust noise; • maintaining roads, laydown areas and stockpile areas in reasonable condition where practical, to minimise noise from vehicles travelling over uneven surfaces. this particularly applies to empty dump trucks and similar machines that can produce significant impact noise; • minimising travel distance for tracked vehicles such as dozers and excavators; • minimising the material drop height from an excavator bucket, particularly for the first load of material being deposited into a truck, to minimise impact noise as the material lands in the truck body; • avoiding and minimising vehicle movements along the road and starting other equipment before 7 am to avoid sleep disturbance for residents; • avoiding audible alarms, horns and similar devices sometimes used by an	Contractor	Construction	Noise and Vibration Impact Assessment (**Appendix M**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	excavator operator to indicate to the truck driver that the truck is loaded; and • avoiding start-up horns and similar warning devices and sources within camps and compounds, particularly for early morning (7 am) starts near residences.			
Noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • All relevant project specific and standard noise and vibration mitigation measures. • Relevant licence and approval conditions. • Permissible hours of work and any limitations on high noise generating activities. • Location of nearest sensitive receivers. • Construction employee parking areas. • Designated loading/ unloading areas and procedures. • Site opening/ closing times (including deliveries). • Environmental incident procedures.	Contractor	Construction	
Noise and vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/ or vibration levels should be scheduled during less sensitive time periods. Any variations to the standard construction hours will follow the approach RTA Environmental Facts Sheet -Noise Management and Night Works, including consultation with the affected local community.	Contractor	Construction	
Noise	Where reasonable and feasible, high noise generating activities (75dB(A)Leq at receiver) be undertaken during standard construction hours and in continuous blocks of no more than three hours with at least one hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same receiver.	Contractor	Construction	
Vibration	Vibration intensive equipment size would be selected to avoid working within the structural damage minimum working distances. The use of less vibration intensive methods of construction or equipment should be considered where feasible and reasonable.	Contractor	Construction	
Vibration	For potential sources of significant vibration including ripping rock or operating a vibrating compactor or vibrating roller: • for residences located 50 m to 100 m from the road or a work site, a smaller compactor or roller should be used where practical, or alternatively use a	Contractor	Construction	Noise and Vibration Impact Assessment (**Appendix M**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	larger non-vibrating roller. For vibrating compactors and rollers, variation of the vibration speed may avoid resonance and achieve lower vibration levels at the residence where residents report excessive vibration at the usual vibrating speed of the machine; and • for residences within 50 m of the road or a work site, a smaller compactor or roller or a larger non-vibrating roller may be required. Prior consultation with residents and vibration monitoring is required. Residents are to be consulted and vibration levels monitored in real time as the compactor or roller begins operating or approaches the residence, to determine whether vibration levels are acceptable or to immediately stop and modify work or equipment to achieve acceptable vibration levels.			
Noise and vibration	Noise and vibration complaints will be recorded, including suitable identification/ description of the source (e.g. continual/ impulsive) and general location of the complaint. Any complaints will be investigated and actioned as required.	Contractor	Construction	

6.6 Aboriginal cultural heritage

6.6.1 Methodology

The scope of works for the Activity involves works that will require site preparation involving the removal or movement of topsoils by mechanical excavation. This includes ancillary areas required for the establishment of temporary site offices, compounds, turning bays and sidetracks, and stockpile areas outside the road reserve.

An Aboriginal Cultural Heritage Assessment (Due Diligence) was completed for the Activity by Heritage Management & Planning and is provided as **Appendix H**.

The methodology used for the Due Diligence included:

- a description of the nature of the works with specific consideration of movement of topsoils with the potential to contain Aboriginal objects;
- a search of relevant Aboriginal heritage registers, including the Aboriginal Heritage Information Management System (AHIMS);
- a review of environmental information to consider the potential that the road upgrades are located in landforms with an elevated potential to contain Aboriginal objects or cultural values;
- a review of historic ground disturbance to consider factors which might have removed Aboriginal objects from the area of the proposed ancillary work areas; and
- documentation of the assessment outcomes including:
    i. a summary of any known archaeological sites or cultural landscape values within the area of the Study Area;

ii. appropriate mitigation measures to avoid known Aboriginal archaeological sites or landforms with the potential to contain Aboriginal archaeological sites; and

iii. statements on the adequacy of the assessment including the requirement for additional archaeological investigation and Aboriginal community consultation.

Site inspections were carried out as part of the assessment and are detailed in the Due Diligence report (refer to **Appendix H**). The primary focus of the inspections was the ancillary work areas/ compounds which are typically located in areas "where the terrain was most favourable for Aboriginal campsites and had not been subject to significant ground disturbance from road construction and maintenance". Works in the vicinity of previously recorded sites were investigated where possible and a sample of culverts, slip remediation areas, and proposed quarry locations were included to understand the general potential of the Activity to impact on Aboriginal sites.

The Due Diligence details consultation undertaken with the local Aboriginal community and references previous investigations and consultation with the Aboriginal community that have been carried out as part of investigations for other related projects within the study area (listed in **Section 5.3** of this REF).

6.6.2 Existing environment

The study area is located within the Dunghutti Nation/ Language Area which is broadly known to include the lands north of Wilsons River, south of the Nambucca River, and west up to the Great Dividing Range. Topography within the project area is typically located on alluvial river flats and steep to very steep slopes on the Macleay escarpment.

The Due Diligence (refer to **Appendix H**) describes the environmental features throughout the site and details the ethnohistory and archaeology for the region, which is used to establish a predictive model of the overall potential for Aboriginal archaeological sites to occur within the Study Area.

A search of the AHIMS identified 86 previously recorded sites within the study area, with four sites identified in proximity to the ancillary works areas. The locations of the identified sites are shown in Figure 2 of the Due Diligence (**Appendix H**).

6.6.3 Potential impacts

The following was noted in relation to the four sites identified by the AHIMS search within proximity to the ancillary works areas:

- The McCormacks Flat Little Smiths Creek Burial (21-5-0001) is mapped incorrectly, however the AHIMS site record form correctly places the site "20 metres north-west of the timber bridge crossing over Little Smiths Creek". The exact location is known to the Aboriginal community and the site is on a small ridge crest to the north of the Study Area. The burials have a small timber fence to demarcate the gravesites.
- The Lower Creek ceremonial site (21-5-0006) is noted as being "On the Macleay River at Lower Creek" however the site is described as a 'cave' and as such it is reasonable to infer that the site is away from the road reserve and would not likely be subject to works.
- A scar tree (21-5-0196) is identified in a 2023 study to be within the Study Area at Georges Junction. However, the photographs of the scar tree in the report indicate that this is a basic mapping error, and the scar tree is located above Georges Creek in the patch of open woodland and not immediately south of Kempsey Road.
- The site (21-5-0215) is mapped to the south of the Study Area closer to the Macleay River. No additional photos are provided within the 2023 report and this area has been previously investigated as part of the earlier Kempsey Road upgrade projects (Everick 2020A).

To provide additional protection for the scar tree (21-5-0196) located above Georges Creek, a safeguard has been included to provide an exclusion zone around the open forest west of the campground. This is to ensure the open area is not mistaken as a laydown/ storage site during the Activity.

Desktop investigations concluded that there is an overall low potential for works on the upper Macleay River and New England escarpment to impact on Aboriginal archaeological sites. Previous investigations within proximity to the Activity area included investigations and consultation with Armidale and Thungutti LALC and concluded that works in close proximity to steep-very steep slopes were not likely to impact on Aboriginal archaeological sites as Aboriginal campsites and hunting sites were predominately located on flat ground along/ above the river. Works within and in immediate proximity to the road reserve are generally within areas of previous disturbance. Slip remediation and culvert replacement/ repairs are

typically located in landforms prone to erosion and accretion of soils, reducing the likelihood that these works would impact on Aboriginal objects. Work associated with the ancillary and compound areas, however, are generally within areas that are flat and have not been subject to ground disturbance (i.e. open paddocks and undisturbed portions of the road reserve). These areas, while subject to forest removal, beef and dairy operations, and tilling/ cropping, are likely to have a low-moderate likelihood of retaining artefacts. They are generally located on flatter ground that is less likely to be affected by soil erosion.

Consequently, the Due Diligence found that in relation to the requirement for additional investigation for slip remediation and road repair works:

- due primarily to the steep nature of the local landscape resulting in damage to the road reserve, it did not consider that there is a "high probability" that Aboriginal objects will be located within the road reserve in the vicinity of flood damage or significant erosion;
- while all of the proposed ancillary works area locations have been subject to at least some degree of ground disturbance from forestry and agriculture resulting in increased topsoil erosion and "the loss of integrity of archaeological sites during periods of heavy rainfall", it is not clear that this disturbance would meet the criteria set out in the Due Diligence Code of Practice;
- Aboriginal stone artefacts are common throughout the region and, should they occur, the area would likely have limited conservation value due to disturbed setting/ agricultural context; and
- while burials are known in the upper Macleay they are typically related to historical gravesites, and traditional burials within the Study Area are not likely due to the disturbed nature of the soils which increase the rate of decay of organic material where there is localised erosion and accretion.

The following sites, or parts of the sites, that are located between Kempsey Road (on the south side) and the Macleay River were considered to have a low-moderate potential to contain Aboriginal artefacts due to the topography of the sites (refer Figures 12-17 of the Due Diligence at **Appendix H**):

- Blackbird Flat (Ancillary sites 6 and 19).
- Carrolls Creek (Ancillary site 22).
- McCormacks Flat (Ancillary site 0).
- Georges Creek (Ancillary site 7).

Construction controls are required to mitigate impacts to undisturbed topsoils in the above areas to ensure that the works are below the threshold for additional investigation or an Aboriginal Heritage Impact Permit (AHIP). The safeguards and management measures would allow the identified sites to be used for laydown and storage with protection in place for the topsoil. Laying down geofabric, aggregate, and gravel would provide a buffer over the topsoil, which could then be removed after construction is completed. Areas lacking topsoil within the identified sites, and therefore disturbed areas, would not require the protection buffer. The identified sites could not be used for activities that would require topsoil disturbance without additional investigations or an AHIP.

The ancillary sites at Lower Creek (Ancillary sites 1 and 2) located between Kempsey Road and the Macleay River have potential to contain Aboriginal artefacts/ sites as they are located on the edge of the Macleay River and are in close proximity to a recorded ceremonial/ mythological site and historical Aboriginal campsite. The Due Diligence recommended that the lands between Kempsey Road and the Macleay River should be excluded from the work program. However, if this is not possible then further archaeological investigations would be required to understand the archaeological potential and the need for an AHIP for ground disturbing works on this area.

The Due Diligence assessment concluded that the proposed ancillary work areas along the Kempsey Road are located within landform areas which have the potential to contain Aboriginal archaeological sites. However, based on the findings of the Due Diligence assessment, additional investigation in accordance with the Code of Practice for the Investigation of Aboriginal Objects (DEECW 2010B) or the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (OEH 2011) is not required, subject to the implementation of the recommended safeguards and management measures.

Subject to implementation of the recommended safeguards and management measures the Activity is not likely to result in harm to Aboriginal objects.

It is not expected that following completion of the Activity the operation of the subject road would have any impact on Aboriginal heritage.

6.6.4 Safeguards and management measures

Table 6.7 Safeguards and management measures - Aboriginal cultural heritage

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal heritage	An Aboriginal Heritage Management Sub-Plan (AHMP) will be prepared and implemented as part of the CEMP. It will provide specific drafting guidance on measures and controls to be implemented for managing impacts on Aboriginal heritage. The AHMP will be prepared in consultation with all relevant Aboriginal groups. The CEMP is to include mapping of areas where topsoil is present and would be subject to additional safeguards and management measures for any sites determined and identified as having a low-moderate potential to contain Aboriginal artefacts due to the flat topography of the site and proximity to the Macleay River.	Contractor	Detailed design/ Pre-construction	Section 4.9 of QA *G36 Environment Protection*
Aboriginal heritage	If suspected Aboriginal objects have been uncovered as a result of development activities within the Project Area: a) Work in the surrounding area is to stop immediately and records are to be made of the finds via project reporting procedures. b) A temporary fence is to be erected around the site and appropriate controls put in place to ensure that no additional ground disturbance happens in the vicinity of the find. c) An appropriately qualified archaeological consultant and a representative of the Armidale or Thungutti LALC (Blackbird Flat) are to be engaged to identify the material and provide an initial assessment of the significance of the object and the likely nature and extent of any associated archaeological sites. d) If the material is found to be of Aboriginal origin, the find must be reported on the AHIMS database. e) In the event that the Aboriginal objects are considered to have been damaged or disturbed, the incident must be reported through the NSW Enviro Hotline. f) Works may only recommence after advice from Heritage NSW on the requirement for an AHIP or where design, engineering or construction measures are identified to mitigate further damage to the Aboriginal site (i.e. site avoidance).	Contractor	Pre-construction/ Construction	ACHA (**Appendix H**)
Aboriginal heritage	If suspected human remains are discovered and/ or harmed in, on, or under the land within the Activity area, all works must halt in the immediate area to prevent any further impacts to the remains. The burial site should be cordoned off and the remains themselves should be left untouched. The nearest police station (Kempsey or Armidale), Armidale or Thungutti LALC and Heritage NSW (Parramatta) are all to be	Contractor	Pre-construction/ Construction	ACHA (**Appendix H**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the site for criminal activities, the Aboriginal community and the Heritage NSW should be consulted as to how the remains should be dealt with. Work may only resume after agreement is reached between all parties, provided it is in accordance with all parties' statutory obligations.			
Aboriginal heritage	Blackbird Flat (Ancillary site 6/19): During detailed design and pre-construction, the avoidance of using Blackbird Flat is to be investigated and implemented if possible. If the site will be avoided, then the area is to be identified as a no-go zone, documented in the CEMP, and a visual barrier erected on site for the duration of the Activity. If using Blackbird Flat cannot be avoided to facilitate construction then disturbance of topsoil is to be avoided, with usage of the site restricted to laydown and storage only, and the following in place: • Topsoil is not to be disturbed and the site is to be considered a no-go zone until all measures are in place. • Where possible, works are to be kept to areas where the topsoil has already been removed (i.e. within the Blackbird Flat Camping Ground and access road), as identified in the CEMP. • For areas where the topsoil is present, as identified in the CEMP, the topsoil is not to be disturbed and a protection buffer consisting of geofabric, aggregate, and gravels is to be laid onto the existing topsoil and grass layer. • At the completion of the use of the area, the protection buffer is to be removed in a manner that does not disturb the topsoil and grass layer underneath. In the event that activities that would disturb topsoil or require the removal/ relocation of topsoil, the following is required: • The area is to be designated as a no-go zone until the following measures have been completed/ put in place. • Preferred option: The works will be subject to archaeological investigation by a qualified specialist/ archaeologist to determine the requirement for an AHIP (if artefacts are present) or to comply with the Due Diligence Code of Practice (if artefacts are not present). If an AHIP is to be pursued, the	Contractor/ ARC	Detailed Design/ Pre-construction/ Construction	ACHA (**Appendix H**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	investigation is to be documented in an Aboriginal cultural heritage assessment report (ACHAR), written in accordance with the 2011 Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). • Alternative option: An Aboriginal sites officer from Thungutti LALC will be engaged as a 'spotter' to check and sift through topsoil as it is moved. Topsoil is to be placed in a location and manner that supports the ability for the spotter to check the soil for artefacts. This may require the topsoil to be placed in a temporary location prior to relocating to a stockpile. The LALC and/ or the archaeologist is to be consulted on the appropriate location and process to facilitate the spotter job. If artefacts are found during the spotter process, all work in the area is to stop immediately and the Unexpected Finds Procedure is to be implemented, supported by the spotter. • If it is determined that an AHIP is required for the area, no works in the area are to proceed and the area is to be visually identified as a no-go zone until the AHIP is in place.			
Aboriginal heritage	Carrolls Creek (Ancillary site 22): During detailed design and pre-construction, the avoidance of using Carrolls Creek is to be investigated and implemented if possible. If the site will be avoided, then the area is to be identified as a no-go zone, documented in the CEMP, and a visual barrier erected on site for the duration of the Activity. If using Carrolls Creek cannot be avoided to facilitate construction then disturbance of topsoil is to be avoided, with usage of the site restricted to laydown and storage only, and the following in place: • Topsoil is not to be disturbed and the site is to be considered a no-go zone until all measures are in place. • Topsoil is not to be disturbed and a protection buffer consisting of geofabric, aggregate, and gravels is to be laid onto the existing topsoil and grass layer. • At the completion of the use of the area, the protection buffer is to be removed in a manner that does not	Contractor/ ARC	Pre-construction/ Construction	ACHA (**Appendix H**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	disturb the topsoil and grass layer underneath. In the event that activities that would disturb topsoil or require the removal/ relocation of topsoil, the following is required: • The area is to be designated as a no-go zone until the following measures have been completed/ put in place. • Preferred option: The works will be subject to archaeological investigation by a qualified specialist/ archaeologist to determine the requirement for an AHIP (if artefacts are present) or to comply with the Due Diligence Code of Practice (if artefacts are not present). If an AHIP is to be pursued, the investigation is to be documented in an Aboriginal cultural heritage assessment report (ACHAR), written in accordance with the 2011 Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). • Alternative option: An Aboriginal sites officer from Thungutti LALC will be engaged as a 'spotter' to check and sift through topsoil as it is moved. Topsoil is to be placed in a location and manner that supports the ability for the spotter to check the soil for artefacts. This may require the topsoil to be placed in a temporary location prior to relocating to a stockpile. The LALC and/ or the archaeologist is to be consulted on the appropriate location and process to facilitate the spotter job. If artefacts are found during the spotter process, all work in the area is to stop immediately and the Unexpected Finds Procedure is to be implemented, supported by the spotter. • If it is determined that an AHIP is required for the area, no works in the area are to proceed and the area is to be visually identified as a no-go zone until the AHIP is in place.			
Aboriginal heritage	McCormacks (Ancillary site 0): During detailed design and pre-construction, the avoidance of using McCormacks is to be investigated and implemented if possible. If the site will be avoided, then the area is to be identified as a no-go zone, documented in the CEMP, and a visual barrier erected on site for the duration of the Activity.	Contractor/ ARC	Pre-construction/ Construction	ACHA (**Appendix H**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	If using McCormacks cannot be avoided to facilitate construction then disturbance of topsoil is to be avoided, with usage of the site restricted to laydown and storage only, and the following in place: • Topsoil is not to be disturbed and the site is to be considered a no-go zone until all measures are in place. • Topsoil is not to be disturbed and a protection buffer consisting of geofabric, aggregate, and gravels is to be laid onto the existing topsoil and grass layer. • At the completion of the use of the area, the protection buffer is to be removed in a manner that does not disturb the topsoil and grass layer underneath. In the event that activities that would disturb topsoil or require the removal/ relocation of topsoil, the following is required: • The area is to be designated as a no-go zone until the following measures have been completed/ put in place. • Preferred option: The works will be subject to archaeological investigation by a qualified specialist/ archaeologist to determine the requirement for an AHIP (if artefacts are present) or to comply with the Due Diligence Code of Practice (if artefacts are not present). If an AHIP is to be pursued, the investigation is to be documented in an Aboriginal cultural heritage assessment report (ACHAR), written in accordance with the 2011 Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). • Alternative option: An Aboriginal sites officer from Thungutti LALC will be engaged as a 'spotter' to check and sift through topsoil as it is moved. Topsoil is to be placed in a location and manner that supports the ability for the spotter to check the soil for artefacts. This may require the topsoil to be placed in a temporary location prior to relocating to a stockpile. The LALC and/ or the archaeologist is to be consulted on the appropriate location and process to facilitate the spotter job. If artefacts are found during the spotter process, all work in the area is to stop immediately and the Unexpected Finds Procedure is to be implemented, supported by the spotter.			

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• If it is determined that an AHIP is required for the area, no works in the area are to proceed and the area is to be visually identified as a no-go zone until the AHIP is in place.			
Aboriginal heritage	Lower Creek (Ancillary site 1 and 2): During detailed design and pre-construction, the avoidance of using Lower Creek is to be investigated and implemented if possible. If the site will be avoided, then the area is to be identified as a no-go zone, documented in the CEMP, and a visual barrier erected on site for the duration of the Activity. If using Lower Creek cannot be avoided to facilitate construction, then the following is required: • The area is to be designated as a no-go zone until the investigation measures have been completed by a suitably qualified specialist/ archaeologist and an AHIP has been put in place if required. • Consultation in accordance with the Aboriginal cultural heritage consultation requirements for proponents (DEECW 2010C) is to be completed. • An investigation is to be completed following the code of practice and will consist of 1x1 m archaeological test pits within the footprint of the works area to determine the nature and extent of archaeological artefacts/ sites. • If an AHIP is to be pursued, the investigation is to be documented in an ACHAR, written in accordance with the 2011 Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). • If it is determined through the archaeological investigation/ ACHAR that an AHIP is required for the area, no works in the area are to proceed and the area is to be visually identified as a no-go zone until the AHIP is in place.	Contractor/ ARC	Pre-construction/ Construction	ACHA (**Appendix H**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal heritage	Georges Junction (Ancillary site 7): During detailed design and pre-construction, the avoidance of using Georges Junction is to be investigated and implemented if possible. If the site will be avoided, then the area is to be identified as a no-go zone, documented in the CEMP, and a visual barrier erected on site for the duration of the Activity. If using Georges Junction cannot be avoided to facilitate construction then disturbance of topsoil is to be avoided, with usage of the site restricted to laydown and storage only, and the following in place: • Topsoil is not to be disturbed and the site is to be considered a no-go zone until all measures are in place. • Where possible, works are to be kept to areas where the topsoil has already been removed (i.e. within the Camping Ground and the pad form the previous ancillary works), as identified in the CEMP. • For areas where the topsoil is present, as identified in the CEMP, the topsoil is not to be disturbed and a protection buffer consisting of geofabric, aggregate, and gravels is to be laid onto the existing topsoil and grass layer. • At the completion of the use of the area, the protection buffer is to be removed in a manner that does not disturb the topsoil and grass layer underneath. In the event that activities that would disturb topsoil or require the removal/ relocation of topsoil, the following is required: • The area is to be designated as a no-go zone until the following measures have been completed/ put in place. • Preferred option: The works will be subject to archaeological investigation by a qualified specialist/ archaeologist to determine the requirement for an AHIP (if artefacts are present) or to comply with the Due Diligence Code of Practice (if artefacts are not present). If an AHIP is to be pursued, the investigation is to be documented in an Aboriginal cultural heritage assessment report (ACHAR), written in accordance with the 2011 Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). • Alternative option: An Aboriginal sites officer from Thungutti LALC will be engaged as a 'spotter' to check and sift	Contractor/ ARC	Pre-construction/ Construction	ACHA (**Appendix H**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	through topsoil as it is moved. Topsoil is to be placed in a location and manner that supports the ability for the spotter to check the soil for artefacts. This may require the topsoil to be placed in a temporary location prior to relocating to a stockpile. The LALC and/ or the archaeologist is to be consulted on the appropriate location and process to facilitate the spotter job. If artefacts are found during the spotter process, all work in the area is to stop immediately and the Unexpected Finds Procedure is to be implemented, supported by the spotter. • If it is determined that an AHIP is required for the area, no works in the area are to proceed and the area is to be visually identified as a no-go zone until the AHIP is in place.			
Aboriginal heritage	An exclusion zone will be set up and visually delineated around the open forest west of the campground to avoid impacts to the scar tree (21-5-0196) for the duration of the Activity.	Contractor	Pre-construction/ construction	ACHA (**Appendix H**)
Aboriginal heritage	All personnel working on site will be inducted and receive information on the required process, should a potential Aboriginal object be found.	Contractor	Pre-construction/ construction	Additional mitigation measure

6.7 Surface water, hydrology, and flooding

6.7.1 Methodology

The surface water assessment for the Activity adopted the following methodology:

- Review of available water quality, flooding data, and existing conditions to define the existing environment.
- Identification of the potential impact of construction and operational activities and potential cumulative impact on water quality with reference to the Australian and New Zealand Environment and Conservation Council (ANZECC) water quality guidelines (2000) and NSW Water Quality Objectives (WQOs) (NSW Government, 2006) for protection of the relevant environmental values.
- Development of safeguards and management measures to manage surface water impacts resulting from the Activity.

6.7.2 Existing environment

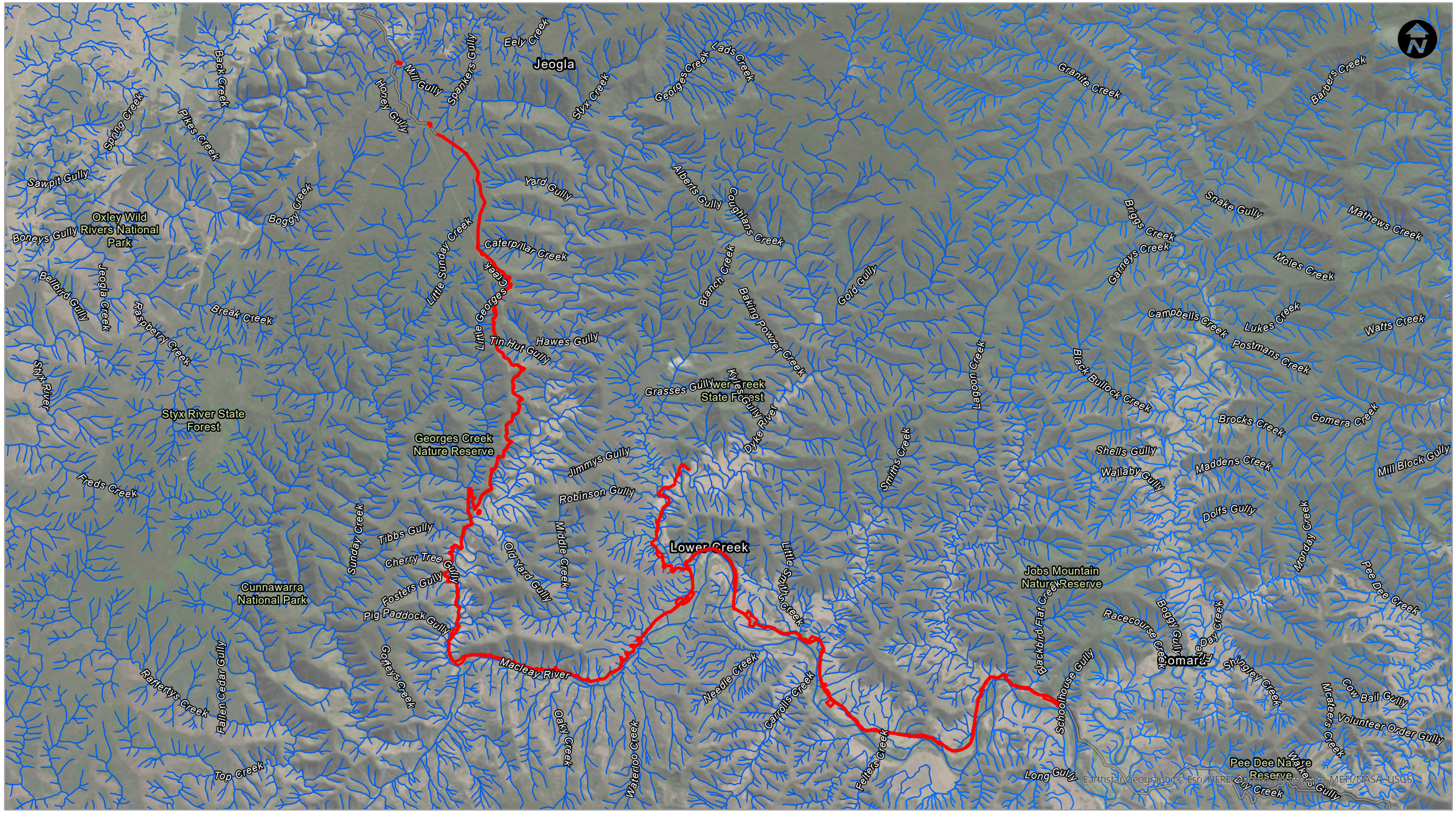
6.7.2.1 Surface water quality

The Activity boundary is located immediately north of the Macleay River (refer to **Illustration 6.3**) following the adjacent cliff-lines running west to east from the Great Dividing Range. The terrain is steep in sections and the road is prone to washouts and slips.

The Macleay River is the fourth largest coastal river in New South Wales and flows from the agriculture-dominated Northern Tablelands through a rugged and sparsely populated mid-catchment (refer to **Plate 6.5**). The wider valleys of the lower catchment are used for livestock grazing, agriculture, and dairying. Grazing accounts for over half of land use within the

catchment, and forest accounts for around 40% of land use (NSW Government, 2023a). Major towns in the catchment are Armidale, Walcha, and Kempsey.

Plate 6.5 Macleay River – Comara



LEGEND

- Activity boundary
- Watercourse

0 2 Km

Nearby Waterways - Illustration 6.3

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: Department of Customer Services
Date: 27/11/2023
Revision: D

There are a number of watercourses in vicinity of the Activity boundary that are tributaries to the Macleay River, these watercourses and their stream order values are shown in **Figure 6.4**, **Figure 6.5**, and **Figure 6.6**, and include:

- Yard Gully;
- Little Sunday Creek;
- Georges Creek;
- Caterpillar Creek;
- Little Georges Creek;
- Tin Hut Gully;
- Tibbs Gully;
- Cherry Tree Gully;
- Fosters Gully;
- Pig Paddock Gully;
- Middle Creek;
- Dyke River;
- Little Smiths Creek;
- Lagoon Creek;
- Blackbird Flat Creek; and
- Schoolhouse Gully.

Macleay River catchment (refer to **Figure 6.7**) has an area of 11,450 km2 (NSW Government, 2023a) and has water quality objectives (NSW Government, 2006) for:

- aquatic ecosystems;
- visual amenity;
- primary contact recreation;
- secondary contact recreation;
- aquatic foods;
- livestock water supply;
- irrigation water supply;
- homestead water supply;
- drinking water – disinfection only;
- drinking water – clarification and disinfection; and
- drinking water – Groundwater.

The Macleay River would be considered slightly to moderately disturbed watercourse due to catchment land use practices including urban development, agriculture, and mining. Many of the minor watercourses within the Activity boundary are also considered slightly to moderately disturbed due to historical vegetation clearing and livestock grazing.

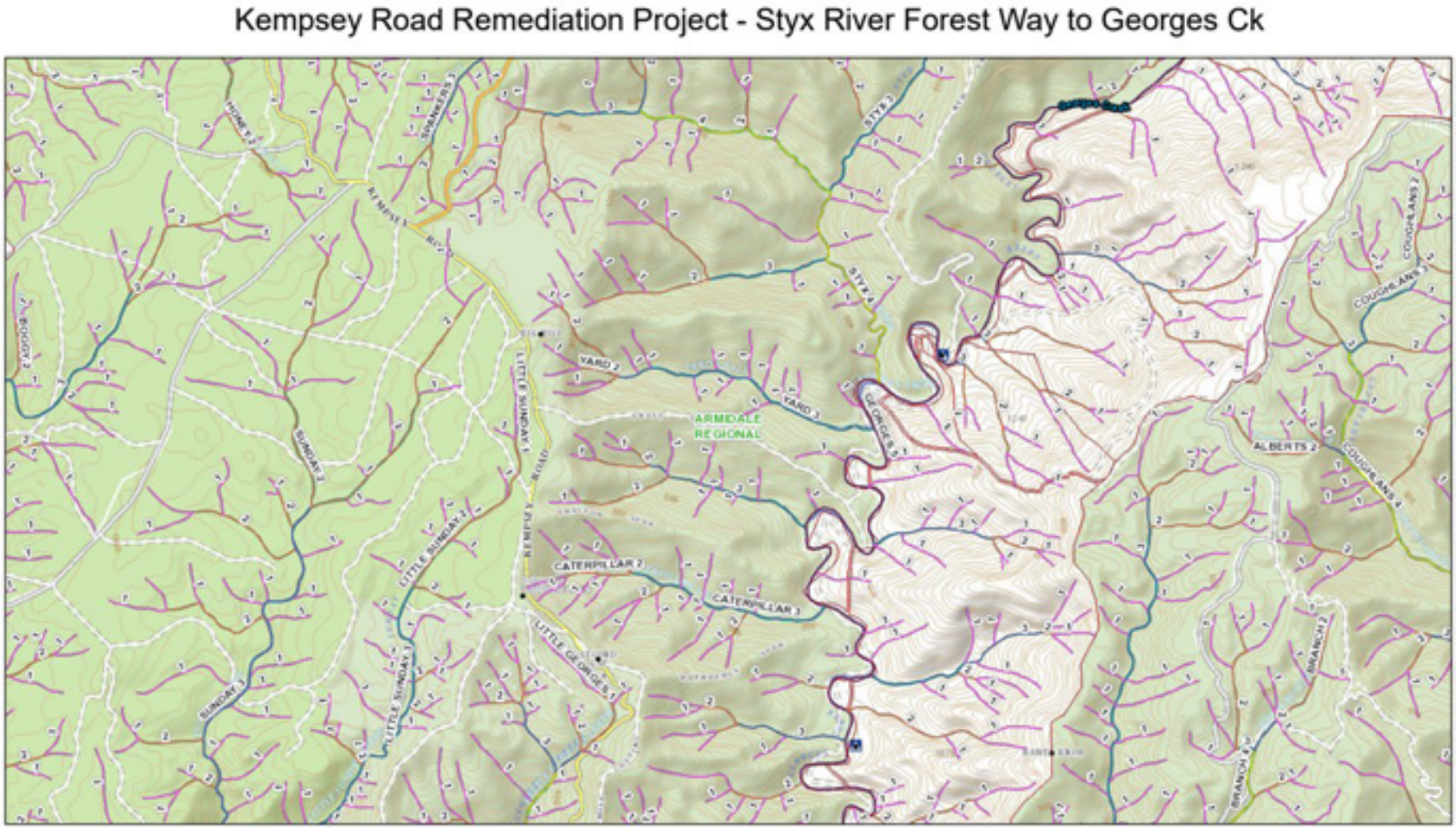


Figure 6.4 Nearby Waterways – Styx River Forest Way to Georges Creek

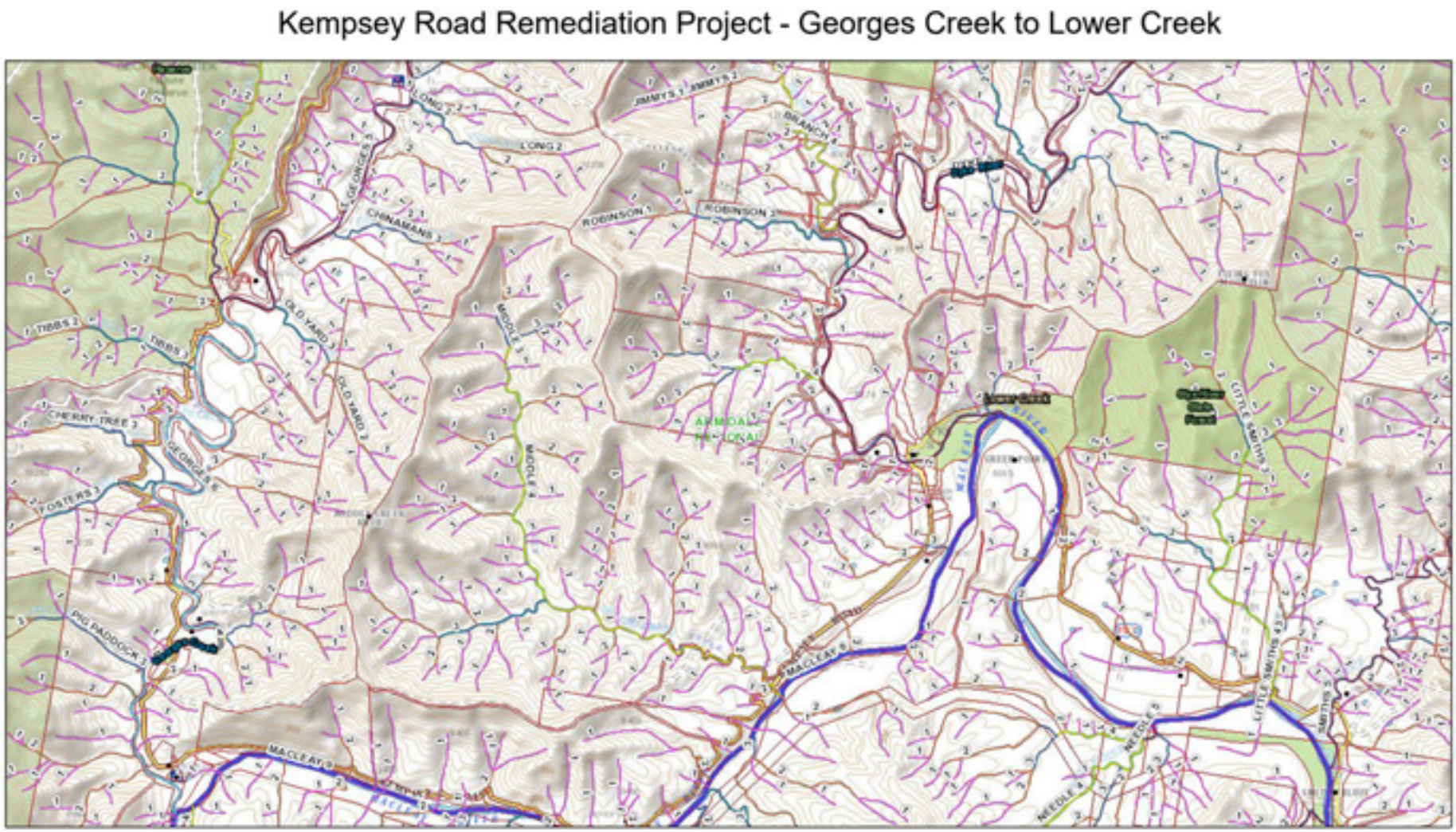


Figure 6.5 Nearby Waterways – Georges Creek to Lower Creek

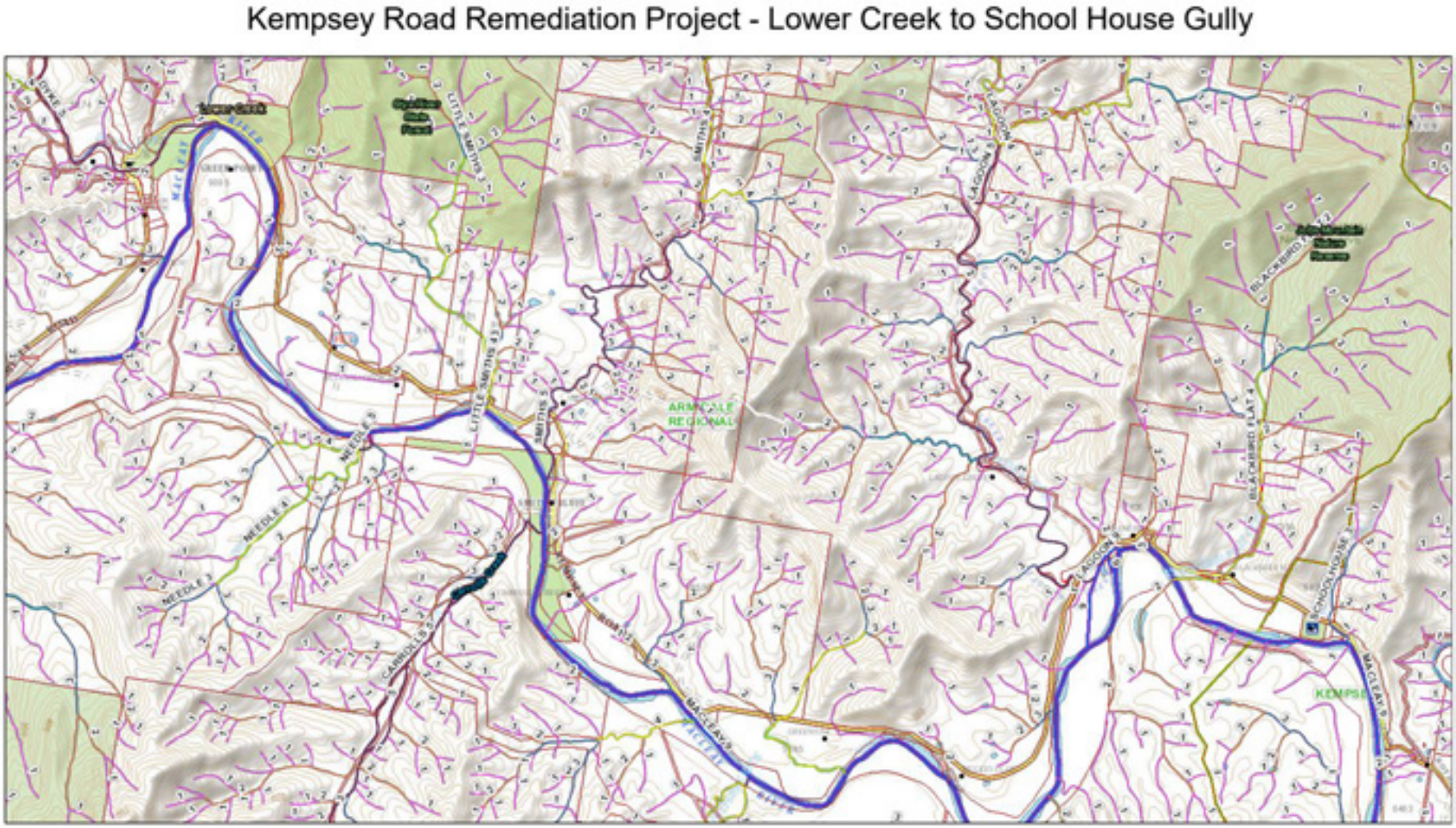


Figure 6.6 Nearby Waterways – Lower Creek to School House Gully

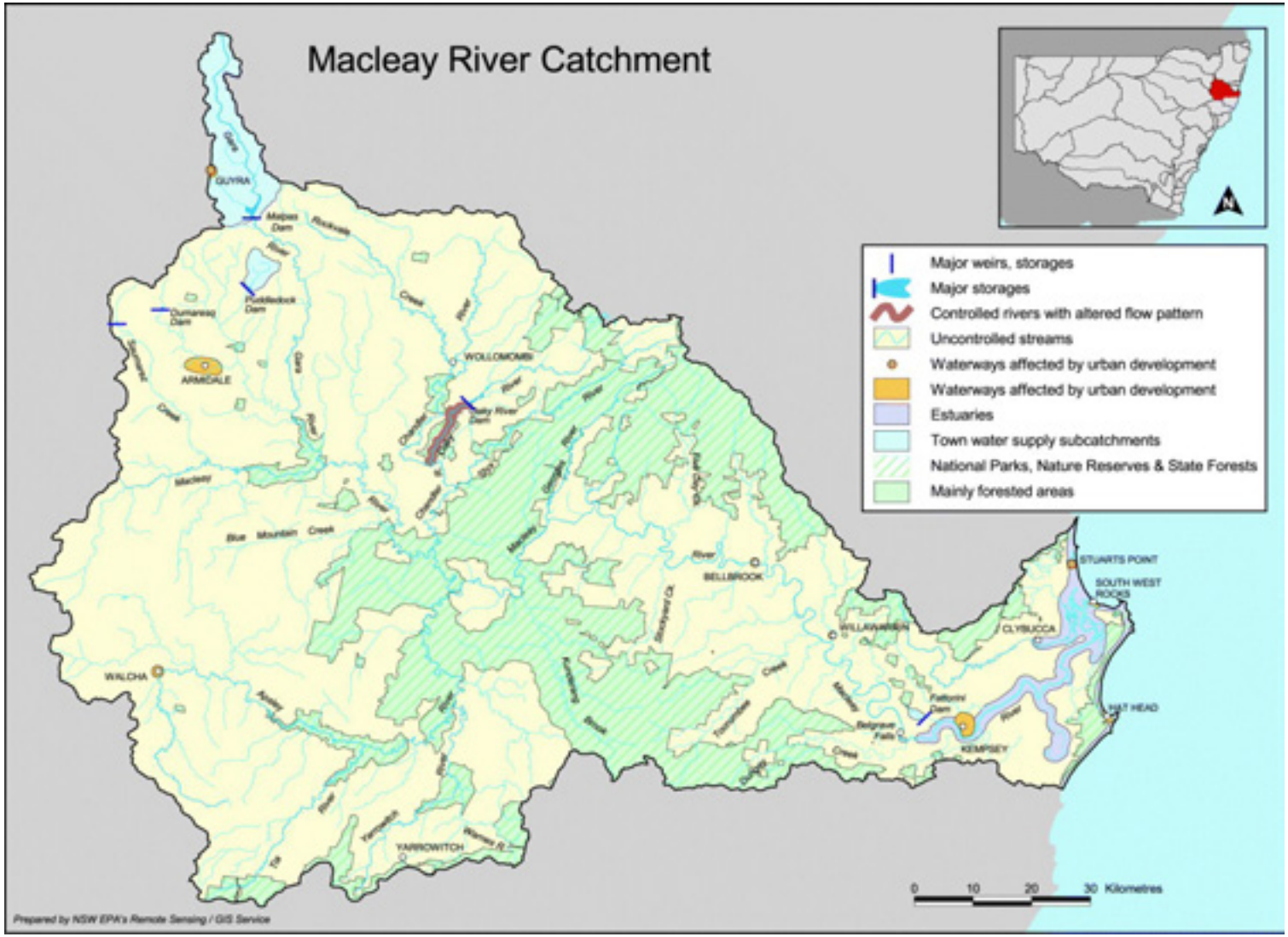


Figure 6.7 Macleay River Catchment

Water Quality Objectives (WQOs) for physical and chemical stressors provided by the NSW Water Quality Objectives (NSW Government, 2006) and ANZECC (2000) are shown in **Table 6.8**.

Water quality of the Macleay River was performed by EMM during the Oven Mountain Pumped Hydro Energy Storage EIS (O'Brien, 2023) over the 2021 – 2022 period. The results of this monitoring regime are shown in **Table 6.9**. These results indicate that pH is an issue for the aquatic environment in the Macleay River and care should be taken when using lime or gypsum in any land application during the Activity. The turbidity of the Macleay River is quite good and runs quite clear for the majority of the length through the Activity works area (refer to **Plate 6.6**). Electrical conductivity and dissolved oxygen are both within the aquatic environment WQOs. Heavy metals have been noted at elevated levels in the Macleay River catchment, particularly upstream from the Activity works area, from the Bakers Creek sub-catchment. This is largely from previous mining activities that have been undertaken in that area (Ashley et al., 2007). The Activity is not expected to generate surface water runoff with metal concentrations that would contribute to the levels already noted in Macleay River.

Table 6.8 Macleay River water quality objectives

Parameter	Units	Aquatic Ecosystem	Primary Contact	ADWG (health)*	Livestock Water Supply	Irrigation Water Supply
pH	-	6.5–8.5	5.0–9.0	-	-	6.5–8.5
Turbidity	NTU	50	6	-	-	-
Electrical Conductivity	µS/cm	200–300**	-	<896	3,582	<950
Dissolved Oxygen	%	85–110	-	-	-	-

* source: (National Health and Medical Research Council, 2022)
** . Values typical of NSW low land rivers as described in Table 3.3.3 of ANZECC (2000)

Table 6.9 Macleay River water quality monitoring

Parameter	Units	Minimum	Median	Maximum
pH	-	10.3	13.7	24.8
Turbidity	NTU	22	55	70
Electrical Conductivity	µS/cm	73	149	192
Dissolved Oxygen	%	72	85	103

Plate 6.6 Macleay River Water Quality - Comara

Existing water users

Water NSW maintains a Water Register (WaterNSW, 2023) of current water access licenses associated with taking water from designated water sources. The Macleay River is segregated into three water source allocation areas:

- Macleay Gorges;
- Macleay Valley; and
- Macleay Coastal Sands Groundwater.

For this assessment the Macleay Gorges and Macleay Valley are the areas of concern for water users in the vicinity of the Activity boundary.

The Macleay Gorges has one water access licence which is in the unregulated river access licence category.

The Macleay Valley has multiple water access licences which are shown in **Table 6.10**.

Table 6.10 Macleay Valley water access licences

Access Licence Category	No. of Water Access Licenses	Water Made Available (ML)	Usage YTD* (ML)
Aquifer	5	281	0
Domestic and Stock	1	4	0
Domestic	4	4	0
Local Water Utility - Groundwater	2	10,100	2,492.7
Local Water Utility – Unregulated River Water	2	41	8.1
Unregulated River Water	65	3,379	0

* Year to Date (YTD) 2023/2024.

Potable water supply

The Activity will depend on surface water access for potable water supply and as shown in **Table 6.10** other land users in this area also depend on the Macleay River for domestic and stock supply. Water quality of Macleay River compared against the Australian Drinking Water Guidelines (NHMRC, 2022) is shown in **Table 6.11**. Only Antimony has been recorded as exceeding the guidelines. Antimony has been reported as having health impacts, including nausea, vomiting, and diarrhoea, after several days of exposure over 30 mg/L. The World Health Organization has placed a guideline value of 20 µg/L on Antimony in drinking water in order to prevent health implications (World Health Organization, 2003), which the current levels in Macleay River currently meet.

Studies conducted in Macleay River catchment (Ashley et al., 2007) indicate that Antimony and Arsenic levels have been reported at high levels in stream sediments and water quality of the Macleay River and there is a high likelihood this is attributed to upstream mining activities.

Table 6.11 Macleay River water quality - Drinking water

Parameter	Units	ADWG (health)*	Macleay River (Maximum Values)**
Electrical Conductivity	µS/cm	<896	192
Arsenic	µg/L	10	3
Antimony	µg/L	3	10
Cadmium	µg/L	2	-
Chromium	µg/L	50	-
Copper	µg/L	2,000	2
Lead	µg/L	10	-
Manganese	µg/L	500	34
Mercury	µg/L	1	-
Nickel	µg/L	20	2

*source: (National Health and Medical Research Council, 2022)

**Water quality values obtained from 2021-2022 water monitoring for Oven Mountain Pumped Hydro EIS assessment (O'Brien, 2023)

6.7.2.2 Climate

The Macleay River catchment has a variable climate along its extent ranging from cool temperate-to-subtropical climate with summer-dominated rainfall (Johnston & Maher, 2022).

The nearest Bureau of Meteorology (BOM) weather stations in proximity to the Activity boundary are Jeogla Station (57011) and Lower Creek (57052) (Bureau of Meteorology, 2023). These two stations illustrate the diversity of the climate at the different elevations within the Activity boundaries as shown in **Table 6.12**. Rainfall occurrence is typically highest between November and March, with lowest rainfall occurrence during July and August.

Climate data is obtained as Patched Point Data from the Queensland Government SILO database. SILO (Scientific Information for Land Owners) is a database of historical climate records for Australia. Patched Point Data is a daily time series of data at a point location consisting of station records which have been supplemented by interpolated estimates, including Computerising the Australian Climate Archives (CLIMARC) data, when observed data are missing. This allows for a full data set from the 1 January 1889 through to the current date.

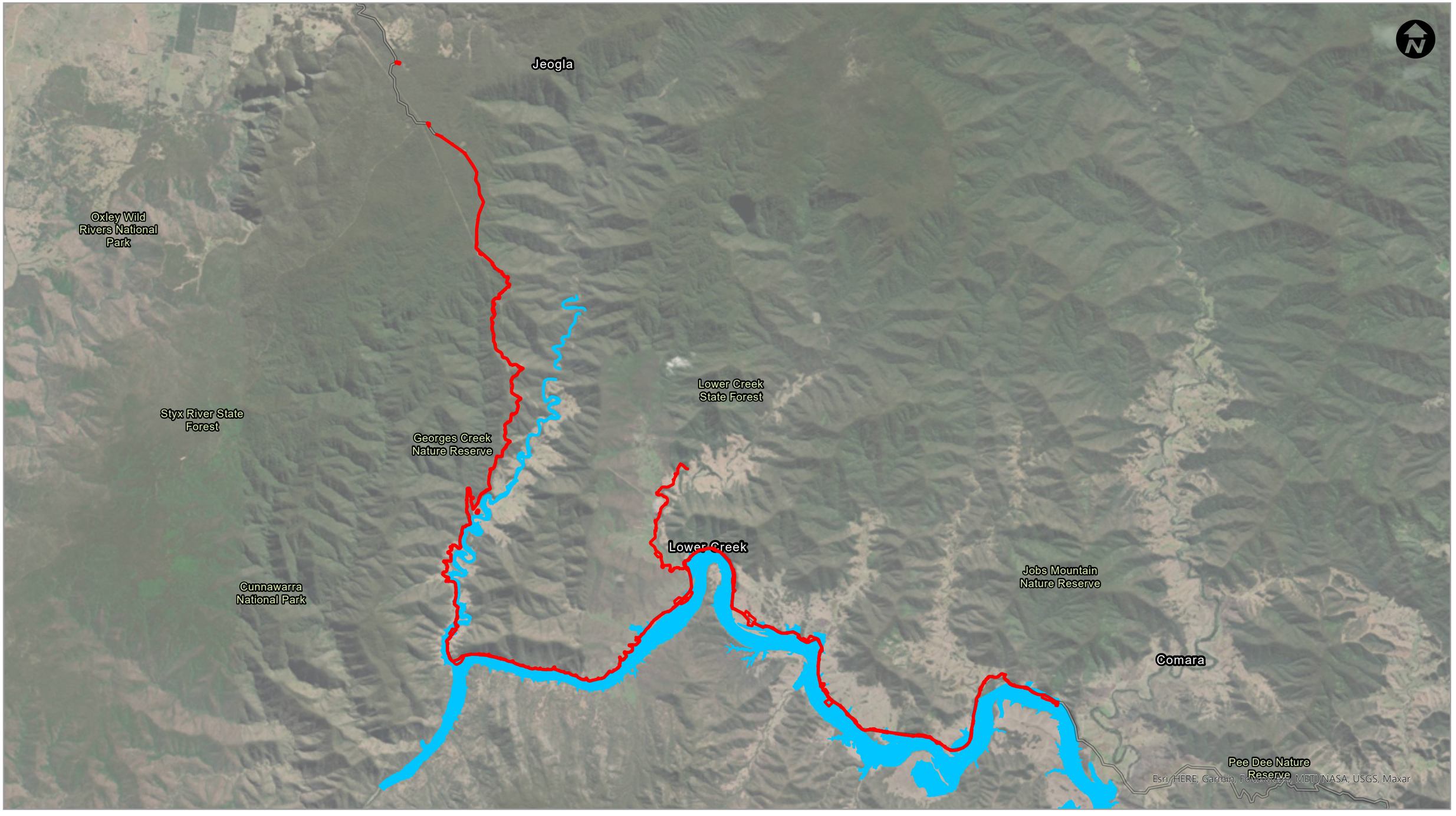
Table 6.12 Climate data – Macleay catchment

Parameter	Units	Jeogla Station (57011)	Lower Creek (57052)
Elevation	m AHD	950	130
Average Rainfall	mm/year	935	1,069
Maximum Rainfall	mm/year	1,781	1,724
Lowest Rainfall	mm/year	310	597

6.7.2.3 Flooding

Due to large variability in the flow regime, the Macleay River system may experience flooding at any time during the year, and the Macleay Valley typically experiences flooding every two to three years. After major rain events the Macleay River at Kempsey can rise rapidly from a dry weather discharge of 56m³/sec to 14,160m³/sec in a 30-hour period.

There are sections of the Activity boundary which are mapped as being susceptible to flooding under 1% AEP floods (refer to **Illustration 6.4**). The affected areas are at Georges Junction, Lower Creek, and Comara.



LEGEND

Activity boundary

OMPS Flood level

0 2 Km

Flood Mapping - Illustration 6.4

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: Department of Customer Services
Date: 27/11/2023
Revision: D

6.7.3 Potential impacts

6.7.3.1 Water quality impacts

The Activity aims to improve drainage of the roadway of Kempsey Road and Lower Creek Road, assisting in protecting road assets occurring within the locality. However, construction activities represent a risk to surface water quality within local receiving waters.

During runoff events or flood conditions, sediment laden waters, chemicals stored on site, and construction waste have the potential to mobilise and enter waterways (Landcom, 2004).

Generation of sediment laden waters and offsite discharge can occur during construction activities such as:

- clearing and grubbing;
- stockpiling of materials;
- general earthworks;
- temporary works i.e. access roads, compounds, laydown areas and pads;
- quarry operations;
- drainage works; or
- placement of fill for embankments.

Sediment laden waters pose a potential risk to downstream surface water quality. Water quality impact includes (but are not limited to) increased turbidity and elevated concentration of nutrients and other pollutants, such as heavy metals and organic chemicals (Landcom, 2004).

Other potential sources that may impact surface water quality during construction include:

- Fuel or oils used by construction plant and equipment.
- Concrete batching plant and concrete washout.
- Waste and litter from building activities and personnel.
- Release of nutrients from fertilisers, herbicides, and pesticides (e.g. used in site remediation/ rehabilitation).
- Acids from acid-based washes.
- Disturbance of contaminated soils and/ or acid sulfate soils, which may adversely affect water chemistry including pH and dissolved solids.

6.7.3.2 Soil loss

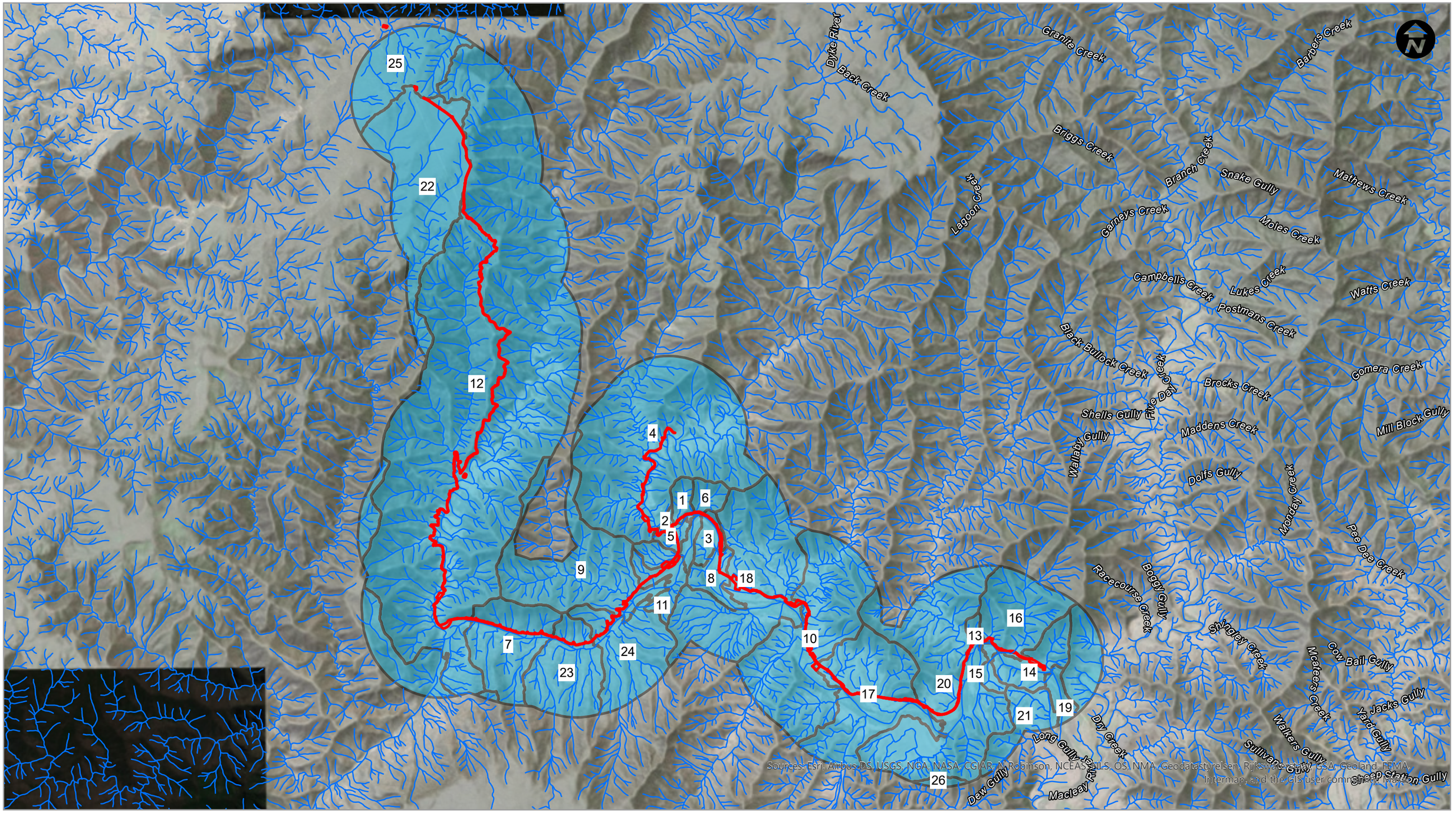
The loss of soil from the site during construction activities is high risk, as determined by the erosion hazard assessment procedure detailed in the International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control Guideline (Witheridge & Catchments & Creeks Pty Ltd, 2008).

In addition to the erosion hazard assessment, a preliminary assessment of potential soil loss for the Activity has been completed to illustrate the approximate quantity of soil that may be lost from the open construction areas; the results from this preliminary assessment are detailed in **Table 6.13**. The assessment was completed using the Revised Universal Soil Loss Equation (RUSLE) as detailed in the International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control Guideline (Witheridge & Catchments & Creeks Pty Ltd, 2008). The site was divided up into 26 catchment areas, as shown in **Illustration 6.5**, which cover the Activity works area. These derived values are preliminary, and a comprehensive RUSLE assessment will be required per catchment and work area as part of the Activity's detailed design, however, the values illustrate the importance of ensuring the development and implementation of appropriate controls as soil loss is expected to occur as part of the Activity and will impact receiving waterways.

Table 6.13 Preliminary soil loss estimation

Catchment Area Number	Catchment Size* (ha)	Activity Works Disturbance Area (ha)	Approximate Soil Loss (t/ha/year)	Approximate Soil Loss (m^3/ha/month)
1	69.1	0.9	51	3.3
2	2.5	0.0	51	3.3
3	86.3	3.8	51	3.3
4	1765.8	6.7	51	3.3
5	62.0	2.3	51	3.3
6	183.9	2.0	51	3.3
7	488.0	3.9	49	3.2
8	128.3	1.2	56	3.6
9	793.8	2.0	49	3.2
10	1082.2	5.8	56	3.6
11	143.2	5.9	51	3.3
12	5737.8	33.3	49	3.2
13	31.1	0.5	58	3.8
14	227.6	3.7	58	3.8
15	0.4	0.0	-	-
16	469.5	2.8	58	3.8
17	755.0	9.7	56	3.6
18	1077.7	10.3	56	3.6
19	74.2	0.0	-	-
20	1382.1	4.4	58	3.8
21	441.0	0.0	-	-
22	1392.3	3.1	49	3.2
23	461.8	1.5	49	3.2
24	490.9	1.7	49	3.2
25	508.9	0.5	49	3.2
26	30.4	0.0	-	-

* size of catchment within 2 km of centreline.
- designates no value derived due to no disturbance area calculated for that specific catchment.



LEGEND

Extent of works
Catchment within 2km
Watercourse

0 2 Km

Catchment Areas - Illustration 6.5

GeoLINK environment | engineering | planning | design

Review of Environmental Factors – ARC Kempsey Road Restoration
4055-1073

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: Department of Customer Services
Date: 27/11/2023
Revision: D

6.7.3.3 Wastewater impacts

Wastewater will be generated on site by the following:

- camp site ablutions, cleaning, maintenance, food preparation, recreational use, etc;
- workshop facilities;
- main compound office facilities;
- washdown areas;
- concrete batching; and
- quarry material processing.

At this stage in project planning it is anticipated that wastewaters are to be captured on site at the respective use areas and stored until it can be removed by an approved contractor licensed to take the waste material. No wastewater is anticipated to be released to land or water during the Activity.

The consideration for re-use or disposal of wastewater generated by the Camp and Office facilities on site has not been considered as part of this REF. The final determination of proposed wastewater use and management is to be decided as part of the detailed design process; this will require the Principal Contractor for the works to undertake the required assessments for their chosen process of wastewater management and obtain the relevant approvals. Regardless of the chosen method of wastewater management the Activity would require a Wastewater Management Plan.

Should water treatment for reuse or discharge/ disposal of this water to the environment outside of a licenced facility be proposed for the Activity, water quality and testing requirements would need to be considered and additional environmental impact assessments will be required.

6.7.3.4 Flood impacts

Works in potential flood prone areas may result in downstream impacts during and after major storm events, i.e. materials and equipment being washed downstream. The Activity will need to be adequately programmed to ensure that works in flood prone areas are not planned during periods when flood risk is highest. A flood risk and response management plan, or emergency event contingency plan, should be developed as part of the CEMP. Ancillary facilities such as construction compounds, laydown areas, and stockpiles would be located outside of areas where they have the potential to impact on major natural flow paths or exacerbate flood conditions.

There are no expected changes to hydrology or flooding patterns as a result of the works.

The above impacts have the potential to cause environmental harm, however, with the implementation of the safeguards and management measures contained herein the risk associated with water quality, hydrology, and flooding impacts would be considered low.

6.7.3.5 Water use

The Activity is proposing to use surface water, from the Macleay River, for:

- potable drinking water (camp and main office facilities);
- fire water supply (emergency water storage);
- washing and cleaning purposes (vehicles, machinery, equipment, etc.);
- workshop use;
- concrete batching and washout;
- quarry use;
- construction purposes; and
- dust management.

The water quality of the Macleay River generally meets the ADWG, however, treatment will be required for human consumption.

The potential for access to this water source to be restricted during extensive drought periods is possible. A water access licence (WAL) would likely be required through the Department of Planning and Environment for use in the camp facilities. The road works are exempt from requiring a WAL.

Bushfires and flood events also have potential to impact water quality due to excess soil runoff, elevated nutrients, and potential for fish kills (Johnston & Maher, 2022). The history of this area indicates that both of these types of events are

common occurrences and as such it is recommended that alternate options for supply of potable water are considered during the detailed design phase in order to plan for extreme weather conditions.

6.7.4 Safeguards and management measures

Table 6.14 Safeguards and management measures - Surface water, hydrology, and flooding

Impact	Environmental safeguards	Responsibility	Timing	Reference
Surface water/ Flooding/ Soils	A Soil and Water Management Sub-Plan will be prepared in accordance with QA Specification G38 and implemented as part of the CEMP. The Plan will identify all reasonably foreseeable risks relating to soil erosion and water pollution associated with undertaking the Activity and describe how these risks will be managed and minimised during construction. That will include arrangements for managing pollution risks associated with spillage or contamination on the site and adjoining areas, and monitoring during and post-construction.	Contractor	Detailed Design/ Pre-construction/ Construction	*G38 Soil and Water Management*
Extreme Events	An extreme weather contingency plan will be prepared as part of the CEMP. This extreme weather contingency plan must address, but is not limited to: • Flood Risk Management, to address, but not necessarily be limited to: – processes for monitoring and mitigation flood risk; and – steps to be taken in the event of a flood warning including removal or securing of loose material, equipment, fuels, and chemicals. • Drought conditions management, including water supply issues. • Bushfire management, including evacuation and emergency management procedures. • Post extreme event management measures, including clean up procedures, water supply management.	Contractor	Detailed Design/ Pre-construction/ Construction	
Traffic/ Flooding	Flood risk signage will be addressed in the CEMP for the works and permanent signage is to be considered during detailed design for operation.	Contractor/ ARC	Detailed design/ Pre-construction/ Construction	Transport and Infrastructure SEPP consultation SES response (refer to **Appendix I**)
Surface water/ Flooding	All major ancillary facilities, i.e. camps, offices, large stockpile and laydown areas, concrete batching areas, etc. are to be located outside of the mapped flood prone area.	Contractor	Detailed Design/ Pre-construction/ Construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
Surface water/ Flooding/ Soils	Chemicals, fuels, and lubricants are to be stored in designated suitably located and bunded secure areas with impermeable flooring to minimise the impact of any spillage or contamination on the Activity site and adjoining areas. Bunded areas must be able to contain 120% of the volume of the largest single store volume within the bund. Chemical/ Dangerous Goods storage areas must not be located within 50 m of any aquatic habitat, flood prone areas, or on slopes steeper than 1:10. Any chemicals, fuels, or lubricants used during shift must be kept in mobile bunds and be returned to the designated storage area/s at the end of shift and prior to rain. Any chemicals, fuels, or lubricants when in transport, must be contained within a labelled container with fastened lid and secured into position.	Contractor	Construction	*G36 Environment Protection*
Surface water/ Flooding	Daily monitoring Bureau of Meteorology forecast for heavy rainfall events and flood events throughout the construction project.	Contractor	Construction	*G38 Soil and Water Management*
Surface water/ Soils	A site-specific Erosion and Sediment Control Plan(s) is required to be prepared and implemented and included in the Soil and Water Management Plan. The Plan(s) will identify detailed measures and controls to be applied to minimise erosion and sediment control risks including, but not necessarily limited to runoff, diversion, and drainage points; sediment basins and traps; scour protection; stabilising disturbed areas as soon as possible, check dams, fencing and swales; and staged implementation arrangements. The Plan will also include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather. The ESCP must be prepared by a person with demonstrated skills and experience in preparing the ESCP in accordance with the BLUE BOOK guidelines.	Contractor	Detailed Design/ Pre-construction/ Construction	*G38 Soil and Water Management*
Surface water/ Soils	Erosion and sediment control measures are to be implemented and maintained to: • prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets; • reduce water velocity and capture sediment on site;	Contractor	Detailed design/ pre-construction	*G38 Soil and Water Management*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	• minimise the amount of material transported from site to surrounding pavement surfaces; and • divert clean water around the site (in accordance with the LANDCOM Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book)).			
Surface water/ Soils	Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.	Contractor	Detailed design/ Pre-construction	*G38 Soil and Water Management*
Surface water/ Soils	Erosion and sediment control measures are not to be removed until the works are completed and areas are stabilised.	Contractor	Detailed design/ Pre-construction	
Surface water/ Soils	Work areas are to be stabilised progressively during the Activity.	Contractor	Detailed design/ Pre-construction	
Surface water/ Soils	A progressive erosion and sediment control plan is to be prepared for the works.	Contractor	Detailed design/ Pre-construction	
Biodiversity/ Climate Change / Surface water/ Soils	Vegetation clearing/ trimming is to be kept to the minimum extent needed to carry out the works.	Contractor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
Water quality	There is to be no release of dirty water into drainage lines and/ or waterways.	Contractor	Detailed design/ Pre-construction	
Water quality	A water quality monitoring program will need to be developed and implemented as part of the Soil and Water Management Plan. The monitoring program is to include: • Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/ slicks) is to be undertaken on a regular basis to identify any potential spills or deficient silt curtains or erosion and sediment controls. • Testing of water to be released from water accumulated on site (sediment basins, sediment traps, excavated areas, etc.) Monitoring parameters should be in accordance with the relevant WQOs. The Soil and Water Management Plan will address management measures on how water is to be treated/ managed if it is not suitable quality for release. Appropriate records should be kept for water quality monitoring activities.	Contractor	Detailed design/ Pre-construction	*G38 Soil and Water Management*
Water quality	Where a flocculant or coagulant is proposed to treat accumulated site water, the Construction	Contractor	Construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Contractor must demonstrate that the proposed flocculant or coagulant is suitable for use and seek approval from ARC. Background water analysis should be performed in receiving waters prior to use (including for the use of Gypsum as a flocculant) due to the elevated pH levels previously recorded in the Macleay River.			
Water quality	Any dewatering activities will be undertaken in accordance with the RTA Technical Guideline: Environmental management of construction site dewatering (EMS-TG-011) in a manner that prevents pollution of waters. Dewatering will only be from Activity excavations that have accumulated stormwater.	Contractor	Construction	
Water quality	The Construction Contractor's CEMP will describe the proposed water source(s) intended for use for construction activities, and ancillary activities, and obtain approval from relevant authority for the chosen source(s) before commencing extraction. If the proposed source is other than a town water supply or natural water source (e.g. recycled water), the CEMP will include procedures for regular testing to ensure that the water is suitable for the purpose and is not hazardous to health and the environment.	Contractor	Detailed design/ Construction	
Water Quality	The Contractor will be required to prepare a Wastewater Management Plan for management of wastewater generated from ancillary facilities (such as camp, site offices, etc.). The Wastewater Management Plan is to include any monitoring or management requirements stipulated in any issued permits or approvals for discharge of wastewater from the Activity works.	Contractor	Detailed design/ Pre-construction	
Water Quality	The Contractor will be required to obtain all the necessary permits and approvals for the discharge of wastewater from any of the proposed ancillary facilities (e.g. camps, offices), including completing any required assessments in order to obtain the required approvals.	Contractor	Detailed design/ Pre-construction	
Water/ Soils	Refuelling of plant and equipment is to occur in impervious bunded areas (rather than drains) located a minimum of 50 metres from drainage lines or waterways. Any machinery or equipment requiring refuelling within 50 m of drainage or waterways will have a portable spill containment bund in place during refuelling activities.	Contractor	Detailed design/ Pre-construction	Amended Section 4.3 of QA *G36 Environment Protection*
Water/ Soils	Appropriate spill kits will be available on site in relevant areas. These kits will contain absorbent material appropriate to the type of substance being used on site, with all personnel trained in how to use them (EPAV, 2018).	Contractor	Detailed design/ Pre-construction	Additional mitigation measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
Waterways	Any items or objects that may cause obstruction or hazard in waterways during the works will be directly supervised and removed on completion of the work.	Contractor	Construction	Transport and Infrastructure SEPP consultation – TfNSW – Maritime Division (**Appendix I**)
Waterways	Notification of the work will be made to TfNSW Maritime at least 28 prior to commencing by email.	Contractor	Construction	Transport and Infrastructure SEPP consultation – TfNSW – Maritime Division (**Appendix I**)

6.8 Soils

6.8.1 Methodology

A desktop investigation of soils included a review of publicly available information to obtain an understanding of the geological formations and soils landscapes within the Activity boundary, as well as a review of the NSW EPA contaminated land registers.

6.8.2 Existing environment

The land use in the vicinity of the Activity boundary consists of (refer to **Figure 6.8**):

- grazing, native vegetation or improved pastures;
- nature conservation;
- production forestry; or
- minimal use due to topographic constraints.

The soils vary in consistency across the Activity boundary including the following soil types per the Australian Soils Classification (Isbell & National Committee on Soil and Terrain, 2021) (refer to **Figure 6.9**):

- Kurosols;
- Dermosols;
- Kandosols;
- Rudosols; and
- Rudosols (Alluvial).

These soils surveyed and included on the eSpade database vary in texture with topsoils consisting of clay Loam, sandy loams, or just sand (NSW Department of Planning and Environment, 2023). A description of the soils that form part of the Activity boundary and their erosion potential are presented in **Table 6.15**. The erosion potential is obtained from the NSW soil and land information system (NSW Department of Planning and Environment, 2023). The erosion potential indicates the susceptibility of landscapes to erode and accounts for slope, ground cover, and soil characteristics.

Table 6.15 Soils descriptions

Soil Type	Description*	Erosion Potential**	Location in Activity Boundary
Kurosol	Kurosols are a duplex soil that have a strong texture contrast with a strongly acid B horizon, the soils are regularly sodic and have low water holding capacity. Kurosols form from parent materials that are highly siliceous, siliceous to intermediate in composition.	Severe	Lower Creek Comara
Dermosol	Dermosols have limited texture contrast between the A and B horizons. They have a well-structured B2 horizon containing low levels of free iron. The parent materials of dermosols range from siliceous, intermediate to mafic in composition. Dermosols soils have moderate water-holding capacity.	Moderate	Jeogla (north of George's Junction)
Kandosol	Kandosols have a limited texture contrast between the A and B horizons. They have a massive or weakly structured B horizon and are not calcareous. Parent material of Kandosols ranges from highly siliceous, siliceous to intermediate in composition. Kandosol soils have moderate water-holding capacity.	Severe	Between George's Creek and Lower Creek
Rudosol	Rudosols are relatively young soils in which soil-forming processes (such as chemical weathering, erosion, or deposition) have had little time to modify them. This classification includes soils with a wide variety of textures and depths, as they may have been formed by very different processes. Rudosols can be stratified, and some are highly saline.	Extreme	Jeogla (western end of project)
Rudosol (Alluvial)	Stratic or Alluvial Rudosol soils are associated with current and previous watercourses. They are characterised by the presence of distinct layers of alluvium, each layer differing in colour, texture, gravel content and thickness. These layers represent depositional events (i.e. flood deposits). The colour of the upper layers is usually dark brown or grey and this may extend down the profile. The soil texture varies markedly between profiles and often within one profile, ranging from sands to clay. Layers of gravel and stone often occur. The more clayey soils may have a granular to blocky structure, while the more sandy soils are structureless (single grain or massive).	Extreme	George's Junction Lower Creek Blackbird Flat

*source: (Isbell & National Committee on Soil and Terrain, 2021)
**source:(NSW Department of Planning and Environment, 2023)

Acid sulphate soils have not been mapped in the Activity area (NSW Department of Planning and Environment, 2023) and are not presented in the Armidale Regional Local Environmental Plan 2012.

During the GeoLINK site visit, on 21 September 2023, the soils in the existing road reserve were observed to have sandy silt loam characteristics with potential for sodic soils (refer to **Plate 6.7** and **Plate 6.8**).

Plate 6.7 Kempsey Road – Road Reserve Soils Western Section – Erosion in Drainage Controls

Plate 6.8 Kempsey Road – Road Reserve Soils Western Section

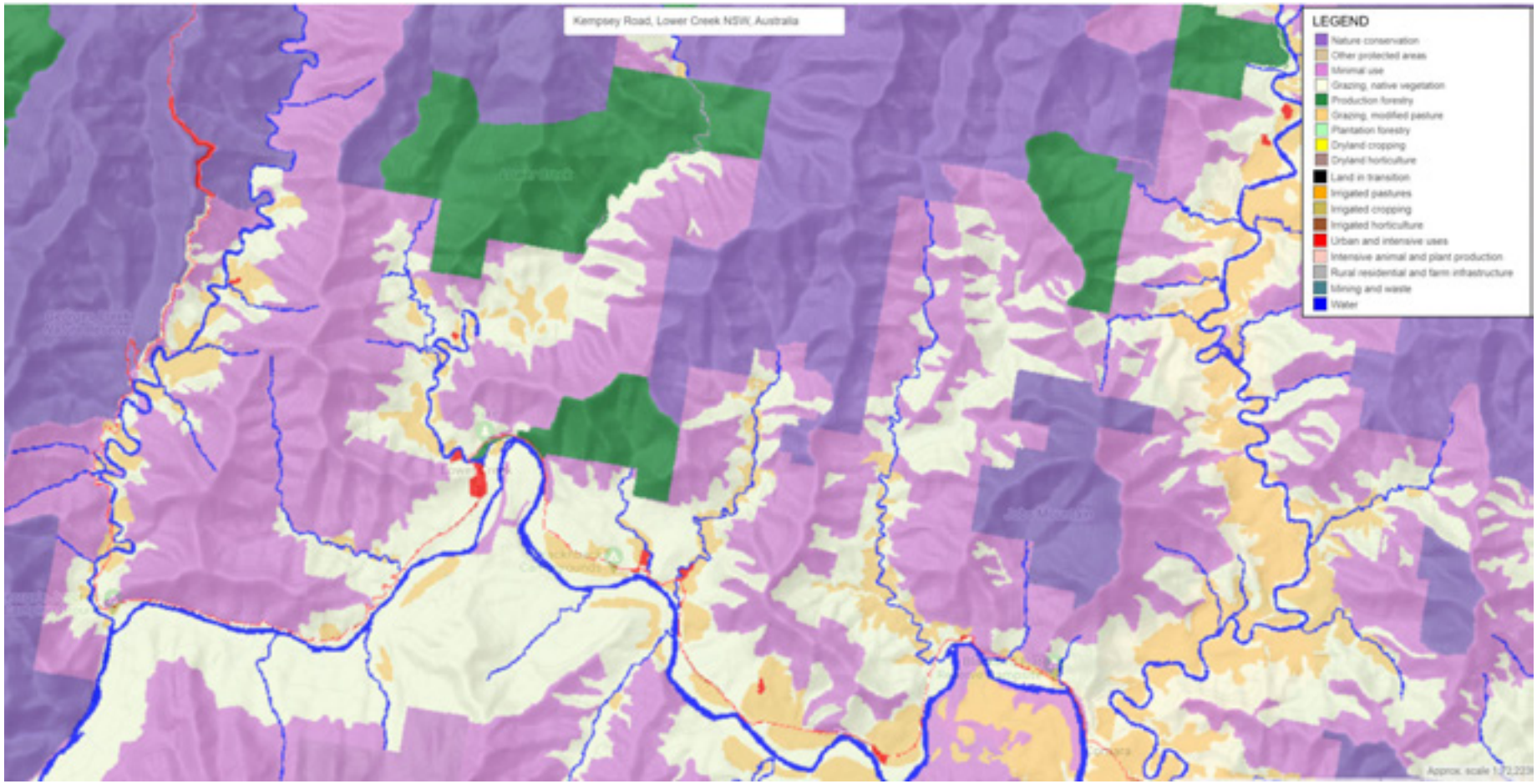


Figure 6.8 Land Use Mapping

source: (NSW Department of Planning and Environment, 2023)

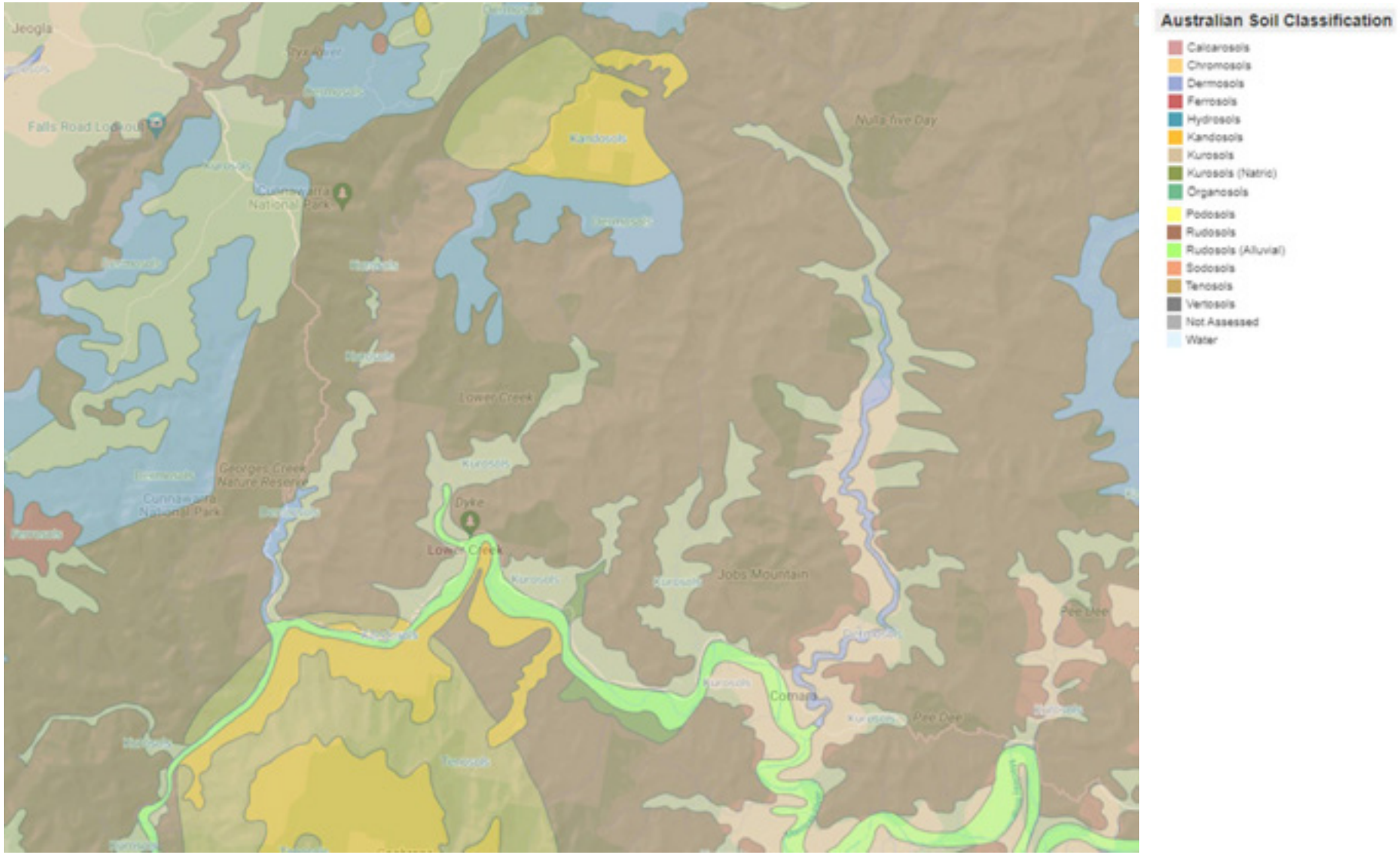


Figure 6.9 Soils mapping

NSW (Mitchell) Landscapes were developed for conservation planning and reserve establishment purposes, to provide consistent statewide ecological units finer than the existing bioregions and sub-regions. The landscapes are mapped on the Sharing and Enabling Environmental Data Portal (SEED) (NSW Government, 2023b).

The following Mitchell Landscapes occur within the study area and are described in **Table 6.16**.

Table 6.16 Mitchell landscapes occurring at the site

Mitchell Landscapes v3.1	Description*
Macleay Escarpment Foothills	*Ridges, hills, and drainage basins leading up to the Great Escarpment on complex and poorly known geology of Silurian-Devonian, Permian, and Carboniferous schist, phyllite, slate, quartzite, schistose sandstone, conglomerate, sandstone, mudstone, limited limestone and interbedded volcanics. General elevation 200 to 500 m, local relief 250 m. Shallow brown earths, grading to brown texture-contrast soils on lower slopes. Thin stony profiles on steep slopes, yellow texture-contrast soils on high river terraces in wider valleys. The valleys and near coastal sectors contain forest and open forest of spotted gum (Corymbia maculata), narrow-leaved ironbark (Eucalyptus crebra), white mahogany (Eucalyptus acmenoides), large-fruited grey gum (Eucalyptus canaliculata), cabbage gum (Eucalyptus amplifolia), grey box (Eucalyptus moluccana), rough-barked apple (Angophora floribunda) and forest oak (Allocasuarina torulosa) with river oak (Casuarina cunninghamiana) along the streams. In the west and extending into the gorges lowland subtropical closed forest is found with; brush box (Lophostemon confertus), Sydney blue gum (Eucalyptus saligna), yellow carabeen (Sloanea woollsii), jackwood (Cryptocarya glaucescens), pigeonberry ash (Cryptocarya erythroxylon), pepperberry tree (Cryptocarya obovata), bolly gum (Litsea reticulata), sassafras (Doryphora sassafras), crabapple (Schizomeria ovata), white quandong (Elaeocarpus kirtonii), and churnwood (Citronella moorei) with cabbage-tree palm (Livistona australis) and Bangalow palm (Archontophoenix cunninghamiana). Dry closed forest on steep sites protected from fire, small areas with cool temperate closed forest components on southern aspects at higher altitudes. Limestone areas have not been mapped but include both the Kunderang Brook and Willi Willi karst.*
Manning – Macleay Channels and Floodplains	*Channels, floodplain, terraces, swamps and estuary of the Manning and Macleay Rivers and other coastal streams on Quaternary alluvium. Extensive floodplain swamps at tributary junctions. General elevation 0 to 50 m, local relief 15 m. Dark organic loams and silty clay, organic mud in the estuary. Flooded gum (Eucalyptus grandis) on alluvial river flats and river oak (Casuarina cunninghamiana) along the banks. Large freshwater wetlands with common reed (Phragmites australis), spike rush (Eleocharis spp.), water couch (Paspalum paspaloides), broad-leaved paperbark (Melaleuca quinquenervia) and swamp oak (Casuarina glauca). The estuary includes grey mangrove (Avicennia marina), river mangrove (Aegiceras corniculatum), milky mangrove (Excoecaria agallocha) and saltmarsh communities.*

*Source: (Department of Environment and Climate Change NSW, 2002)

A search of the NSW EPA Contaminated Land Record (NSW EPA, 2023a) and List of Notified Sites (NSW EPA, 2023b) has not identified any areas of concern for contamination in proximity to the Activity boundary.

6.8.3 Potential impacts

Substantial earthworks will be required as part the Activity works, these include, but are not limited to:

- camp, compound, laydown, and stockpile area development;
- drainage works (e.g. culvert replacement and installation, table drains, etc.);
- side track, and turnaround construction;
- road widening;
- slip remediation works;
- scour protection works;
- pavement works; and
- quarry activities.

Erosion and sedimentation

The Activity would involve removal of topsoil, earthworks associated with filling for the new road, and stockpiling of spoil for construction. If not adequately managed, earthworks, stockpiling, and transportation of spoil could potentially have the following impacts:

- Erosion of exposed soil and stockpiled materials.
- An increase in sediment loads entering nearby watercourses.

With the Macleay River, and associated tributaries, in very close proximity to the Activity, and the topography having substantial slopes, the movement of sediment into the waterway is high risk from the Activity works.

With the implementation of erosion and sedimentation controls, potential construction related erosion and sedimentation impacts would be appropriately managed and would be minor.

Contamination

Soil contamination could occur as a result of any accidental spills or leaks of fuels, oils, and other chemicals from equipment and vehicles during construction. To avoid this potential impact, fuels and chemicals would be managed in accordance with the safeguards and management measures.

Operation

Following completion of the Activity it is not expected that operation of the road rehabilitation roadworks would have any impact on soils.

6.8.4 Safeguards and management measures

Table 6.17 Safeguards and management measures – Soils

Impact	Environmental safeguards	Responsibility	Timing	Reference
Surface water/ Flooding/ Soils	A Soil and Water Management Sub-Plan will be prepared in accordance with QA Specification G38 and implemented as part of the CEMP. The Plan will identify all reasonably foreseeable risks relating to soil erosion and water pollution associated with undertaking the Activity and describe how these risks will be managed and minimised during construction. That will include arrangements for managing pollution risks associated with spillage or contamination on the site and adjoining areas, and monitoring during and post-construction.	Contractor	Detailed Design/ Pre-construction/ Construction	*G38 Soil and Water Management*
Surface water/ Soils	A site-specific Erosion and Sediment Control Plan(s) is required to be prepared and implemented and included in the Soil and Water Management Plan. The Plan(s) will identify detailed measures and controls to be applied to minimise erosion and sediment control risks including, but not necessarily limited to runoff, diversion and drainage points; sediment basins and traps; scour protection; stabilising disturbed areas as soon as possible, check dams, fencing and swales; and staged implementation arrangements. The Plan will also include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up	Contractor	Detailed Design/ Pre-construction/ Construction	*G38 Soil and Water Management*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	measures to be applied in the event of wet weather. The ESCP must be prepared by a person with demonstrated skills and experience in preparing the ESCP in accordance with the BLUE BOOK guidelines.			
Surface water/ Soils	Erosion and sediment control measures are to be implemented and maintained to: • prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets; • reduce water velocity and capture sediment on site; • minimise the amount of material transported from site to surrounding pavement surfaces; and • divert clean water around the site (in accordance with the LANDCOM Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book).	Contractor	Detailed design / pre-construction	*G38 Soil and Water Management*
Surface water/ Soils	Work areas are to be stabilised progressively during the works.	Contractor	Detailed design/ Pre-construction	
Surface water/ Soils	A progressive erosion and sediment control plan is to be prepared for the works.	Contractor	Detailed design/ Pre-construction	
Biodiversity/ Climate Change/ Surface water/ Soils	Vegetation clearing/ trimming is to be kept to the minimum extent needed to carry out the works.	Contractor	Detailed design/ Construction	*G40 Clearing and Grubbing*
Soils and erosion	All stockpile areas must be approved for use prior to commencement of use. Stockpiles will be managed to minimise the potential for mobilisation and transport of dust and sediment in runoff in accordance with the Blue Book (Landcom, 2004), TfNSW Stockpile Sites Management Guideline (Roads and Maritime, 2015) and TfNSW QA G38. Management measures may include, but are not limited to: • Minimising the number of stockpiles, area used for stockpiles, and time that they are left exposed. • Locating stockpiles away from drainage lines, waterways, and areas where they may be susceptible to wind erosion. • Stabilising stockpiles, establishing appropriate sediment controls, and suppressing dust as required. • Locating stockpiles outside of the tree protection zone of trees or native	Contractor	Detailed design/ Pre-construction	*G38 Soil and Water Management* and *G40 Clearing and Grubbing*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	vegetation identified for retention. The tree protection zone will be delineated in accordance with AS 4970. • Keeping stockpile heights to no greater than 2 m, unless otherwise approved by ARC, and slopes to no steeper than 2:1. • Covering, or otherwise protecting from erosion, stockpiles that will be in place for more than 20 days as well as any stockpiles that are susceptible to wind or water erosion, within 10 days of forming each stockpile. • Keeping topsoil that is not contaminated by noxious weeds in stockpiles for later spreading on fill batters and other areas. Other material may also be stockpiled but kept separated from the topsoil stockpiles. • Implementing measures to prevent the growth of weeds in topsoil stockpiles.			
Soils and erosion	Tannins from stockpiled mulch must be managed in accordance with TfNSW Environmental Direction 25: Management of Tannins from Vegetation Mulch (TfNSW, 2012).	Contractor	Construction	*G38 Soil and Water Management* and *G40 Clearing and Grubbing*
Surface water/ Flooding/ Soils	Chemicals, fuel, and lubricants are to be stored in designated suitably located and bunded secure areas with impermeable flooring to minimise the impact of any spillage or contamination on the Site and adjoining areas. Bunded areas must be able to contain 120% of the volume of the largest single store volume within the bund. Chemical/ Dangerous Goods storage areas must not be located within 50 m of any aquatic habitat, flood prone areas, or on slopes steeper than 1:10. Any chemicals, fuels or lubricants used during shift must be kept in mobile bunds and be returned to the designated storage area/s at the end of shift and prior to rain. Any chemicals, fuels, or lubricants when in transport, must be contained within a labelled container with fastened lid and secured into position.	Contractor	Construction	*G36 Environment Protection*
Water/ Soils	Appropriate spill kits will be available on site in relevant areas. These kits will contain absorbent material appropriate to the type of substance being used on site, with all personnel trained in how to use them (EPAV, 2018).	Contractor	Detailed design/ Pre-construction	Additional mitigation measure
Contaminated land	A Contaminated Land Management Procedure will be prepared in accordance with the *Guideline for the Management of Contamination*	Contractor	Detailed design/ Pre-construction	Section 4.2 of QA *G36*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	(RMS, 2013) and implemented as part of the CEMP.			*Environment Protection*
Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the discovered contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with ARC.	Contractor	Detailed design / Pre-construction	Section 4.2 of QA *G36 Environment Protection*
Accidental spill	A site-specific emergency spill procedure will be developed and include spill-management measures in accordance with the Transport *Code of Practice for Water Management* (RTA, 1999) and relevant EPA guidelines. The procedure will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities.	Contractor	Detailed design / Pre-construction	Section 4.3 of QA *G36 Environment Protection*

6.9 Non-Aboriginal heritage

6.9.1 Methodology

A Historical Heritage Assessment and Heritage Management Strategy (HHA) was completed for the Activity by Eureka Heritage and is provided as **Appendix N**.

The principal objectives of this heritage impact study were to:

- conduct a review of the historical context as the basis for an assessment of heritage significance of sites and/or features that could occur along the roadway;
- carry out a review of the proposed works and identify any potential for heritage impact; and
- prepare a Statement of Heritage Impact, including a preliminary archaeological assessment, and provide appropriate management recommendations.

To meet the study objectives and address the requirements of a Statement of Heritage Impact, the following methodology has been used:

- the review of studies and reports related to the site;
- review of historical context information;
- a brief synopsis and discussion of the contextual history of the site;
- a site inspection for present day context of the site;
- the review of established heritage significance;
- research for comparative sites;
- application of the standard guidelines, questions, and criteria for a SOHI;
- the formulation of appropriate management recommendations and/ or mitigation measures; and
- compliance with the criteria for studies, assessment, heritage management and reporting that are established by the NSW Heritage Manual as endorsed by the NSW Heritage Council.

6.9.2 Existing environment

The study area is located at the interface of the Northern Tablelands and east coast escarpment, in the upper reaches of the Macleay River catchment. It is situated mid-way between the coast township of Kempsey and the regional centre of Armidale, and the road supports the local community and agriculture and tourism industries from both townships.

A search of relevant inventories and databases found that no heritage listed sites occur within or directly adjacent to the roadway alignments and the Activity boundary.

Three significant heritage listed items occur beyond the Activity but are worthy of mention:

- Listed on the SHR, the Kunderang East Pastoral Station.
- The Nationally significant Gondwana Rainforests of Australia, inscribed on the World Heritage List and the National Heritage List.
- The locally significant Styx River Bridge, (now by passed with a concrete bridge) listed on the Armidale-Dumaresq LEP 2012, located beyond the northern extreme of the Activity.

The HHA describes the historical context of the region and the road in detail (refer to **Appendix N**). Based on the historical research, it has been found that a road extending from Kempsey to Armidale existed in some form in 1841 when first surveyed. Road construction to improve the reliability of the road would have commenced in the early 1860s, and road repair and widening would have occurred constantly throughout time as it became necessary. The stonework, or parts of the stonework, that make up the culvert structures could potentially date from the very early era of road construction in the early 1860s through to as late as the 1970s. A period of expenditure on road maintenance and improvement is known to have occurred the 1950s. Due to the continuous construction and maintenance, to some degree at some sites, it is difficult to identify a definitive construction date as there may be a combination of repairs and modifications made over many times, over many years.

The report also includes detailing of the Scorched Earth Policy put into place by the Australian Government during World War II to protect against invasion. Kempsey-Armidale Road was nominated as an evacuation route from the coast to the tablelands as a part of planned evacuations inland for regrouping if an invasion occurred. The roadway was set with explosives at two points on the Big Hill by digging tunnels beneath the road and subsequently filling them with explosives, thus preparing the road to be blown up should it be necessary in order to deny the enemy an easy passage to the inland (refer to the HHA at **Appendix N**).

There are 58 locations within the Activity identified by ARC during surveys that the HHA addresses. One site is a rock formation with the potential to be tied to World War II and the remaining 57 sites are culverts where hand placed stone was observed. Mortar was observed securing the stonework at most of the culverts, except for four. However, it is not unusual for dry stone components to have been extended, repaired, and/or modified with the use of mortar during road widening, repair and maintenance works occurring over a period of more than 150 years.

6.9.3 Potential impacts

Road and culverts

The continuous construction and maintenance of the roads has the potential to have obscured older works over time. For example, box culverts of quarried stone may be obscured by more recent piped extensions. It is possible that many more historical culverts and walls remain obscured from view and from identification due to burial beneath the road surface, through collapse of the road and outlet, and through overgrowth. Additionally, on many occasions in historical times, as is the case today, emergency measures would have been taken to repair damage caused by land slip or road collapse. This evidence may be revealed during project works. Such an incident occurred in early 2022 along Kempsey Road, where a failed culvert and road collapse exposed an older retaining wall and culvert stonework (refer to **Appendix N**).

Heritage listed Items

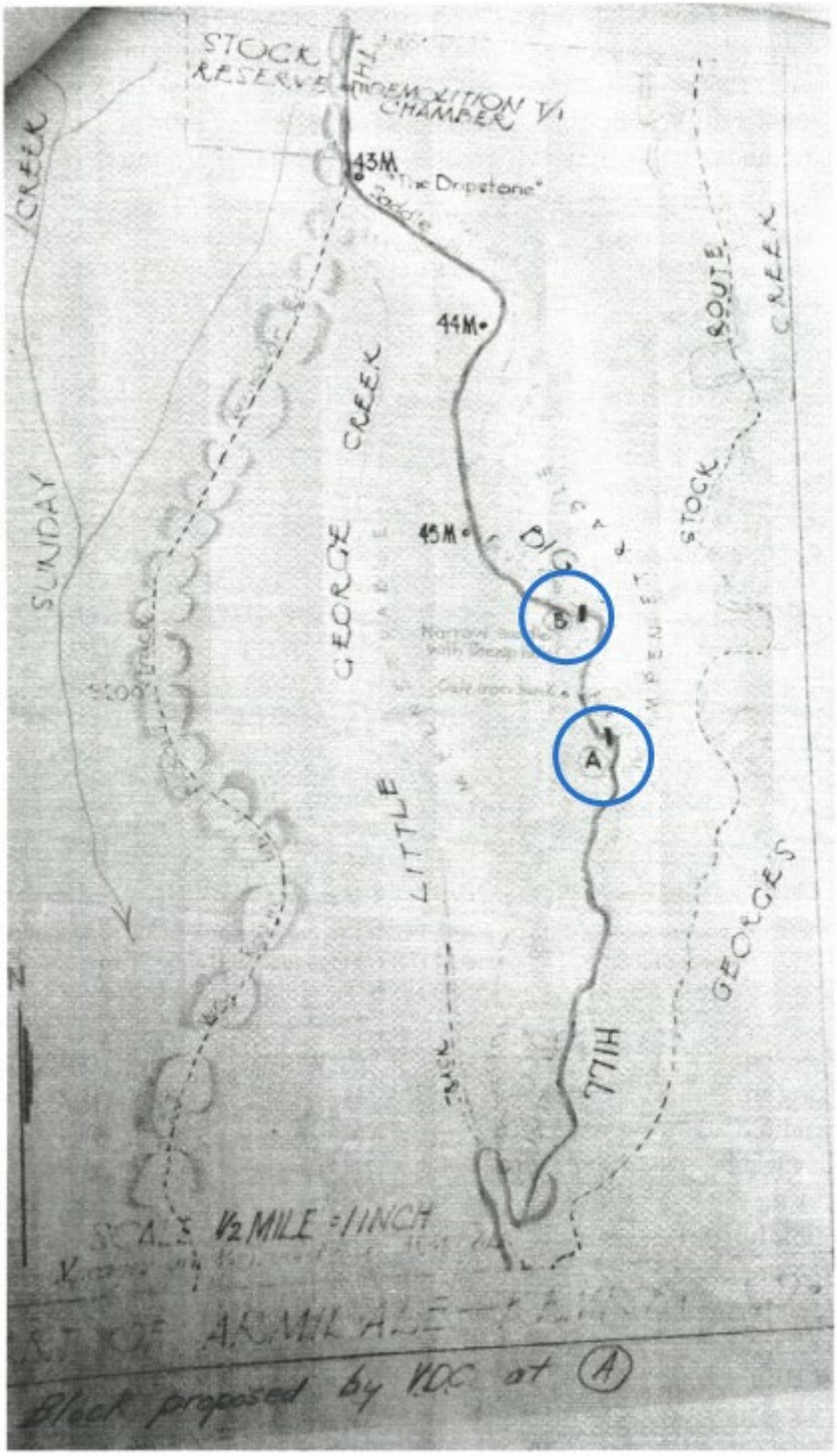
The Gondwana Rainforests of Australia World Heritage listed site includes parts of Cunnawarra National Park; however, as per the EPBC Act protected matters mapping, the areas of Cunnawarra National Park included in the World Heritage listing are not adjacent to or in close proximity to the Activity. None of the mentioned significant heritage listed items located beyond the Activity boundary are expected to be impacted by the Activity.

World War II

With the history of Kempsey-Armidale Road identified as an evacuation route for potential World War II invasion and the Scorched Earth Policy, there were likely explosives once located in tunnels dug out from under the road. As noted in the HHA (refer to **Appendix N**), two potential locations where the road was proposed to be rigged for being destroyed are known and mapped along Big Hill. Location B (refer to **Figure 6.10**) appears to be in close proximity to the location for White Rock

Quarry (refer to **Appendix A**). Location A appears to be where there would be a culvert replacement. As this is a hand drawn map, caution should be exercised about the exact location of the potential explosive sites. These known locations will need ground-truthing prior to any works commencing.

It is reasonable to believe there is a possibility, even if low, that other locations were additionally rigged with explosives and were not recorded, either due to an attempt to hide information from the enemy or due to lost or poor record keeping. As the consequences of an unexpected find would be extremely high, safeguards and management measures has been included for the management of unexploded ordinance and unexpected finds.



Source: Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**).

Figure 6.10 Map showing proposed mine sites, A and B, on Kempsey Road

Distinction between a work and a relic

The NSW *Heritage Act 1977* protects items of environmental heritage, which may be places, buildings, works, relics, movable objects, and precincts of State or local heritage significance. Historical archaeological remains have additional protection under the Heritage Act from being moved or excavated through the operation of the relic's provisions. However, a work which can be taken to include structures such as bridges, culverts, building footprints, industrial sites, and drains, are not

relics. Therefore, the structural remnants and/ or infrastructure potentially within the Activity would be considered works and not relics. Therefore, there is no requirement for a statutory permit application under the NSW Heritage Act. However, the potential for the relics' provisions of the Heritage Act to be triggered should be carefully considered if a potential archaeological site is to be disturbed and/ or there is a reasoned potential for relics to be exposed near, or in association with, a work.

Heritage significance

The Kempsey-Armidale Road and remnant stonework of drainage culverts and retaining walls attain at least a level of local significance for their historical, social, and aesthetic values for the potential to contain information of road and drainage construction technologies of the mid-19th century, which may contribute additional and significant information to that already known within the New England.

Social significance is further demonstrated in the association of the line of road as an evacuation route should the Scorched Earth Policy have been triggered by a Japanese invasion of the east coast during World War II. Should evidence of this policy remain, it would attain a local level of significance.

Based on comparable known State significant sites, there is some potential for some sites to attain a higher level of significance at the State level.

There is some reasoned and demonstrated potential for archaeological remnants of significant value to be present at sites of historical structures along Kempsey-Armidale Road and Lower Creek Road. These structures have the potential to contribute information not readily available or known within the New England region. Therefore, safeguards and management measures have been included to minimise and reduce potential impacts to European heritage within the Activity site.

Statement of heritage impact

A statement of heritage impact (SOHI) is prepared to assist in the review and approval process when a project could potentially impact upon a heritage item. The purpose of a SOHI is not to 'support' a proposal as such. A SOHI should provide an objective assessment of impact and provide mitigation measures and recommendations as appropriate.

Proposed restoration works for Kempsey Road and Lower Creek Road would result in the loss by removal, or burial where possible, of structural works of historical provenance, considered to attain local heritage significance as evidence of early road formation and construction in the New England region commencing from circa 1860. The loss of these structures would be unavoidable in the effort to restore this line of road to a safe and reliable route between Kempsey and Armidale.

However, the loss of such structures and historical evidence can only be assessed as detrimental to assessed heritage values. The loss of the physical evidence of the structures can be adequately mitigated through the recording of sites as they are exposed and assessed for heritage provenance. The records collated during the project might then provide opportunity for further research and comparative analysis across other historical roads of New South Wales.

Basis of recommendations

The recommendations and management measures are proposed on the basis that:

- The statement of heritage impact has concluded that there is some reasoned potential for items that could be defined as heritage works to be exposed and destroyed by the substantial earthworks necessary for restoration works along Kempsey Road and Lower Creek Road, including replacement of drainage culverts and any associated stone walls, stone formations on both the inlet and outlet alignments, stone retaining walls and other, possibly unknown, features.
- A review of culvert locations within the study area confirms that there is potential for culverts of historical provenance, and of historical significance, to remain within the roadway and/ or culverts that appear modern to be extensions of older culverts. There is potential for historical stone retaining walls to have been buried and thereby obscured by landslips. If present, there is a high likelihood for these remnants to be exposed during excavation and earthworks.
- There is some potential for impact upon archaeological resources associated with historical skills, technologies and resources employed for road construction by private contractors engaged by the government to carry out the road construction and maintenance works in regional and remote areas during the mid-19th century.
- There are likely to be more sites where historical remnants of road infrastructure are unexpectedly exposed during excavation. These sites should be adequately recorded according to the expected standards and to allow further study and analysis.

6.9.4 Safeguards and management measures

Table 6.18 Safeguards and management measures - Non-Aboriginal heritage

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non-Aboriginal heritage	A non-Aboriginal Heritage Management Sub-Plan (NAHMP) will be prepared and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to non-Aboriginal heritage. This is to include a procedure for the management of items considered historical remnants of earlier construction along the roadway, such as stone culverts, stone wing walls, retaining walls, bridges, buried remnant timbers and the like, during earthworks and during excavation for culvert replacements. The culverts and possible bunker identified in the Historical Heritage Assessment and Heritage Management Strategy report should be noted and prioritised for a precautionary approach during earthworks. A suitably qualified specialist/ archaeologist should be retained in an on-call capacity during all excavation activity to guide management when/ if historical remnants are discovered.	Contractor	Detailed design/ Pre-construction/ Construction	Section 4.10 of QA *G36 Environment Protection* and Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
Non-Aboriginal heritage	While there is no reasonable expectation for significant archaeological resources that meet the definition of a relic to be exposed during project works, attention is directed to s139 and s146 of the NSW *Heritage Act 1977* and the provisions of the Act in relation to the exposure of relics whereby the Act requires that if: *i) a relic is suspected, or there are reasonable grounds to suspect a relic in ground, that is likely to be disturbed damaged or destroyed by excavation; and/or* *ii) any relic is discovered in the course of excavation that will be disturbed, damaged or destroyed by further excavation;* Those responsible for the discovery must notify nominated management personnel within ARC who will assess whether to notify Heritage NSW and suspend work that might have the effect of disturbing, damaging, or destroying such relic until the requirements of the Heritage NSW have been satisfied.	Contractor	Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
Non-Aboriginal heritage	All workers engaged in excavation and/ or earthworks should be made aware of the potential for the exposure of historical stonework and/ or features or remnants associated with drainage infrastructure, retaining or other works along the entire section of roadways under restoration works. An 'All Care and Due Diligence' approach is to be taken in order to not cause inadvertent damage or impact to any historical features prior to their assessment and management.	Contractor	Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)

Impact	Environmental safeguards	Responsibility	Timing	Reference
	When required, specialist advice should be sought as a precautionary approach to avoid the loss of information before it can be adequately recorded.			
Non-Aboriginal heritage	Due to the remote location of this project, a recording methodology will be developed in consultation with the Activity's heritage/ archaeology specialist for use in the field by nominated personnel with some basic training. This would avoid delays in the progress of works while awaiting the arrival of a specialist for discoveries not considered unique or unexpected. This will include a template recording form to guide the collection of information, and a guide for effective photographic recording. Site records are to be kept safe both in paper and electronic formats with copies submitted to the project's heritage/ archaeology consultant.	Contractor	Pre-construction/ Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
Non-Aboriginal heritage	The *Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. A suitably qualified specialist/ archaeologist should be retained in an on-call capacity during all excavation activity to guide management when/ if unexpected historical remnants are suspected and/ or discovered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
Non-Aboriginal heritage	Existing culverts should be considered for the potential for retaining structural remnants, in whole or part, where feasible and safe to do so. Should the site allow, the preferred method would be the burial of the complete or partial structure, including the filling of the structure for increased stability, with the new drainage infrastructure constructed alongside the existing. This would allow some evidence to remain in the ground where it is best preserved for future generations. Where structures are preserved, adequate recording is to be carried out as per the site recording process and the location recorded to inform any future works that might be required at the site.	Contractor/ ARC	Detailed design/ Pre-construction/ Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
Non-Aboriginal heritage	Where existing culverts do not allow for the retention of any structural remnants and complete removal is required, the structure is to be recorded as per the site recording process prior to demolition/ removal.	Contractor	Pre-construction/ Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
Non-Aboriginal heritage	An unexpected finds procedure will be developed in accordance with the Unexploded	Contractor	Detailed design/ Pre-	

Impact	Environmental safeguards	Responsibility	Timing	Reference
	Ordnance (UXO) of Australia and implemented specifically for the potential of finding unexploded ordinance during the Activity. In line with the UXO, this will include the following steps: I. If a suspect UXO item is found - **DO NOT TOUCH**, disturb or tamper with the item in any way. This includes making any attempt to move the item to a 'safe' location. II. Carefully note the appearance of the item and the location. Take a photograph if it is possible to do so without further approaching or disturbing the item. III. If possible, mark the location so that it can be found later. Coloured tape or paint make easily recognised marker material. Note the route to the item. IV. Inform the property owner, park ranger, prime contractor, site foreman or supervisor of the find. V. Inform the Police that a possible ammunition item has been found. They will instigate a request for Defence personnel to attend and dispose of the item.		construction/ Construction	
Non-Aboriginal heritage	The known potential mine sites will undergo ground-truthing to the extent possible and/ or further detailed information will be sought from the appropriate authorities about potential locations, including the Department of Defence. It is not known whether the sites have been cleared or not. It is not known if all sites have been recorded and/ or identified.	Contractor	Detailed design/ Pre-construction/ Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
Non-Aboriginal heritage	An unexploded ordinance (UXO) might be considered an archaeological relic within the definitions of the NSW Heritage Act. However, the nature of an UXO is beyond the realm of archaeological management other than to record information about the find. If an UXO is discovered during the project, the information collected about the UXO's location, and any photography, only if safe to do so, including photos from a distance to record its context within the landscape is to be recorded and advice is to be sought from a suitably qualified specialist/ archaeologist.	Contractor	Detailed design/ Pre-construction/ Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
Non-Aboriginal heritage	Armidale Regional Council might consider the installation of historical interpretation at the conclusion of project works to communicate the history and historical and engineering significance of the Kempsey-Armidale Road.	ARC	Post-construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)

6.10 Air quality

6.10.1 Existing environment

The Activity is located in a vegetated and rural setting. Potential airborne particles within the locality are largely restricted to vehicle emissions, dust generated by vehicle movements, and agricultural activities in the broader landscape.

A large portion of Kempsey-Armidale Road is unsealed which contributes to extensive dust generation along the road alignment (refer to **Plate 6.9**). As observed during site visits, the larger the vehicle travelling along these sections the greater the dust plume generated.

Plate 6.9 Dust generation on Kempsey Road unsealed sections

6.10.2 Potential impacts

During construction, the Activity may temporarily affect air quality in the local area through:

- exhaust emissions from machinery and equipment (including large generators to power camp and compound);
- dust generated during excavation works and earthworks, including leaving disturbed areas exposed rather than reinstating or rehabilitating;
- vehicle movements along Kempsey-Armidale Road, particularly the unsealed sections;
- concrete batching works;
- quarry operations; and
- material delivery/ stockpiling.

Sensitive receivers that are likely to be impacted by air quality emissions are the same as those listed in the noise assessment (refer to **Section 6.5**), particularly those that are in close proximity to the Activity work sites with minimal buffering properties to protect them from air quality impacts.

The elongated nature of the Activity site, the steep sloped terrain, the road having a winding path, and the dense pockets of vegetation are expected to reduce the impact of emissions and dust on the properties of some sensitive receivers. It is likely that some sensitive receivers may only experience impacts from construction works occurring in closer proximity and not from the Activity as a whole. Potential impacts can be managed or minimised through implementation of safeguards and management measures.

The road would be mostly restored to the pre-disaster condition, which was a gravel road, with small sections finished as sealed road. Air quality post-construction would be impacted by traffic generated dust along the gravel sections of Kempsey-Armidale Road and Lower Creek Road. However, this is similar to the state of the roads prior to the Activity, resulting in no change of conditions post Activity.

6.10.3 Safeguards and management measures

Table 6.19 Safeguards and management measures – Air quality

Impact	Environmental safeguards	Responsibility	Timing	Reference
Air Quality	Appropriate air quality management measures will be included in the CEMP. This section of the CEMP will identify: • potential sources of air pollution (such as dust, vehicles transporting waste, plant and equipment) during construction; • air quality management objectives consistent with any relevant published EPA and/ or DPIE guidelines; • mitigation and suppression measures to be implemented, such as spraying or covering exposed surfaces, provision of vehicle clean down areas, covering of loads, street cleaning, use of dust screens, maintenance of plant in accordance with manufacturer's instructions; • methods to manage works during strong winds or other adverse weather conditions; • a progressive rehabilitation strategy for exposed surfaces; • when the air quality, suppression and management measures need to be applied, who is responsible, and how effective will be assessed; and • community notification and complaint handling procedures.	Contractor	Detailed Design	
Air Quality/ Waste	Vegetation or other materials will not be burnt on-site.	Contractor	Construction	
Air Quality	Vehicles transporting waste or other materials that may produce odours or dust will be covered during transportation.	Contractor	Construction	
Air Quality	Construction works that create high levels of dust or air borne particulates will not be carried out during strong winds or in weather conditions likely to exacerbate the situation.	Contractor	Construction	
Air Quality	Machinery and vehicles not in use during construction will be turned off and not left to unnecessarily run idle.	Contractor	Construction	
Air Quality	Vehicles, machinery, and equipment will be maintained in accordance with manufacturer's specifications in order to meet the requirements of the *Protection of the Environment Operations Act 1997* and associated regulation.	Contractor	Construction	
Traffic/ Air Quality	Regular dust management of unsealed roads. Dust suppression techniques will be utilised to minimise the potential for dust generation/ dispersal during works, as required.	Contractor	Construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
Air Quality	Works to be appropriately staged to ensure exposed disturbed areas are reinstated prior to opening new sections.	Contractor	Construction	
Air Quality	All construction and ancillary operations related traffic are to utilise designated access tracks only.	Contractor	Construction	
Air Quality	Daily air quality logs are to be maintained by operational crews (part of the daily diary) to ensure records are available in the event of complaints being made.	Contractor	Construction	

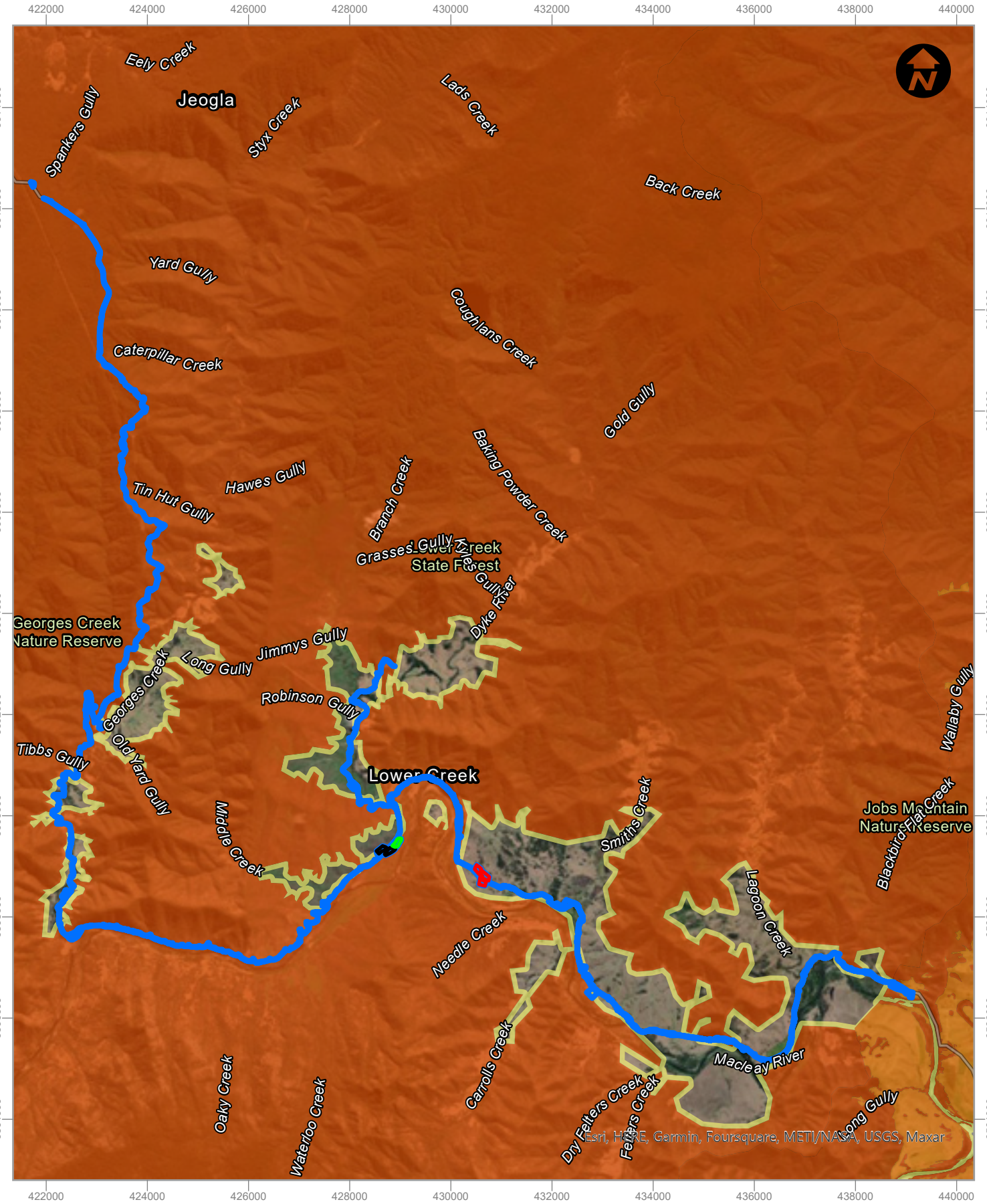
6.11 Bushfire

6.11.1 Existing environment

The Activity is located within a relatively remote area, with limited access options and limited communication services in several areas. The Activity site is predominately within the Kempsey Road reserve and isolated areas of adjacent private property. The proposed locations for the camp and compound in the ECI phase construction methodology (refer to **Appendix A**), being site 0 as the first option and site 2/3 as the alternative options, are vacant grazing land.

ARC's bushfire prone land mapping indicates that the project site is classified as bushfire prone land and contains areas of Category 1 Vegetation and Vegetation Buffer. Isolated areas of cleared grazing land within the project site are generally not mapped as bushfire prone land, however, unmanaged grassland can be a potential bushfire hazard and has been assessed as such.

Overall bushfire mapping has been shown in **Illustration 6.6**.



LEGEND

- Kempsey Road restoration project boundary
- Site 0
- Site 2
- Site 3
- Vegetation category 1
- Vegetation category 2
- Vegetation category 3
- Vegetation buffer

0 2 km

Bushfire Prone Land - Illustration 6.6

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: ESRI World Imagery
Date: 27/11/2023

6.11.2 Potential impacts

A bushfire assessment has been prepared by GeoLINK for this REF and can be found at **Appendix O**.

An asset protection zone (APZ) is described by the Planning for Bushfire Protection (PBP) 2019 as a fuel reduced area surrounding a built asset or structure which provides a buffer zone between a bushfire hazard and the asset. The workers' camp, being a residential land use, is required to meet the provisions of Chapter 7 and 8 of the PBP 2019. The bushfire assessment (refer to **Appendix O**) has calculated the required APZ for site 0, 2 and 3 in accordance with PBP 2019 and concluded site 0 has the ability to enable APZs to be provided that exceed the minimum requirement, which is encouraged where possible (refer to **Illustration 6.7**). Sites 2 and 3 are significantly constrained for available building footprint once the required APZs has been applied to the sites (refer to **Illustration 6.8** and **Illustration 6.9**).

Bushfire protection construction standards required for a structure are based on the Bushfire Attack Level (BAL). The BAL is used to describe the level of potential bushfire attack and incorporates radiant heat flux exposure thresholds. The modular buildings to be used for the workers' camp accommodations should comply with BAL 29 and would need to meet the relevant construction codes, standards, and additional requirements. Other modular buildings at the compound site are predominately Class 5-8 buildings and under the National Construction Code there are no specific bushfire performance requirements for these building types. However, in order to satisfy the objectives of PBP 2019, it is recommended that the modular buildings in the main compound are also constructed to BAL 29.

The proposed bushfire sprinkler system (refer to **Section 3.4**) would provide additional protection to the camp buildings. A static water supply for firefighting at the camp and compound would be required. This would be in addition to the domestic supply required to service the camp and compound buildings and in addition to the water supply required for the bushfire sprinkler system.

Access for the Activity would be along Kempsey-Armidale Road. During construction, access for residents, service providers, and emergency services would be affected due to blockages from open trenches and construction plant. The impact can be reduced through safeguards and management measures that put controls and procedures in place.

Due to the disparate and isolated nature of the work site it is recommended that a Bushfire Emergency Management and Evacuation Plan be prepared for the project. The Bushfire Emergency Management and Evacuation Plan should include actions to maintain a level of preparedness, to prepare for bushfire occurring in the locality, to adequately communicate relevant actions and to respond to local fire activity.

There is the potential for construction activities to generate ignition of the surrounding bushland, particularly during dry periods and certain weather conditions. Therefore, safeguards and management measures will be in place to minimise the potential for unplanned ignitions to occur and to undertake quick response to stop a fire spreading.

A Bush Fire Operations Plan should be prepared as part of the Site Construction Management Plan to identify potential ignition risks and appropriate mitigation measures. This should include:

- Identifying bushfire risks and potential ignition sources at each work site.
- Measures to maintain bushfire awareness among workers.
- Measures to prevent ignitions.
- Identifying work that is not to be carried out during total fire bans or days of elevated fire danger.
- Availability of fire-suppression equipment.
- Storage and maintenance of fuels and other flammable materials.
- Procedures for notifying the RFS and on-site workers of any ignition.
- Emergency management procedures in line with the Bushfire Emergency Management and Evacuation Plan.

Based on the assessment undertaken in the Bushfire Hazard Assessment report (refer to **Appendix O**), Site 0 is the preferred site for the workers' camp and main compound due to there being:

- Lesser extent of bushfire prone vegetation within close proximity of the site.
- The ability to provide apzs that are greater than the required minimum (larger apzs are encouraged where possible).
- Vehicular access to the Macleay River for an additional firefighting water source.

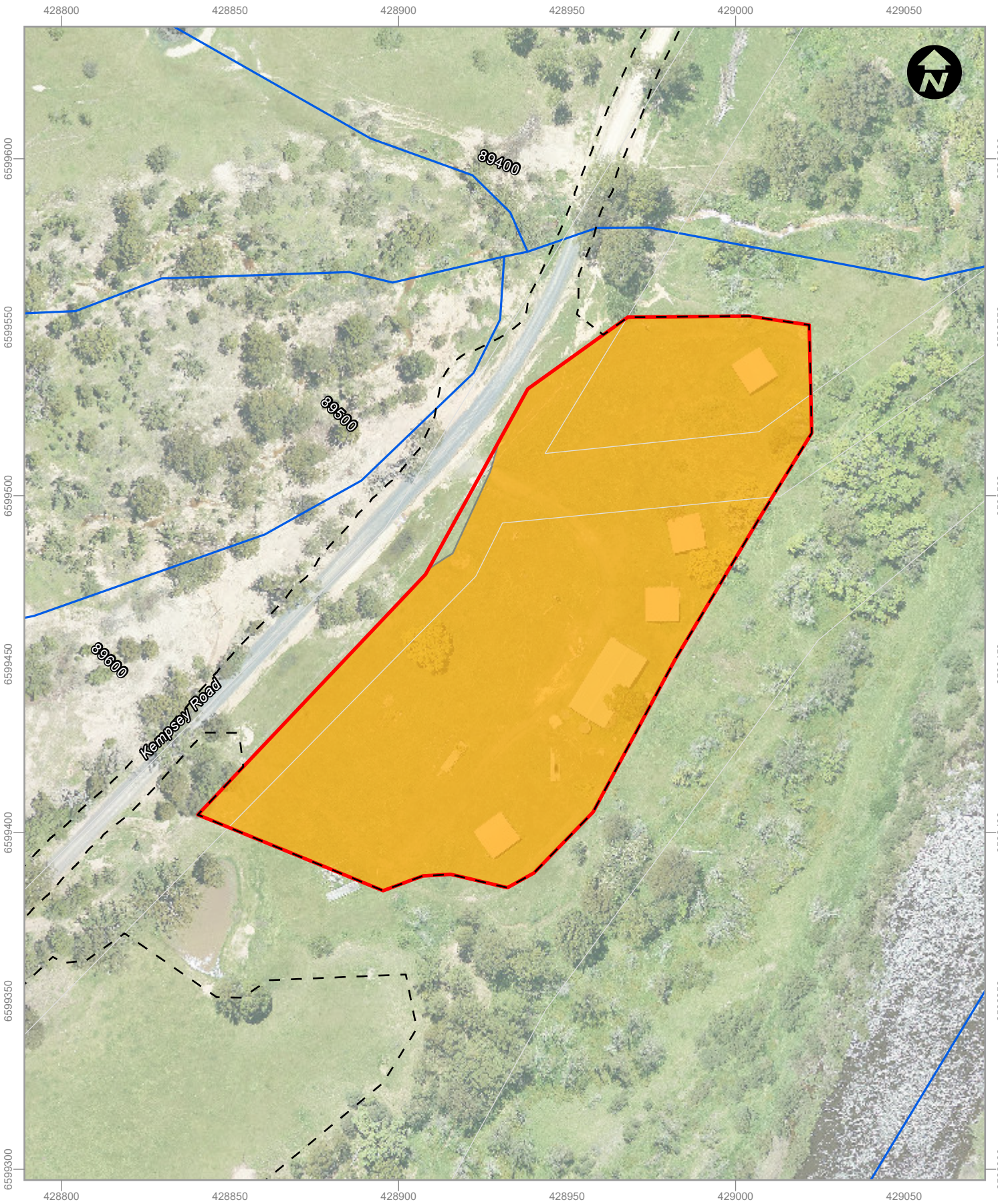
LEGEND

- Camp
- Batch, major compound and laydown
- Camp, compound, laydown alternate 1st option
- Kempsey Road restoration project boundary
- Cadastre
- Asset protection zone
- Watercourse

0 40 Metres

Asset Protection Zone - Site 0 - Illustration 6.7

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: Seymour White
Date: 19/12/2023



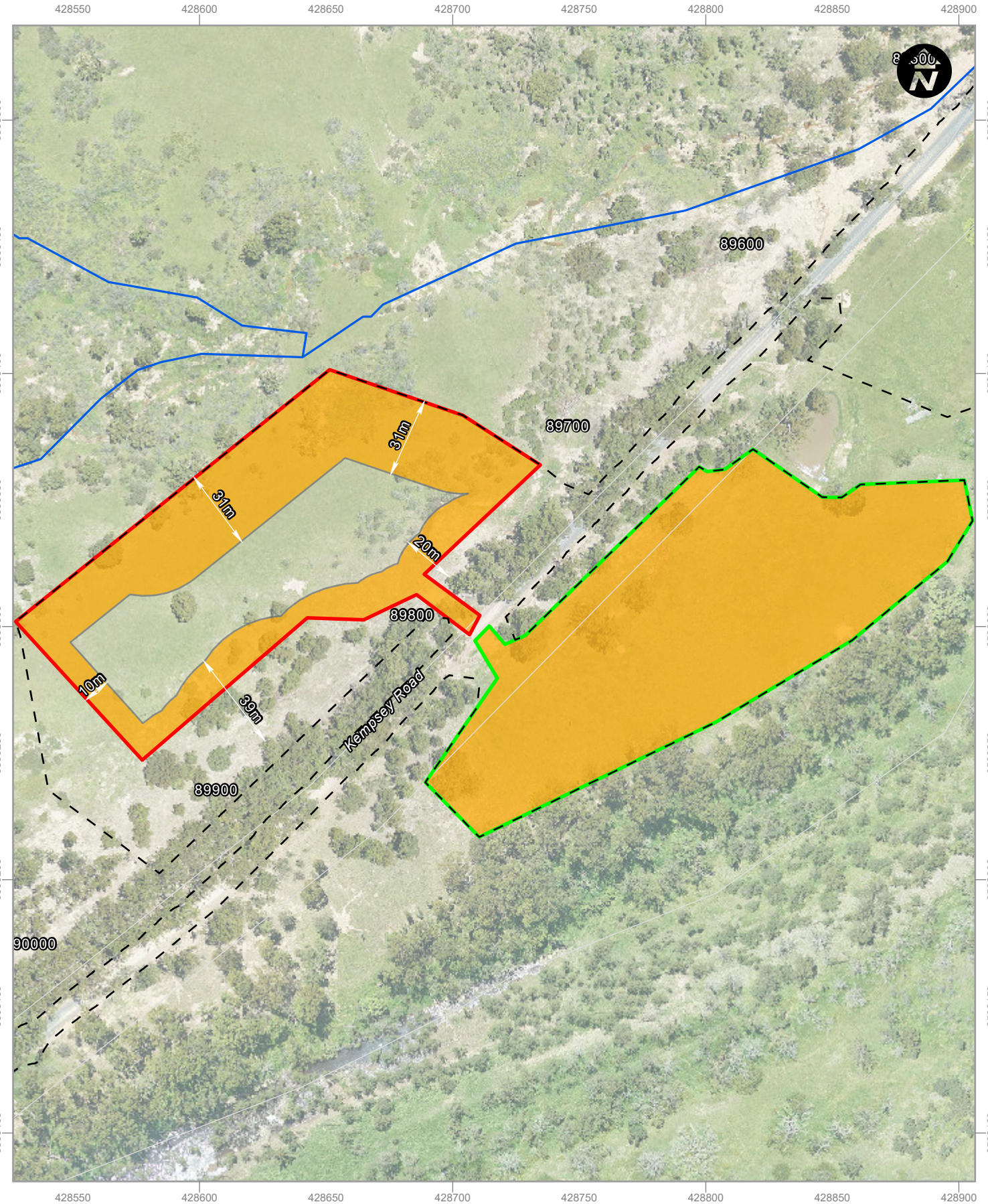
LEGEND

- Camp, major compound or laydown - alternative option
- Kempsey Road restoration project boundary
- Cadastre
- Asset protection zone
- Watercourse

0 30 Metres

Asset Protection Zone - Site 2 - Illustration 6.8

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: Seymour White
Date: 19/12/2023



LEGEND

- Batch, camp, compound or Laydown - alternative option
- Batch, camp, compound or Laydown - 2nd option
- Kempsey Road restoration project boundary
- Cadastre
- Asset protection zone
- Watercourse

0 40 Metres

Asset Protection Zone - Site 3 - Illustration 6.9

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Review of Environmental Factors – ARC Kempsey Road Restoration
4055-1073

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Drawn by: AB Checked by: RE Reviewed by: MCZ
Source of base data: Seymour White
Date: 19/12/2023

6.11.3 Safeguards and management measures

Table 6.20 Safeguards and management measures – Bushfire

Impact	Environmental safeguards	Responsibility	Timing	Reference
Bushfire	APZs for the camp and main compound are to be provided in accordance with Table 4.1 and Illustrations 4.1, 4.2 or 4.3 found in the Bushfire Hazard Assessment report for the relevant site.	Contractor	Detailed design/ Pre-construction During construction	Bushfire Hazard Assessment (**Appendix O**)
Bushfire	The camp and compound area and surrounding APZ are to be established and managed as an Inner Protection Area in accordance with Appendix A4.1.1 of PBP 2019.	Contractor	Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
Bushfire	Camp and compound buildings are to be constructed to comply with Section 3 and 7 (BAL 29) of AS3959-2018 'Construction of Buildings in Bushfire Prone Areas' and Section 7.5.2 of PBP 2019.	Contractor	Detailed design/ Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
Bushfire	Access to the camp and main compound is to comply with Table 7.4a of PBP 2019 and is to include a trafficable area around the perimeter of each facility within the APZ.	Contractor	Detailed design/ Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
Bushfire	A total 200,000 litre static firefighting water supply is to be provided for the camp and compound sites. The firefighting water supply is required in addition to the domestic supply required to service the camp and compound buildings and the water supply required to service the bushfire sprinkler system and any fire hose reels or similar required under the National Construction Code.	Contractor	Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
Bushfire	The firefighting water supply is to be installed and maintained in accordance with Table 7.4a of PBP 2019.	Contractor	Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
Bushfire	Electricity and gas services are to comply with Table 7.4a of PBP 2019.	Contractor	Detailed design/ Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
Bushfire	Landscaping is to comply with the standards for an Inner Protection Area, as outlined in PBP 2019 – Appendix A4.1.1.	Contractor	During construction	Bushfire Hazard Assessment (**Appendix O**)
Bushfire	Prior to the commencement of operations of the workers' camp and main compound, a Bushfire Emergency Management and Evacuation Plan consistent with the NSW RFS publication: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*, and AS 3745:2010 'Planning for emergencies in facilities' is to be prepared.	Contractor	Pre-construction	Bushfire Hazard Assessment (**Appendix O**)
Bushfire	A Bushfire Operations Plan is to be prepared as part of the Site Construction Management Plan.	Contractor	Pre-construction	Bushfire Hazard Assessment (**Appendix O**)
National Parks estate/ Bushfire	Any works at the intersections of the Activity and fire trails will need to:	Contractor	Detailed design/ Pre-	NSW RFS Fire Trail Standards

Impact	Environmental safeguards	Responsibility	Timing	Reference
	a. Minimise the time the intersection is disrupted. b. Provide alternative access arrangements to the fire trail while works are undertaken when the intersection will be disrupted for an extended period. c. Ensure that the intersections with the fire trail are reinstated in accordance with the RFS Fire Trail Standards, Section 2.2 for the relevant Category of Fire Trail.		construction/ Construction	

6.12 Waste

6.12.1 Existing environment

Kempsey Road and Lower Creek Road would likely be subject to some general rubbish discarded by road users within the area.

6.12.2 Potential impacts

The Activity would be undertaken to minimise impacts from generated waste produced on site by ensuring that all waste is either reused on site as appropriate or collected and disposed/ recycled in accordance with Council waste disposal protocols and EPA guidelines. No materials would be used in a manner that poses a risk to public safety.

Waste generated from the Activity may include, but is not limited to:

- Road, slip remediation, and excavation material.
- Vegetative waste.
- General site, office, and workers' camp rubbish.
- Septic waste (i.e. from ablutions).
- Wastewater (i.e. from main compound and workers' camp).
- Used containers, drums, bags, and packaging materials.
- Chemicals, oils, and grease from machinery.
- Consumables such as batteries, tyres, oil filters and grease cartridges.
- Unsuitable spoil material.
- Waste concrete from damaged pipes and headwalls that are replaced as part of the Works.
- Waste concrete from concrete washouts.

The quantity of potential waste streams is unquantifiable at this stage given the limited ECI design. This assessment has assumed the reuse of material onsite would be suitable to meet project requirements and standards. Potential permanent stockpiles for excess spoil have not been considered under this REF and would require additional assessment.

The main offices are anticipated to accommodate 66 people and the workers' camp is anticipated to accommodate up to 200 people. General waste, recyclable waste, and food waste would need to be considered in the logistical operation of these ancillary facilities and included in a Waste Management Plan. Any wastewater generated by the office and camp facilities will need to be addressed in a Wastewater Management Plan, as detailed in **Section 6.7**.

During construction, any waste produced by the operations (i.e. vegetative waste and spoil material) would be reused where possible to minimise the volume of waste produced by the project.

Any excess spoil not utilised on site would be handled in the following order of priority:

1. Onsite permanent stockpile.
2. Permanent stockpile on private land adjacent to the site (subject to property owner agreement and compliance with Specification G36).
3. Transported to a licensed waste facility.

Native vegetative waste from site clearing would be mulched and stored appropriately on site, for use in erosion and sediment controls where appropriate. All non-native vegetative waste will be managed and disposed of in accordance with the *Biosecurity Act 2015*.

A waste transfer facility is located at Lower Creek on Kempsey Road and the access to this facility by local residents may be impacted during the Activity works. Consideration for a temporary transfer station outside the Activity area will the responsibility of the Contractor to arrange in consultation with the waste Contractor engaged by ARC. Final location of the temporary waste transfer station has not been considered as part of this REF assessment. The Contractor will need to liaise with the ARC and KSC Waste Facility Management Teams during the detailed design phase and development of Waste Management Plan to ensure waste is appropriately managed for both construction works and impacted residents throughout the life of the Activity.

6.12.3 Safeguards and management measures

Table 6.21 Safeguards and management measures – Waste

Impact	Environmental safeguards	Responsibility	Timing	Reference
Waste	Prepare a Waste Management Sub-Plan prior to commencement of works/ site establishment that identifies waste streams and how they would be managed. Resource management hierarchy principles are to be followed: • Avoid unnecessary resource consumption as a priority. • Avoidance is followed by resource recovery (including re-use of materials, reprocessing, recycling, and energy recovery). • Disposal is undertaken as a last resort. The Contractor is to liaise with ARC and KSC Waste Facility Management Teams during the detailed design phase and development of the Waste Management Plan.	Contractor	Detailed design/ Pre-construction/ During construction	
Waste/ Visual impact	All working areas are to be maintained, kept free of rubbish, and cleaned up at the end of each working day.	Contractor	During construction	
Waste	Any contaminated waste generated will be disposed of in accordance with the EPA approved methods of waste disposal.	Contractor	During construction	
Waste/ Climate Change	Waste will be minimised and will be collected and recycled or disposed of in accordance with Council waste disposal protocols and EPA guidelines.	Contractor	During construction	
Waste	Non-native vegetation material generated from tree and vegetation removal is to be mulched on-site and taken to a licenced waste facility.	Contractor	During construction	
Waste	The Contractor will arrange for a temporary waste transfer station for use by local residents, to be placed outside of the Activity. Consultation with the waste Contractor engaged by ARC is to be undertaken when determining the location.	Contractor	Detailed design/Pre-construction/ During construction	
Air quality/ Waste	Vegetation or other materials will not be burnt on-site.	Contractor	During construction	

6.13 Landscape character and visual impacts

6.13.1 Existing environment

Kempsey-Armidale Road predominately accommodates a combination of local, forestry, agricultural and tourist traffic. It also provides a critical connection between Armidale and Kempsey.

The section of Kempsey Road between the northern most point of the Activity boundary to approximately 6 km north of George's Junction predominantly travels through and adjacent to Cunnawarra National Park and Georges Creek Nature Reserve, meaning the drive along the road through this area is dominated by trees and vegetation. This road section is a winding road along steep sections as the road drops in elevation towards the Macleay River. The 6 km before the road reaches George's Junction opens into the valley between the adjacent mountains with a soft slope towards the river surrounded by patches of grazing land. Lower Creek Road has a similar landscape between the adjacent mountains to the east.

From George's Junction to the eastern boundary of the Activity site, Kempsey Road travels between the foot of the mountain and the Macleay River, following the river's path. The road along this section is lined with trees while passing through patches of open grazing land. There is a combination of flat areas and areas with steep sections on either side of the road.

Overall, the landscape that Kempsey Road and Lower Creek Road travel through are dominated with vegetation and rural properties. There are some built structures, mainly houses, along the eastern half of the road alignment within the regional setting.

6.13.2 Potential impacts

Construction

Construction for the Activity would result in visual impacts, which are the day-to-day visual effects on people's views. These visual impacts would be consistent with construction works, such as the presence of machinery and equipment, excavations, vegetation removal, the presence of laydown areas, the workers' camp, the site offices, concrete batch plant, and other temporary structures. During construction the visual impacts could reach moderate to high levels, depending on the location along the roads, however, the impacts are considered temporary. Due to the linear nature of the Activity site, the construction would move along the road alignments throughout the construction schedule. Post construction most of these temporary visual impacts would no longer be present.

Operation

The landscape character assessment of the site correlates to the overall impact of the Activity on the area's character and sense of place. Kempsey Road and Lower Creek Road are existing roads that travel through vegetated mountain and valleys with patches of rural grazing areas. The overall sense of place and regional character would not be impacted by the road restoration as the Activity would be restoring the road to the pre-disaster conditions.

Despite the minimal to no impact on the landscape character, the Activity would potentially cause visual impacts. Alterations to the views for residents and recreational users across the Macleay River would likely result from the permanent stabilisation works. In particular, the proposed gravity walls and shotcrete to be constructed on the downslope side of Kempsey Road alongside the Macleay River would result in a man-made concrete finish at locations along the roadway. Initially after construction is complete, the walls and shotcrete would be among areas where vegetation has been removed due to construction works, resulting in the walls and shotcrete potentially appearing stark against the surrounding locations. This initial impact of exposed soil, gravity walls, and shotcrete would be considered temporary. Over time it is expected that the surrounding vegetation would re-establish on the exposed soil and around the built-up areas. Viewpoints from a lower elevation would be expected to improve over time as the renewed vegetation provides visual screening for the lower sightlines and soften the visual impact of the shotcrete.

Therefore, the aesthetic qualities or value of the locality are not expected to be significantly impacted by the Activity. The character of the general area would largely remain the same post-construction and no significant visual impact is expected. In view of the overall environment, the location of potential viewpoints and the return of vegetation, the level of visual modification is considered low and on balance the impact is considered minor. Further assessment of potential visual impacts of the proposal are included in **Table 6.22**. Mitigation measures and safeguards have been developed to ensure any potential impacts are minimised.

Table 6.22 Visual impact checklist

Criteria	Yes	No	N/A
Is the proposal adjacent to an important physical or cultural element or landscape? (heritage items and areas, distinctive or historic built form, National Parks, conservation areas, scenic highways etc). *While part of the works would be located adjacent to Georges Creek Nature Reserve and the Macleay River, the Activity would be mostly limited to the road reserve and would not significantly alter the landscape character of the surrounding terrain. Given the nature of the Activity it is not expected to significantly alter the landscape character of Kempsey Road or Lower Creek Road.*	Partly	Partly	
Does the proposal obstruct or intrude upon the character or views of a valued landscape or urban area. For example, local significant topography, a rural landscape or a park, a river lake or the ocean or a historic or distinctive townscape or landmark? *The proposed work would not obstruct or intrude upon the character or views of a valued landscape in the long-term. Minor, short-term impacts upon the visual landscape would be changes to the visual amenity of the site associated with the works area, presence of compound sites and machinery/ construction works associated with the proposal.*		√	
Does the proposal require the removal of mature trees or other significant stands of vegetation, either native or introduced? *The proposal would require clearing of select trees and groundcover within the road reserve and select immediately adjacent areas of Kempsey Road and Lower Creek Road to facilitate installation of drainage structures, culvert replacement, scour protection works, slip remediation treatments, and temporary works, such as associated access tracks, laydown areas, and the compound.* *The Activity would require the removal of native vegetation from four PCTs. Refer to Section for additional information on biodiversity impacts.* *Vegetation removal for the Activity is unlikely to affect the visual amenity of the site substantially in the long-term.*		√	
Does the proposal result in large areas of shotcrete visible from the road or adjacent properties? *While some shotcrete is proposed for select sections of the alignment, it would occur on the downward slope, away from the road, making it minimally visible for road users. For adjacent properties, it is expected that surrounding vegetation would provide some visual screening of the shotcrete and soften the visual impact, which would improve over time as the vegetation re-establishes in the disturbed areas. A significant visual impact is not expected.*		√	
Does the proposal involve new noise walls or visible changes to existing noise walls? *N/A*			√
Does the proposal involve the removal or reuse of large areas of road corridor landscape, either verges or medians? *N/A*			√
Does the proposal involve significant changes to the appearance of a bridge (including piers, girders, abutments and parapets) that are visible from the road or residential areas?			√

Criteria	Yes	No	N/A
N/A			
If involving lighting, will the proposal create unwanted light spillage on residential properties at night? *N/A*			√
Would any new structures or features being constructed result in over shadowing to adjoining properties or areas? *N/A*			√

6.13.3 Safeguards and management measures

Table 6.23 Safeguards and management measures - Landscape character and visual impacts

Impact	Environmental safeguards	Responsibility	Timing	Reference
Waste/ Visual impact	All working areas are to be maintained, kept free of rubbish, and cleaned up at the end of each working day.	Contractor	During construction	
Visual impact	Project work sites, including construction areas and supporting facilities (such as storage compounds and stockpiles) are to be managed to minimise visual impacts, including appropriate storage of equipment, parking, stockpile management and arrangements for the storage and removal of rubbish and waste materials.	Contractor	During construction	
Visual impact	Any shotcrete used will be kept to the minimal amount required and measures to prevent overspray, especially onto the surrounding area, will be put into place.	Contractor	During construction	

6.14 Socio-economic

6.14.1 Existing environment

Kempsey-Armidale Road predominately accommodates a combination of local, forestry, agricultural, and tourist traffic. It also provides a critical connection between Armidale and Kempsey. The section of Kempsey Road that runs north and south between the northern boundary of the Activity site and approximately 6 km north of George's Junction is situated adjacent to Cunnawarra National Park and Georges Creek Nature Reserve. Lower Creek Road and the remaining section of Kempsey Road are situated in a regional setting with farms, residential properties, and tourist accommodations.

6.14.2 Potential impacts

Restoration of Kempsey Road and Lower Creek Road would result in an overall positive impact to the local community, forestry and agriculture transport, and tourism. The roads are in poor condition after the bushfires and flooding, with the roads being closed to all but essential travel and emergency services. A large concern centres around the safety of the road use, which would be resolved by the Activity and allow the road to be fully reopened.

Construction

During construction the Activity would result in a minor negative socio-economic impact, in particular due to the road closures. Kempsey Road is currently closed to all traffic except local essential travel and emergency services and would remain so during the construction period. In addition to this, Kempsey Road would be closed to all traffic, including the local and essential traffic, during the 10 days on roster construction period. The road would be reopened to local essential travel overnight and for a partial escort at midday on select days (refer to **Section 3.3.7** for description). This would result in local residents requiring to plan ahead if they need to leave home for the day and to leave and return either before construction

starts for the day, during the midday travel period if they are on the correct side, or after construction stops for the evening. Cattle truck movement would also be impacted with movements requiring planning around the 10 days on/ 4 days off roster. Community consultation has occurred to assess the community's willingness to proceed with the 10 days on/ 4 days off roster and feedback has been in favour of the roster and for the midday escorts to occur on two of the days during the 10 days on roster period, which allows for an expedited construction schedule in comparison to a standard workday schedule. Ongoing community consultation should occur to check in if the two days for midday escorts are sufficient and to allow for ARC to adjust the number of days and/ or schedule based on future community feedback and times of year.

To accommodate the construction of the Activity, private property would be required as locations for ancillary sites, such as the main compound, workers' camp, laydown areas, and concrete batch plant. This will require discussions and arrangements with local property owners. Initial community consultation has been positive for the leasing of private land. Due to the sites needing to be selected for specific qualities, not all private land along Kempsey Road would be suitable for leasing. There is the potential for landowners not approached for leasing opportunities to feel they are not being treated fairly. This risk can be managed through a communication plan as noted in the recommended management measures.

In addition to the traffic and property leasing impacts, some additional minor impacts related to visual amenity, air quality, and noise and vibration are expected during the Activity, however, these can largely be managed with recommended safeguards and management measures outlined in the REF. The impacts during construction are considered to be temporary in nature.

Operation

Post-construction, the Activity would improve the condition of Kempsey Road and Lower Creek Road. This would have a positive socio-economic impact by reducing the safety risk to road users and restoring connectivity.

6.14.3 Safeguards and management measures

Table 6.24 Safeguards and management measures – Socio-economic

Impact	Environmental safeguards	Responsibility	Timing	Reference
Socio-economic	A Community Involvement Plan (CIP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum): • regular community updates and transparency on Activity processes and decisions as appropriate; • mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions; and • contact name and number for complaints. The CIP will be prepared in accordance with the *Community Involvement and Communications Resource Manual* (RTA, 2008).	Contactor	Detailed design/ pre-construction	
Socio-economic	Ongoing community consultation is to be done for the duration of the Activity to gage the satisfaction and requirements of the community around the midday escorts. ARC should make periodic adjusts as required to the number of days and the scheduled days for the midday escorts based on community feedback.	ARC	Construction	
Socio-economic	A complaints handling procedure and register is to be included in the CEMP and is to include that all complaints are to be responded to within 24 hours.	Project Manager/ Contractor	During construction	

6.15 Climate change

6.15.1 Existing environment

Anthropogenic climate change associated with global warming is the result of human activities creating greenhouse gas emissions which in turn affects the environment. Anthropogenic climate change and the need to reduce emissions is a key issue of global, national, and local importance.

6.15.2 potential impacts

The Activity would contribute to carbon emissions and anthropogenic climate change via the production of greenhouse gas emissions by construction equipment and traffic, the consumption of materials requiring carbon emissions, and the potential removal of trees and vegetation that may otherwise act as a carbon sink. Given the duration and scale of the works there would be an influence on emissions and potentially climate change. However, the appropriate implementation of safeguards and management measures would aid in reducing or minimising the cumulative emissions, fuel consumption, and related effects.

6.15.3 Safeguards and management measures

Table 6.25 Safeguards and management measures – Climate change

Impact	Environmental safeguards	Responsibility	Timing	Reference
Climate Change	Vehicles and equipment will be switched off when not required for direct construction activities.	Contractor	During construction	
Waste/ Climate Change	Waste will be minimised and will be collected and recycled or disposed of in accordance with Council waste disposal protocols and EPA guidelines.	Contractor	During construction	
Biodiversity/ Climate Change/ Surface water/ Soils	Vegetation clearing/ trimming is to be kept to the minimum extent needed to carry out the works.	Contractor	During construction	

6.16 Cumulative impacts

6.16.1 Study area

The study area for the purposes of assessing cumulative impacts is the Armidale Regional LGA. The Activity site is located adjacent to the boundary with Kempsey Shire LGA.

6.16.2 Other projects and developments

Table 6.26 Proposed future projects

Project	Construction impacts	Operational impacts
Oven Mountain Pumped Hydro Energy Storage Project – includes the construction and operation of a pumped hydro energy storage system. This system creates electricity by pumping water up to the upper reservoir when electricity (such as solar) is available and uses gravity to create electricity when the water is allowed to flow	Construction impacts of the Oven Mountain development may include: • Clearing vegetation. • Construction noise. • Additional traffic on Kempsey-Armidale Road for the duration of the construction project (expected to be 4 – 5 years). • Material required, such as road base and concrete. • Water use from the Macleay River. • Impacts on Aboriginal heritage.	Operational impacts of the Oven Mountain project may include: • A minor increase in traffic on Kempsey-Armidale Road to access the site for maintenance. • Potential visual impacts to recreational users of the area. • Ongoing impacts to flora and fauna from new roads. • Local effects on surface water flows

Project	Construction impacts	Operational impacts
back to the lower reservoir. The location is proposed to be on an ephemeral tributary of the Macleay River.		

6.16.3 Potential impacts

The Activity is expected to add to a number of cumulative impacts during construction including resource consumption, disruption to traffic, vegetation clearing, noise impacts and generation of greenhouse gas emissions (i.e. through operation of vehicles and equipment). However, the safeguards and management measures stated within **Section 6** aim to minimise the extent to which the Activity contributes to cumulative adverse environmental impacts.

The Oven Mountain Pumped Hydro Energy Storage Project has been proposed to be located adjacent to the Macleay River, south of the Activity location with some overlap of project boundaries. The Oven Mountain project EIS, which was on public display in September/ October 2023, identified a similar construction start period and timeframe as the Activity, with the expectation to use Kempsey-Armidale Road for the Oven Mountain project site access. If the overlap and timing of the two projects is not considered and coordinated, there could be impacts on material availability and traffic impacts. The State Significant Infrastructure project is under assessment as of September 2024.

The location of the Activity is adjacent to the Kempsey Shire LGA boundary. Therefore, projects undertaken by Kempsey Shire Council could have cumulative impacts to the Activity and could result in impacts on material availability and traffic. Consultation with Kempsey Shire Council during the Activity would assist in coordination and minimising impacts.

6.16.4 Safeguards and management measures

Table 6.27 Safeguards and management measures - Cumulative impacts

Impact	Environmental safeguards	Responsibility	Timing	Reference
Cumulative construction impacts	Consultation to occur with proponents of the Oven Mountain Pumped Hydro Energy Storage project to: • Increase awareness of construction timeframes and impacts. • Coordinate road access. • Coordinate impact mitigation and management.	Armidale Regional Council and Contractor	Detailed design/ Pre-construction/ During construction	
Cumulative construction impacts	Consultation to occur with Kempsey Shire Council to: • Increase awareness of construction timeframes and impacts. • Coordinate road access. • Coordinate impact mitigation and management.	Armidale Regional Council and Contractor	Detailed design/ Pre-construction/ During construction	
Cumulative construction impacts	The contractor is to develop and establish a Community Involvement Management Plan, which incorporates comprehensive interface agreements with relevant stakeholders.	Contractor	Detailed design/ Pre-construction/ During construction	

7. Environmental management

This chapter describes how the proposal will be managed to reduce potential environmental impacts during detailed design, construction, and operation. A framework for managing potential impacts is provided. A summary of site-specific environmental safeguards is provided and the licence and/or approval requirements required prior to construction are listed.

7.1 Environmental management plans (or system)

Safeguards and management measures have been identified in the REF in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the Activity. Should the Activity proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A Construction Environmental Management Plan (CEMP) will be prepared to describe the safeguards and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP will be prepared prior to construction of the Activity and must be reviewed and certified by ARC prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the TfNSW standard specifications set out in the *QA Specification G36 - Environmental Protection (Management System)*, *QA Specification G38 - Soil and Water Management (Soil and Water Plan)*, *QA Specification G40 - Clearing and Grubbing, QA Specification G10 - Traffic Management*.

7.2 Summary of safeguards and management measures

Environmental safeguards and management measures outlined in this REF will be incorporated into the detailed design phase of the proposal and during construction and operation of the Activity, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the Activity on the surrounding environment. The safeguards and management measures are summarised in **Table 7.1**.

Table 7.1 Summary of safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
1	Biodiversity	A Flora and Fauna Management Sub-Plan (FFMSP) will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP). The FFMSP will generally follow the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024).	Contractor	Pre-construction	QA *G36 Environment Protection*
2	Biodiversity	Pre-clearing surveys will be undertaken in accordance with *Guide 1: Pre-clearing process* of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024)**.**	Contractor	Pre-construction	Biodiversity Assessment Report (**Appendix D**)
3	Biodiversity	An Environmental Work Method Statement would be prepared for any instream works. It would include: • Assessment of the need for aquatic fauna salvage by a licenced aquatic ecologist. • Methods to manage water quality risks. • An erosion and sediment control plan.	Contractor	Pre-construction	Biodiversity Assessment Report (**Appendix D**)
4	Biodiversity	The works limit would be clearly delineated to prevent impacts to native vegetation and fauna habitat outside of the approved works footprint.	Contractor	Pre-construction	Biodiversity Assessment Report (**Appendix D**)
5	Biodiversity/ Climate Change/ Surface water/ Soils	Vegetation clearing/ trimming is to be kept to the minimum extent needed to carry out the works.	Contractor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
6	Biodiversity	The 10 culverts listed in Table 4.3 in the BAR would be subject to ecologist microbat inspections prior to commencing works to: • Determine the presence/ absence of microbats, and if present, the number of animals, species and breeding status, and appropriate management option. • Remove and exclude microbats if present.	Contactor	Pre-construction	Biodiversity Assessment Report (**Appendix D**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• Prior to construction phase, install exclusion devices to prevent microbat access and roosting opportunities within the culvert (such as one-way valves, curtains and filling gaps and voids). The ecologist would be responsible for managing the animals' welfare and providing advice as appropriate. Key requirements include: • If breeding colonies are detected, works at that culvert may be delayed until outside of that species' breeding period (October to mid-April inclusive for the Southern Myotis). • Microbats would not be displaced during periods of torpor, cold or windy conditions. • Exclusion may need to be installed at night after flyout if >10 animals are present. • Consideration of availability and potential need for alternative roosting habitat.			
7	Biodiversity	In new concrete culverts over 0.75 m diameter, the culvert cell joins and internal lift holes would be left open (i.e. not grouted), to retain microbat roost habitat post completion of the works. If not achievable artificial microbat habitat would be installed a minimum of one month prior to microbat exclusion and this would be completed in consultation with an ecologist regarding appropriate design and location.	Contactor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
8	Biodiversity	Pruning of mature trees is to be in accordance with Part 5 of the Australian Standard 4373-2007 Pruning of amenity trees.	Contactor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
9	Biodiversity	Declared weeds are to be managed according to requirements under the *Biosecurity Act 2015* and *Guide 6: Weed Management* of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024), where required. The Contractor will need to adequately manage biosecurity risks as part of the development of the FFMSP within the CEMP. It is also recommended that the Contractor liaise with the Local Weeds Authority on development of appropriate mitigation and management measures for the CEMP.	Contactor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
10	Biodiversity	Fauna handling must be carried out in accordance with the requirements *Guide 9: Fauna Handling* of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024).	Contactor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
11	Biodiversity	If unexpected, threatened fauna or flora species are discovered, stop works immediately and follow the procedure in *Guide 1: Pre-clearing process* of the *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (TfNSW, 2024).	Contactor	Detailed design/ pre-construction	Biodiversity Assessment Report (**Appendix D**)
12	Biodiversity	All pathogens (e.g. Chytrid, Myrtle Rust and Phytophthora) are to be managed in accordance with *Guide 7: Pathogen Management* of the *Biodiversity Management Guidelines: Protecting and managing*	Contactor	Detailed design/ pre-construction	Biodiversity Assessment

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		biodiversity on Transport for NSW projects (TfNSW, 2024) and *DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora).*			Report (**Appendix D**)
13	National Parks estate	Prior to finalising the remediated road design, slope stability engineering requirements, location of ancillary facilities, and hazardous tree removal, as it affects the Cunnawarra National Park and Georges Creek Nature Reserve, the proponent must consult with NSW NPWS via: • NPWS Coffs Coast Area: Manager Glenn.Storrie@environment.nsw.gov.au, Team leader Rangers simon.hemer@environment.nsw.gov.au and Ranger kath.crowe@environment.nsw.gov.au. • NPWS New England Area: Manager Aaron.Simmon@environment.nsw.gov.au, Team Leader Rangers peter.berney@environment.nsw.gov.au and Ranger adam.baillie@environment.nsw.gov.au.	ARC/ Contractor	Detailed design/ Pre-construction	Transport and Infrastructure SEPP consultation Biodiversity and Conservation response (refer to **Appendix I**)
14	National Parks estate	A suitability qualified arborist is to be engaged to do the tree pruning and removal. Tree contractors must have a minimum AQF Level 3 Certificate in arboriculture and work in accordance with Australian Standard® AS 4373-2007 – Pruning of Amenity Trees, the *Work Health & Safety (WHS) Act 2011* and the WHS Regulations 2017, the Safe Work Guide to Managing Risks of Tree Trimming and Removal Work 2016 and the Code of Practice for The Amenity Tree Industry 1998. Work near powerlines should be carried out in accordance with the Code of Practice for Work Near Overhead Power Lines. Tree contractors shall be members of Tree Contractors Association Australia (TCAA) or Arborists Australia (AA) and hold Workers Compensation and Public Liability Insurance. Tree contractors must liaise with the consulting arborist to ensure that tree pruning, and removal works are completed according to specification.	Contractor	Pre-construction/ Construction	Tree Assessment Report (**Appendix K**)
15	National Parks estate	An AQF Level 5 Arborist must annually monitor (during the Activity) the health and structural condition of trees on site. Trees require monitoring by on-site staff after severe weather events such as lightning, heavy rain, or extreme winds. It is important that staff and children are not under trees when winds are greater than 35 km/h. A virtual weathervane may be a useful tool in determining wind categories.	Contractor	Construction	Tree Assessment Report (**Appendix K**)
16	National Parks estate	Daily check on the trees for changes in their condition for example, broken and hung or suspended branches or failed section including stump plate or soil disturbance. It is recommended as part of the WH&S procedures and reviewed prior to the days start of work on sites where there is a daily constant occupation.	Contractor	Construction	Tree Assessment Report (**Appendix K**)
17	National Parks estate	Areas of encroachment of the Activity boundary onto National Parks estate land are considered No-Go zones until approval/ authorisation has been provided by National Parks. Construction in No-Go zones are not to commence until approval/ authorisation has been granted. If construction is being undertaken adjacent to a No-Go zone prior to approval/ authorisation, then the No-Go zone is to have a temporary barrier and signage erected to delineate the boundary.	Contractor	Pre-construction/ Construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
18	National Parks estate	Where the Activity boundary is adjacent to or within National Parks land, a temporary barrier will be erected to delineate the boundary. The contractor is responsible for regular monitoring of the boundary to ensure it remains in place for the duration of the construction within the area.	Contractor	Pre-construction/ Construction	
19	National Parks estate	Encroachment areas of the Activity boundary onto National Parks estate land are not to be used for the storing of materials, equipment, workers' vehicles, or machinery. Locations of laydowns and minor compounds are to be reconsidered to areas within the road reserve or on land outside of the National Park and Nature Reserve.	Contractor	Detailed design/ Pre-construction	Developments adjacent to National Parks and Wildlife Service lands Guidelines for consent and planning authorities (DPIE, 2020)
20	National Parks estate/ Bushfire	Any works at the intersections of the Activity and fire trails will need to: a. Minimise the time the intersection is disrupted. b. Provide alternative access arrangements to the fire trail while works are undertaken when the intersection will be disrupted for an extended period. c. Ensure that the intersections with the fire trail are reinstated in accordance with the RFS Fire Trail Standards, Section 2.2 for the relevant Category of Fire Trail.	Contractor	Detailed design/ Pre-construction/ Construction	NSW RFS Fire Trail Standards
21	Rehabilitation	The CEMP is to include site specific rehabilitation plan for each work area. This is to include at a minimum: • Rehabilitation criteria. • Rehabilitation action plan and schedule. • Planting types. • Topsoil quantity, quality, and any testing requirements. • Weed management. • Erosion and soil loss management. • Establishment and maintenance regimes for rehabilitated areas. • Monitoring, reporting, and auditing processes.	Contractor	Pre-construction/ Construction	
22	Rehabilitation	Where reshaping the land, such as cut and fill, is required to accommodate construction works, the topsoil and subsoil will be recovered from surfaces and stockpiled (separately) until required for rehabilitation of the areas. Stockpiles will include measures to maintain separation from other materials, protect soil health, and reduce loss from erosion and soil runoff. Measures will be included to minimise the infiltration of weeds and invasive species from establishing in the stockpile.	Contractor	Construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
23	Rehabilitation	As feasible, the Activity is to be staged to reduce the amount of surface area stripped of topsoil and subsoil and exposed at any one time.	Contractor	Construction	
24	Rehabilitation	Where possible, stockpiled topsoil and subsoil are to be reused within the same area/ location as they were removed from.	Contractor	Construction	
25	Rehabilitation	Rehabilitation on land that is adjacent to or on National Parks estate land is to include consultation with National Parks prior to the completion of the rehabilitation plan for the area.	Contractor	Pre-construction/ Construction	
26	Rehabilitation	Rehabilitation on land adjacent to the road is to include consultation with and agreement of the appropriate landowners and the rehabilitation outcomes are to reasonably take into consideration the landowners' requirements. Formal agreements are to be completed and signed by all parties (landholder, contractor, ARC).	Contractor	Pre-construction/ Construction	
27	Rehabilitation	Rehabilitation is to be scheduled to occur as the Activity progresses to minimise the amount of time stripped land is exposed at any given time.	Contractor	Pre-construction/ Construction	
28	Rehabilitation	Cleared vegetation that has been mulched is to be stockpiled on site (in accordance with TfNSW *G40 Specification*) and re-used in the site rehabilitation process.	Contractor	Construction	
29	Rehabilitation	Imported topsoil may be used to make up for any shortfall in the quantity of topsoil available from site. Imported organic topsoil must be a weed-free "organic type" soil mix that conforms to AS 4419:2018 and suitable for the culture of plant material in landscape areas. It must: (a) be of a friable porous nature; (b) contain no refuse or materials toxic to plant growth; (c) contain no stumps, roots, clay lump or stones larger than 25 mm in size; (d) have an organic content of at least 15% to 20% by mass as determined by the method specified in AS 1289; (e) have a pH in the range of 5 to 6.5; (f) have a soluble salt content not exceeding 0.06% by mass; (g) be suitable for phosphorus sensitive plants; and (h) be free of weed and weed refuse material. A copy of soil testing certificate must be provided to ARC.	Contractor	Construction	
30	Traffic and transport	A Traffic Management Plan and Safety Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the Transport *Traffic Control at Work Sites Manual*	Contractor	Detailed design/ Pre-construction	*G10 – Traffic Management*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		(Transport for NSW, 2022)and *D&C Specification G10 Traffic Management* (Transport for NSW, 2020). The TMP will include: • Confirmation of haulage routes. • Measures to maintain access to local roads and properties. • Site-specific traffic control measures (including signage) to manage and regulate traffic movement, both inside the construction area and outside the construction area (i.e. east and west side of Kempsey-Armidale Road approaching the construction site). • Measures to maintain pedestrian and cyclist access (where relevant). • Requirements and methods to consult and inform the local community of impacts on the local road network. • Access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads or causing safety issues for local road users. • A response plan for any construction traffic incident. • Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic. • Logistical management of heavy load movements into and out of the site. • Monitoring, review, and amendment mechanisms.			
31	Traffic	All traffic closures/ disruptions/ changed road conditions would be communicated to road users in accordance with Council via suitable means/ media.	Project Manager	Pre-construction/ Construction	
32	Traffic	Consultation with all emergency services, including Fire and Rescue NSW, Police and Ambulance, NSW SES and NSW RFS will be undertaken where the construction phase of the upgrades would cause disruption to the operation of the road and may impact the ability for emergency vehicles to use this route.	Project Manager	Construction	*G36 Environmental Protection*
33	Traffic	Reducing the speed limit of Kempsey-Armidale Road in sections that are narrow, winding, unsealed, or have obstructed sight distances to ensure road speed is safe for road users.	Contractor	Construction	Traffic Impact Assessment (**Appendix L**)
34	Traffic	Installing give way signage and road markings on sections of road that are narrow but have good sight distance of oncoming traffic (e.g., Styx River Crossing bridge).	Contractor	Construction	Traffic Impact Assessment (**Appendix L**)
35	Traffic	Installing automated temporary traffic lights on sections that are narrow and have poor sight distance of oncoming traffic.	Contractor	Construction	Traffic Impact Assessment (**Appendix L**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
36	Traffic/ Flooding	Flood risk signage will be addressed in the CEMP for the works and permanent signage is to be considered during detailed design for operation.	Contractor/ ARC	Detailed design/ Pre-construction/ Construction	Transport and Infrastructure SEPP consultation SES response (refer to **Appendix I**)
37	Traffic	Restricting construction traffic to designated periods of the day when existing traffic volumes are low.	Contractor	Construction	Traffic Impact Assessment (**Appendix L**)
38	Traffic	Pre-planning heavy vehicle movements and implementing convoy tactics with manned traffic control at appropriate locations to manage normal traffic movements.	Contractor	Pre-construction/ Construction	Traffic Impact Assessment (**Appendix L**)
39	Traffic/ Air quality	Regular dust management of unsealed roads. Dust suppression techniques will be utilised to minimise the potential for dust generation/ dispersal during works, as required.	Contractor	Construction	Traffic Impact Assessment (**Appendix L**)
40	Noise and vibration	A Noise and Vibration Management Sub-Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the Interim Construction Noise Guideline (ICNG) (DECC, 2009) and identify: • All potential significant noise and vibration generating activities associated with the Activity. • Feasible and reasonable safeguards and management measures to be implemented, taking into account Beyond the Pavement: urban design policy, process and principles (Transport, 2014). • A monitoring program to assess performance against relevant noise and vibration criteria. • Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures. • Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.	Contractor	Detailed design/ Pre-construction	Section 4.6 of QA *G36 Environment Protection*
41	Noise and vibration	All sensitive receivers (e.g., schools and local residents) likely to be affected will be notified at least seven days prior to commencement of any works associated with the Activity that may have an adverse noise or vibration impact. The notification will provide details of: • The project. • The construction period and construction hours. • Contact information for project management staff. • Complaint and incident reporting.	Contractor	Detailed design/ Pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• How to obtain further information.			
42	Noise	The best available technology that is economically achievable is to be used for each construction task.	Contractor	Pre-construction/ Construction	Noise and Vibration Impact Assessment (**Appendix M**)
43	Noise	The quietest equipment that is available and economical for each task will be used and that equipment is to be located appropriately, including: • maintaining all equipment in good condition, with particular emphasis on noise control devices such as engine exhaust silencers, to minimise noise from each machine; • replacing all tonal reverse alarms with broadband reverse alarms, and adjusting the noise level of reverse alarms to the lowest practical level to minimise noise without compromising worker safety; • selecting the quietest available power generators, air conditioners and other camp and compound equipment, particularly for equipment that operates at night within audible range of a residence; and • arranging the layout of camps and compounds to minimise noise to residences with particular consideration for noise sources that operate at night (generators, air conditioners) and high noise level sources (earthmoving equipment, volumetric mixing equipment, and trucks).	Contractor	Construction	Noise and Vibration Impact Assessment (**Appendix M**)
44	Noise	Equipment will be managed to minimise noise, including: • switching diesel powered or other machines off when not being used, rather than leaving machines idling for an extended period; • use of mild engine speed and power where possible, rather than full speed, to minimise engine and exhaust noise; • maintaining roads, laydown areas and stockpile areas in reasonable condition where practical, to minimise noise from vehicles travelling over uneven surfaces. this particularly applies to empty dump trucks and similar machines that can produce significant impact noise; • minimising travel distance for tracked vehicles such as dozers and excavators; • minimising the material drop height from an excavator bucket, particularly for the first load of material being deposited into a truck, to minimise impact noise as the material lands in the truck body; • avoiding and minimising vehicle movements along the road and starting other equipment before 7 am to avoid sleep disturbance for residents; • avoiding audible alarms, horns and similar devices sometimes used by an excavator operator to indicate to the truck driver that the truck is loaded; and	Contractor	Construction	Noise and Vibration Impact Assessment (**Appendix M**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• avoiding start-up horns and similar warning devices and sources within camps and compounds, particularly for early morning (7 am) starts near residences.			
45	Noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • All relevant project specific and standard noise and vibration mitigation measures. • Relevant licence and approval conditions. • Permissible hours of work and any limitations on high noise generating activities. • Location of nearest sensitive receivers. • Construction employee parking areas. • Designated loading/ unloading areas and procedures. • Site opening/ closing times (including deliveries). • Environmental incident procedures.	Contractor	Construction	
46	Noise and vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/ or vibration levels should be scheduled during less sensitive time periods. Any variations to the standard construction hours will follow the approach RTA Environmental Facts Sheet -Noise Management and Night Works, including consultation with the affected local community.	Contractor	Construction	
47	Noise	Where reasonable and feasible, high noise generating activities (75dB(A)Leq at receiver) be undertaken during standard construction hours and in continuous blocks of no more than three hours with at least one hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same receiver.	Contractor	Construction	
48	Vibration	Vibration intensive equipment size would be selected to avoid working within the structural damage minimum working distances. The use of less vibration intensive methods of construction or equipment should be considered where feasible and reasonable.	Contractor	Construction	
49	Vibration	For potential sources of significant vibration including ripping rock or operating a vibrating compactor or vibrating roller: • for residences located 50 m to 100 m from the road or a work site, a smaller compactor or roller should be used where practical, or alternatively use a larger non-vibrating roller. For vibrating compactors and rollers, variation of the vibration speed may avoid resonance and achieve lower vibration levels at the residence where residents report excessive vibration at the usual vibrating speed of the machine; and • for residences within 50 m of the road or a work site, a smaller compactor or roller or a larger non-vibrating roller may be required. Prior consultation with residents and vibration monitoring is required. Residents are to be consulted and vibration levels monitored in real	Contractor	Construction	Noise and Vibration Impact Assessment (**Appendix M**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		time as the compactor or roller begins operating or approaches the residence, to determine whether vibration levels are acceptable or to immediately stop and modify work or equipment to achieve acceptable vibration levels.			
50	Noise and vibration	Noise and vibration complaints will be recorded, including suitable identification/ description of the source (e.g. continual/ impulsive) and general location of the complaint. Any complaints will be investigated and actioned as required.	Contractor	Construction	
51	Aboriginal heritage	An Aboriginal Heritage Management Sub-Plan (AHMP) will be prepared and implemented as part of the CEMP. It will provide specific drafting guidance on measures and controls to be implemented for managing impacts on Aboriginal heritage. The AHMP will be prepared in consultation with all relevant Aboriginal groups. The CEMP is to include mapping of areas where topsoil is present and would be subject to additional safeguards and management measures for any sites determined and identified as having a low-moderate potential to contain Aboriginal artefacts due to the flat topography of the site and proximity to the Macleay River.	Contractor	Detailed design/ Pre-construction	Section 4.9 of QA *G36 Environment Protection*
52	Aboriginal heritage	If suspected Aboriginal objects have been uncovered as a result of development activities within the Project Area: a) Work in the surrounding area is to stop immediately and records are to be made of the finds via project reporting procedures. b) A temporary fence is to be erected around the site and appropriate controls put in place to ensure that no additional ground disturbance happens in the vicinity of the find. c) An appropriately qualified archaeological consultant and a representative of the Armidale or Thungutti LALC (Blackbird Flat) are to be engaged to identify the material and provide an initial assessment of the significance of the object and the likely nature and extent of any associated archaeological sites. d) If the material is found to be of Aboriginal origin, the find must be reported on the AHIMS database. e) In the event that the Aboriginal objects are considered to have been damaged or disturbed, the incident must be reported through the NSW Enviro Hotline. f) Works may only recommence after advice from Heritage NSW on the requirement for an AHIP or where design, engineering or construction measures are identified to mitigate further damage to the Aboriginal site (i.e. site avoidance).	Contractor	Pre-construction/ Construction	ACHA (**Appendix H**)
53	Aboriginal heritage	If suspected human remains are discovered and/ or harmed in, on, or under the land within the Activity area, all works must halt in the immediate area to prevent any further impacts to the remains. The burial site should be cordoned off and the remains themselves should be left untouched. The nearest police station (Kempsey or Armidale), Armidale or Thungutti LALC and Heritage NSW (Parramatta) are all to be notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the site for criminal activities, the Aboriginal community and the Heritage NSW should be consulted as to how the remains should be dealt with. Work may only resume after agreement is reached between all parties, provided it is in accordance with all parties' statutory obligations.	Contractor	Pre-construction/ Construction	ACHA (**Appendix H**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
54	Aboriginal heritage	Blackbird Flat (Ancillary site 6/19): During detailed design and pre-construction, the avoidance of using Blackbird Flat is to be investigated and implemented if possible. If the site will be avoided, then the area is to be identified as a no-go zone, documented in the CEMP, and a visual barrier erected on site for the duration of the Activity. If using Blackbird Flat cannot be avoided to facilitate construction then disturbance of topsoil is to be avoided, with usage of the site restricted to laydown and storage only, and the following in place: • Topsoil is not to be disturbed and the site is to be considered a no-go zone until all measures are in place. • Where possible, works are to be kept to areas where the topsoil has already been removed (i.e. within the Blackbird Flat Camping Ground and access road), as identified in the CEMP. • For areas where the topsoil is present, as identified in the CEMP, the topsoil is not to be disturbed and a protection buffer consisting of geofabric, aggregate, and gravels is to be laid onto the existing topsoil and grass layer. • At the completion of the use of the area, the protection buffer is to be removed in a manner that does not disturb the topsoil and grass layer underneath. In the event that activities that would disturb topsoil or require the removal/ relocation of topsoil, the following is required: • The area is to be designated as a no-go zone until the following measures have been completed/ put in place. • Preferred option: The works will be subject to archaeological investigation by a qualified specialist/ archaeologist to determine the requirement for an AHIP (if artefacts are present) or to comply with the Due Diligence Code of Practice (if artefacts are not present). If an AHIP is to be pursued, the investigation is to be documented in an Aboriginal cultural heritage assessment report (ACHAR), written in accordance with the 2011 Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). • Alternative option: An Aboriginal sites officer from Thungutti LALC will be engaged as a 'spotter' to check and sift through topsoil as it is moved. Topsoil is to be placed in a location and manner that supports the ability for the spotter to check the soil for artefacts. This may require the topsoil to be placed in a temporary location prior to relocating to a stockpile. The LALC and/ or the archaeologist is to be consulted on the appropriate location and process to facilitate the spotter job. If artefacts are found during the spotter process, all work in the area is to stop immediately and the Unexpected Finds Procedure is to be implemented, supported by the spotter. • If it is determined that an AHIP is required for the area, no works in the area are to proceed and the area is to be visually identified as a no-go zone until the AHIP is in place.	Contractor	Pre-construction/ Construction	ACHA (**Appendix H**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
55	Aboriginal heritage	Carrolls Creek (Ancillary site 22): During detailed design and pre-construction, the avoidance of using Carrolls Creek is to be investigated and implemented if possible. If the site will be avoided, then the area is to be identified as a no-go zone, documented in the CEMP, and a visual barrier erected on site for the duration of the Activity. If using Carrolls Creek cannot be avoided to facilitate construction then disturbance of topsoil is to be avoided, with usage of the site restricted to laydown and storage only, and the following in place: • Topsoil is not to be disturbed, and the site is to be considered a no-go zone until all measures are in place. • Topsoil is not to be disturbed and a protection buffer consisting of geofabric, aggregate, and gravels is to be laid onto the existing topsoil and grass layer. • At the completion of the use of the area, the protection buffer is to be removed in a manner that does not disturb the topsoil and grass layer underneath. In the event that activities that would disturb topsoil or require the removal/ relocation of topsoil, the following is required: • The area is to be designated as a no-go zone until the following measures have been completed/ put in place. • Preferred option: The works will be subject to archaeological investigation by a qualified specialist/ archaeologist to determine the requirement for an AHIP (if artefacts are present) or to comply with the Due Diligence Code of Practice (if artefacts are not present). If an AHIP is to be pursued, the investigation is to be documented in an Aboriginal cultural heritage assessment report (ACHAR), written in accordance with the 2011 Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). • Alternative option: An Aboriginal sites officer from Thungutti LALC will be engaged as a 'spotter' to check and sift through topsoil as it is moved. Topsoil is to be placed in a location and manner that supports the ability for the spotter to check the soil for artefacts. This may require the topsoil to be placed in a temporary location prior to relocating to a stockpile. The LALC and/ or the archaeologist is to be consulted on the appropriate location and process to facilitate the spotter job. If artefacts are found during the spotter process, all work in the area is to stop immediately and the Unexpected Finds Procedure is to be implemented, supported by the spotter. • If it is determined that an AHIP is required for the area, no works in the area are to proceed and the area is to be visually identified as a no-go zone until the AHIP is in place.	Contractor/ ARC	Pre-construction/ Construction	ACHA (**Appendix H**)
56	Aboriginal heritage	McCormacks (Ancillary site 0):	Contractor	Pre-construction/ Construction	ACHA (**Appendix H**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		During detailed design and pre-construction, the avoidance of using McCormacks is to be investigated and implemented if possible. If the site will be avoided, then the area is to be identified as a no-go zone, documented in the CEMP, and a visual barrier erected on site for the duration of the Activity. If using McCormacks cannot be avoided to facilitate construction then disturbance of topsoil is to be avoided, with usage of the site restricted to laydown and storage only, and the following in place: • Topsoil is not to be disturbed, and the site is to be considered a no-go zone until all measures are in place. • Topsoil is not to be disturbed and a protection buffer consisting of geofabric, aggregate, and gravels is to be laid onto the existing topsoil and grass layer. • At the completion of the use of the area, the protection buffer is to be removed in a manner that does not disturb the topsoil and grass layer underneath. In the event that activities that would disturb topsoil or require the removal/ relocation of topsoil, the following is required: • The area is to be designated as a no-go zone until the following measures have been completed/ put in place. • Preferred option: The works will be subject to archaeological investigation by a qualified specialist/ archaeologist to determine the requirement for an AHIP (if artefacts are present) or to comply with the Due Diligence Code of Practice (if artefacts are not present). If an AHIP is to be pursued, the investigation is to be documented in an Aboriginal cultural heritage assessment report (ACHAR), written in accordance with the 2011 Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). • Alternative option: An Aboriginal sites officer from Thungutti LALC will be engaged as a 'spotter' to check and sift through topsoil as it is moved. Topsoil is to be placed in a location and manner that supports the ability for the spotter to check the soil for artefacts. This may require the topsoil to be placed in a temporary location prior to relocating to a stockpile. The LALC and/ or the archaeologist is to be consulted on the appropriate location and process to facilitate the spotter job. If artefacts are found during the spotter process, all work in the area is to stop immediately and the Unexpected Finds Procedure is to be implemented, supported by the spotter. • If it is determined that an AHIP is required for the area, no works in the area are to proceed and the area is to be visually identified as a no-go zone until the AHIP is in place.			
57	Aboriginal heritage	Lower Creek (Ancillary site 1 and 2): During detailed design and pre-construction, the avoidance of using Lower Creek is to be investigated and implemented if possible. If the site will be avoided, then the area is to be identified as a no-go zone, documented in the CEMP, and a visual barrier erected on site for the duration of the Activity.	Contractor	Pre-construction/ Construction	ACHA (**Appendix H**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		If using Lower Creek cannot be avoided to facilitate construction, then the following is required: • The area is to be designated as a no-go zone until the investigation measures have been completed by a suitably qualified specialist/ archaeologist and an AHIP has been put in place if required. • Consultation in accordance with the Aboriginal cultural heritage consultation requirements for proponents (DEECW 2010C) is to be completed. • An investigation is to be completed following the code of practice and will consist of 1x1 m archaeological test pits within the footprint of the works area to determine the nature and extent of archaeological artefacts/ sites. • If an AHIP is to be pursued, the investigation is to be documented in an ACHAR, written in accordance with the 2011 Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). • If it is determined through the archaeological investigation/ ACHAR that an AHIP is required for the area, no works in the area are to proceed and the area is to be visually identified as a no-go zone until the AHIP is in place.			
58	Aboriginal heritage	Georges Junction (Ancillary site 7): During detailed design and pre-construction, the avoidance of using Georges Junction is to be investigated and implemented if possible. If the site will be avoided, then the area is to be identified as a no-go zone, documented in the CEMP, and a visual barrier erected on site for the duration of the Activity. If using Georges Junction cannot be avoided to facilitate construction then disturbance of topsoil is to be avoided, with usage of the site restricted to laydown and storage only, and the following in place: • Topsoil is not to be disturbed, and the site is to be considered a no-go zone until all measures are in place. • Where possible, works are to be kept to areas where the topsoil has already been removed (i.e. within the Camping Ground and the pad form the previous ancillary works), as identified in the CEMP. • For areas where the topsoil is present, as identified in the CEMP, the topsoil is not to be disturbed and a protection buffer consisting of geofabric, aggregate, and gravels is to be laid onto the existing topsoil and grass layer. • At the completion of the use of the area, the protection buffer is to be removed in a manner that does not disturb the topsoil and grass layer underneath. In the event that activities that would disturb topsoil or require the removal/ relocation of topsoil, the following is required:	Contractor	Pre-construction/ Construction	ACHA (**Appendix H**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		• The area is to be designated as a no-go zone until the following measures have been completed/ put in place. • Preferred option: The works will be subject to archaeological investigation by a qualified specialist/ archaeologist to determine the requirement for an AHIP (if artefacts are present) or to comply with the Due Diligence Code of Practice (if artefacts are not present). If an AHIP is to be pursued, the investigation is to be documented in an Aboriginal cultural heritage assessment report (ACHAR), written in accordance with the 2011 Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). • Alternative option: An Aboriginal sites officer from Thungutti LALC will be engaged as a 'spotter' to check and sift through topsoil as it is moved. Topsoil is to be placed in a location and manner that supports the ability for the spotter to check the soil for artefacts. This may require the topsoil to be placed in a temporary location prior to relocating to a stockpile. The LALC and/ or the archaeologist is to be consulted on the appropriate location and process to facilitate the spotter job. If artefacts are found during the spotter process, all work in the area is to stop immediately and the Unexpected Finds Procedure is to be implemented, supported by the spotter. • If it is determined that an AHIP is required for the area, no works in the area are to proceed and the area is to be visually identified as a no-go zone until the AHIP is in place.			
59	Aboriginal heritage	An exclusion zone will be set up and visually delineated around the open forest west of the campground to avoid impacts to the scar tree (21-5-0196) for the duration of the Activity.	Contractor	Pre-construction/ construction	ACHA (**Appendix H**)
60	Aboriginal heritage	All personnel working on site will be inducted and receive information on the required process, should a potential Aboriginal object be found.	Contractor	Pre-construction/ construction	Additional mitigation measure
61	Surface water/ Flooding/ Soils	A Soil and Water Management Sub-Plan will be prepared in accordance with QA Specification G38 and implemented as part of the CEMP. The Plan will identify all reasonably foreseeable risks relating to soil erosion and water pollution associated with undertaking the Activity and describe how these risks will be managed and minimised during construction. That will include arrangements for managing pollution risks associated with spillage or contamination on the site and adjoining areas, and monitoring during and post-construction.	Contractor	Detailed Design/ Pre-construction/ Construction	*G38 Soil and Water Management*
62	Extreme Events	An extreme weather contingency plan will be prepared as part of the CEMP. This extreme weather contingency plan must address, but is not limited to: • Flood Risk Management, to address, but not necessarily be limited to: – processes for monitoring and mitigation flood risk; and	Contractor	Detailed Design/ Pre-construction/ Construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		– steps to be taken in the event of a flood warning including removal or securing of loose material, equipment, fuels, and chemicals. • Drought conditions management, including water supply issues. • Bushfire management, including evacuation and emergency management procedures. • Post extreme event management measures, including clean up procedures, water supply management.			
63	Surface water/ Flooding	All major ancillary facilities, i.e. camps, offices, large stockpile and laydown areas, concrete batching areas, etc. are to be located outside of the mapped flood prone area.	Contractor	Detailed Design/ Pre-construction/ Construction	
64	Surface water/ Flooding/ Soils	Chemicals, fuels, and lubricants are to be stored in designated suitably located and bunded secure areas with impermeable flooring to minimise the impact of any spillage or contamination on the Activity site and adjoining areas. Bunded areas must be able to contain 120% of the volume of the largest single store volume within the bund. Chemical/ Dangerous Goods storage areas must not be located within 50 m of any aquatic habitat, flood prone areas, or on slopes steeper than 1:10. Any chemicals, fuels, or lubricants used during shift must be kept in mobile bunds and be returned to the designated storage area/s at the end of shift and prior to rain. Any chemicals, fuels, or lubricants when in transport, must be contained within a labelled container with fastened lid and secured into position.	Contractor	Construction	*G36 Environment Protection*
65	Surface water/ Flooding	Daily monitoring Bureau of Meteorology forecast for heavy rainfall events and flood events throughout the construction project.	Contractor	Construction	*G38 Soil and Water Management*
66	Surface water/ Soils	A site-specific Erosion and Sediment Control Plan(s) is required to be prepared and implemented and included in the Soil and Water Management Plan. The Plan(s) will identify detailed measures and controls to be applied to minimise erosion and sediment control risks including, but not necessarily limited to: runoff, diversion and drainage points; sediment basins and traps; scour protection; stabilising disturbed areas as soon as possible, check dams, fencing and swales; and staged implementation arrangements. The Plan will also include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.	Contractor	Detailed Design/ Pre-construction/ Construction	*G38 Soil and Water Management*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		The ESCP must be prepared by a person with demonstrated skills and experience in preparing the ESCP in accordance with the BLUE BOOK guidelines.			
67	Surface water/ Soils	Erosion and sediment control measures are to be implemented and maintained to: • prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets; • reduce water velocity and capture sediment on site; • minimise the amount of material transported from site to surrounding pavement surfaces; and • divert clean water around the site (in accordance with the LANDCOM Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book).	Contractor	Detailed design/ pre-construction	*G38 Soil and Water Management*
68	Surface water/ Soils	Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.	Contractor	Detailed design/ Pre-construction	*G38 Soil and Water Management*
69	Surface water/ Soils	Erosion and sediment control measures are not to be removed until the works are completed, and areas are stabilised.	Contractor	Detailed design/ Pre-construction	
70	Surface water/ Soils	Work areas are to be stabilised progressively during the Activity.	Contractor	Detailed design/ Pre-construction	
71	Surface water/ Soils	A progressive erosion and sediment control plan is to be prepared for the works.	Contractor	Detailed design/ Pre-construction	
72	Water quality	There is to be no release of dirty water into drainage lines and/ or waterways.	Contractor	Detailed design/ Pre-construction	
73	Water quality	A water quality monitoring program will need to be developed and implemented as part of the Soil and Water Management Plan. The monitoring program is to include: • Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/ slicks) is to be undertaken on a regular basis to identify any potential spills or deficient silt curtains or erosion and sediment controls. • Testing of water to be released from water accumulated on site (sediment basins, sediment traps, excavated areas, etc.).	Contractor	Detailed design/ Pre-construction	*G38 Soil and Water Management*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		Monitoring parameters should be in accordance with the relevant WQOs. The Soil and Water Management Plan will address management measures on how water is to be treated/ managed if it is not suitable quality for release. Appropriate records should be kept for water quality monitoring activities.			
74	Water quality	Where a flocculant or coagulant is proposed to treat accumulated site water, the Construction Contractor must demonstrate that the proposed flocculant or coagulant is suitable for use and seek approval from ARC. Background water analysis should be performed in receiving waters prior to use (including for the use of Gypsum as a flocculant) due to the elevated pH levels previously recorded in the Macleay River.	Contractor	Construction	
75	Water quality	Any dewatering activities will be undertaken in accordance with the RTA Technical Guideline: Environmental management of construction site dewatering (EMS-TG-011) in a manner that prevents pollution of waters.	Contractor	Construction	
76	Water quality	The Construction Contractor's CEMP will describe the proposed water source(s) intended for use for construction activities, and ancillary activities, and obtain approval from relevant authority for the chosen source(s) before commencing extraction. If the proposed source is other than a town water supply or natural water source (e.g. recycled water), the CEMP will include procedures for regular testing to ensure that the water is suitable for the purpose and is not hazardous to health and the environment.	Contractor	Detailed design/ Construction	
77	Water quality	The Contractor will be required to prepare a Wastewater Management Plan for management of wastewater generated from ancillary facilities (such as camp, site offices, etc.). The Wastewater Management Plan is to include any monitoring or management requirements stipulated in any issued permits or approvals for discharge of wastewater from the Activity works.	Contractor	Detailed design/ Construction	
78	Water quality	The Contractor will be required to obtain all the necessary permits and approvals for the discharge of wastewater from any of the proposed ancillary facilities (e.g. camps, offices), including completing any required assessments in order to obtain the required approvals.	Contractor	Detailed design/ Construction	
79	Water/ Soils	Refuelling of plant and equipment is to occur in impervious bunded areas (rather than drains) located a minimum of 50 metres from drainage lines or waterways. Any machinery or equipment requiring refuelling within 50 m of drainage or waterways will have a portable spill containment bund in place during refuelling activities.	Contractor	Detailed design/ Pre-construction	Amended Section 4.3 of QA *G36 Environment Protection*
80	Water/ Soils	Appropriate spill kits will be available on site in relevant areas. These kits will contain absorbent material appropriate to the type of substance being used on site, with all personnel trained in how to use them (EPAV, 2018)	Contractor	Detailed design/ Pre-construction	Additional mitigation measure

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
81	Waterways	Any items or objects that may cause obstruction or hazard in waterways during the works will be directly supervised and removed on completion of the work.	Contractor	Construction	Transport and Infrastructure SEPP consultation – TfNSW – Maritime Division (**Appendix I**)
82	Waterways	Notification of the work will be made to TfNSW Maritime at least 28 prior to commencing by email.	Contractor	Construction	Transport and Infrastructure SEPP consultation – TfNSW – Maritime Division (**Appendix I**)
83	Soils and erosion	All stockpile areas must be approved for use prior to commencement of use. Stockpiles will be managed to minimise the potential for mobilisation and transport of dust and sediment in runoff in accordance with the Blue Book (Landcom, 2004), TfNSW Stockpile Sites Management Guideline (Roads and Maritime, 2015) and TfNSW QA G38. Management measures may include, but are not limited to: • Minimising the number of stockpiles, area used for stockpiles, and time that they are left exposed. • Locating stockpiles away from drainage lines, waterways, and areas where they may be susceptible to wind erosion. • Stabilising stockpiles, establishing appropriate sediment controls, and suppressing dust as required. • Locating stockpiles outside of the tree protection zone of trees or native vegetation identified for retention. The tree protection zone will be delineated in accordance with AS 4970. • Keeping stockpile heights to no greater than 2 m, unless otherwise approved by ARC, and slopes to no steeper than 2:1. • Covering, or otherwise protecting from erosion, stockpiles that will be in place for more than 20 days as well as any stockpiles that are susceptible to wind or water erosion, within 10 days of forming each stockpile. • Keeping topsoil that is not contaminated by noxious weeds in stockpiles for later spreading on fill batters and other areas. Other material may also be stockpiled but kept separated from the topsoil stockpiles. • Implementing measures to prevent the growth of weeds in topsoil stockpiles.	Contractor	Detailed design/ Pre-construction	*G38 Soil and Water Management* and *G40 Clearing and Grubbing*

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
84	Soils and erosion	Tannins from stockpiled mulch must be managed in accordance with TfNSW Environmental Direction 25: Management of Tannins from Vegetation Mulch (TfNSW, 2012).	Contractor	Construction	*G38 Soil and Water Management* and *G40 Clearing and Grubbing*
85	Contaminated land	A Contaminated Land Management Procedure will be prepared in accordance with the *Guideline for the Management of Contamination* (RMS, 2013) and implemented as part of the CEMP.	Contractor	Detailed design/ Pre-construction	Section 4.2 of QA *G36 Environment Protection*
86	Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the discovered contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with ARC.	Contractor	Detailed design / Pre-construction	Section 4.2 of QA *G36 Environment Protection*
87	Accidental spill	A site-specific emergency spill procedure will be developed and include spill-management measures in accordance with the Transport *Code of Practice for Water Management* (RTA, 1999) and relevant EPA guidelines. The procedure will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities.	Contractor	Detailed design / Pre-construction	Section 4.3 of QA *G36 Environment Protection*
88	Non-Aboriginal heritage	A non-Aboriginal Heritage Management Sub-Plan (NAHMP) will be prepared and implemented as part of the CEMP. It will provide specific guidance on measures and controls to be implemented to avoid and mitigate impacts to non-Aboriginal heritage. This is to include a procedure for the management of items considered historical remnants of earlier construction along the roadway, such as stone culverts, stone wing walls, retaining walls, bridges, buried remnant timbers and the like, during earthworks and during excavation for culvert replacements. The culverts and possible bunker identified in the Historical Heritage Assessment and Heritage Management Strategy report should be noted and prioritised for a precautionary approach during earthworks. A suitably qualified specialist/ archaeologist should be retained in an on-call capacity during all excavation activity to guide management when/ if historical remnants are discovered.	Contractor	Detailed design/ Pre-construction/ Construction	Section 4.10 of QA *G36 Environment Protection* and Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
89	Non-Aboriginal heritage	While there is no reasonable expectation for significant archaeological resources that meet the definition of a relic to be exposed during project works, attention is directed to s139 and s146 of the NSW *Heritage Act 1977* and the provisions of the Act in relation to the exposure of relics whereby the Act requires that if: *i) a relic is suspected, or there are reasonable grounds to suspect a relic in ground, that is likely to be disturbed damaged or destroyed by excavation; and/ or*	Contractor	Construction	Historical Heritage Assessment and Heritage Management

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		ii) any relic is discovered in the course of excavation that will be disturbed, damaged or destroyed by further excavation; Those responsible for the discovery must notify nominated management personnel within ARC who will assess whether to notify Heritage NSW and suspend work that might have the effect of disturbing, damaging, or destroying such relic until the requirements of the Heritage NSW have been satisfied.			Strategy (**Appendix N**)
90	Non-Aboriginal heritage	All workers engaged in excavation and/ or earthworks should be made aware of the potential for the exposure of historical stonework and/ or features or remnants associated with drainage infrastructure, retaining or other works along the entire section of roadways under restoration works. An 'All Care and Due Diligence' approach is to be taken in order to not cause inadvertent damage or impact to any historical features prior to their assessment and management. When required, specialist advice should be sought as a precautionary approach to avoid the loss of information before it can be adequately recorded.	Contractor	Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
91	Non-Aboriginal heritage	Due to the remote location of this project, a recording methodology will be developed in consultation with the Activity's heritage/ archaeology specialist for use in the field by nominated personnel with some basic training. This would avoid delays in the progress of works while awaiting the arrival of a specialist for discoveries not considered unique or unexpected. This will include a template recording form to guide the collection of information, and a guide for effective photographic recording. Site records are to be kept safe both in paper and electronic formats with copies submitted to the project's heritage/ archaeology consultant.	Contractor	Pre-construction/ Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
92	Non-Aboriginal heritage	The *Standard Management Procedure - Unexpected Heritage Items* (Roads and Maritime, 2015) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. A suitably qualified specialist/ archaeologist should be retained in an on-call capacity during all excavation activity to guide management when/ if unexpected historical remnants are suspected and/or discovered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
93	Non-Aboriginal heritage	Existing culverts should be considered for the potential for retaining structural remnants, in whole or part, where feasible and safe to do so. Should the site allow, the preferred method would be the burial of the complete or partial structure, including the filling of the structure for increased stability, with the new drainage infrastructure constructed alongside the existing. This would allow some evidence to remain in the ground where it is best preserved for future generations. Where structures are preserved, adequate recording is to be carried out as per the site recording process and the location recorded to inform any future works that might be required at the site.	Contractor/ ARC	Detailed design/ Pre-construction/ Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
94	Non-Aboriginal heritage	Where existing culverts do not allow for the retention of any structural remnants and complete removal is required, the structure is to be recorded as per the site recording process prior to demolition/ removal.	Contractor	Pre-construction/ Construction	Historical Heritage Assessment and Heritage Management Strategy (Appendix N)
95	Non-Aboriginal heritage	An unexpected finds procedure will be developed in accordance with the Unexploded Ordnance (UXO) of Australia and implemented specifically for the potential of finding unexploded ordinance during the Activity. In line with the UXO, this will include the following steps: I. If a suspect UXO item is found - **DO NOT TOUCH**, disturb or tamper with the item in any way. This includes making any attempt to move the item to a 'safe' location. II. Carefully note the appearance of the item and the location. Take a photograph if it is possible to do so without further approaching or disturbing the item. III. If possible, mark the location so that it can be found later. Coloured tape or paint make easily recognised marker material. Note the route to the item. IV. Inform the property owner, park ranger, prime contractor, site foreman or supervisor of the find. V. Inform the Police that a possible ammunition item has been found. They will instigate a request for Defence personnel to attend and dispose of the item.	Contractor	Detailed design/ Pre-construction/ Construction	
96	Non-Aboriginal heritage	The known potential mine sites will undergo ground-truthing to the extent possible and/ or further detailed information will be sought from the appropriate authorities about potential locations, including the Department of Defence. It is not known whether the sites have been cleared or not. It is not known if all sites have been recorded and/ or identified.	Contractor	Detailed design/ Pre-construction/ Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
97	Non-Aboriginal heritage	An unexploded ordinance (UXO) might be considered an archaeological relic within the definitions of the NSW Heritage Act. However, the nature of an UXO is beyond the realm of archaeological management other than to record information about the find. If an UXO is discovered during the project, the information collected about the UXO's location, and any photography, only if safe to do so, including photos from a distance to record its context within the landscape is to be recorded and advice is to be sought from a suitably qualified specialist/ archaeologist.	Contractor	Detailed design/ Pre-construction/ Construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
98	Non-Aboriginal heritage	Armidale Regional Council might consider the installation of historical interpretation at the conclusion of project works to communicate the history and historical and engineering significance of the Kempsey-Armidale Road.	ARC	Post-construction	Historical Heritage Assessment and Heritage Management Strategy (**Appendix N**)
99	Air Quality	Appropriate air quality management measures will be included in the CEMP. This section of the CEMP will identify: • potential sources of air pollution (such as dust, vehicles transporting waste, plant and equipment) during construction; • air quality management objectives consistent with any relevant published EPA and/or DPIE guidelines; • mitigation and suppression measures to be implemented, such as spraying or covering exposed surfaces, provision of vehicle clean down areas, covering of loads, street cleaning, use of dust screens, maintenance of plant in accordance with manufacturer's instructions; • methods to manage works during strong winds or other adverse weather conditions; • a progressive rehabilitation strategy for exposed surfaces; • when the air quality, suppression and management measures need to be applied, who is responsible, and how effective will be assessed; and • community notification and complaint handling procedures.	Contractor	Detailed Design	
100	Air Quality/ Waste	Vegetation or other materials will not be burnt on-site.	Contractor	Construction	
101	Air Quality	Vehicles transporting waste or other materials that may produce odours, or dust will be covered during transportation.	Contractor	Construction	
102	Air Quality	Construction works that create high levels of dust or air borne particulates will not be carried out during strong winds or in weather conditions likely to exacerbate the situation.	Contractor	Construction	
103	Air Quality	Machinery and vehicles not in use during construction will be turned off and not left to unnecessarily run idle.	Contractor	Construction	
104	Air Quality	Vehicles, machinery, and equipment will be maintained in accordance with manufacturer's specifications in order to meet the requirements of the *Protection of the Environment Operations Act 1997* and associated regulation.	Contractor	Construction	
105	Air Quality	Works to be appropriately staged to ensure exposed disturbed areas are reinstated prior to opening new sections.	Contractor	Construction	
106	Air Quality	All construction and ancillary operations related traffic are to utilise designated access tracks only.	Contractor	Construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
107	Air Quality	Daily air quality logs are to be maintained by operational crews (part of the daily diary) to ensure records are available in the event of complaints being made.	Contractor	Construction	
108	Bushfire	APZs for the camp and main compound are to be provided in accordance with Table 4.1 and Illustrations 4.1, 4.2 or 4.3 found in the Bushfire Hazard Assessment report for the relevant site.	Contractor	Detailed design/ Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
109	Bushfire	The camp and compound area and surrounding APZ are to be established and managed as an Inner Protection Area in accordance with Appendix A4.1.1 of PBP 2019.	Contractor	Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
110	Bushfire	Camp and compound buildings are to be constructed to comply with Section 3 and 7 (BAL 29) of AS3959-2018 'Construction of Buildings in Bushfire Prone Areas' and Section 7.5.2 of PBP 2019.	Contractor	Detailed design/ Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
111	Bushfire	Access to the camp and main compound is to comply with Table 7.4a of PBP 2019 and is to include a trafficable area around the perimeter of each facility within the APZ.	Contractor	Detailed design/ Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
112	Bushfire	A total 200,000 litre static firefighting water supply is to be provided for the camp and compound sites. The firefighting water supply is required in addition to the domestic supply required to service the camp and compound buildings and the water supply required to service the bushfire sprinkler system and any fire hose reels or similar required under the National Construction Code.	Contractor	Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
113	Bushfire	The firefighting water supply is to be installed and maintained in accordance with Table 7.4a of PBP 2019.	Contractor	Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)
114	Bushfire	Electricity and gas services are to comply with Table 7.4a of PBP 2019.	Contractor	Detailed design/ Pre-construction/ During construction	Bushfire Hazard Assessment (**Appendix O**)

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
115	Bushfire	Landscaping is to comply with the standards for an Inner Protection Area, as outlined in PBP 2019 – Appendix A4.1.1.	Contractor	During construction	Bushfire Hazard Assessment (**Appendix O**)
116	Bushfire	Prior to the commencement of operations of the workers' camp and main compound, a Bushfire Emergency Management and Evacuation Plan consistent with the NSW RFS publication: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan*, and AS 3745:2010 'Planning for emergencies in facilities' is to be prepared.	Contractor	Pre-construction	Bushfire Hazard Assessment (**Appendix O**)
117	Bushfire	A Bushfire Operations Plan is to be prepared as part of the Site Construction Management Plan.	Contractor	Pre-construction	Bushfire Hazard Assessment (**Appendix O**)
118	Waste	Prepare a Waste Management Sub-Plan prior to commencement of works/ site establishment that identifies waste streams and how they would be managed. Resource management hierarchy principles are to be followed: • Avoid unnecessary resource consumption as a priority. • Avoidance is followed by resource recovery (including re-use of materials, reprocessing, recycling, and energy recovery). • Disposal is undertaken as a last resort. The Contractor is to liaise with ARC and KSC Waste Facility Management Teams during the detailed design phase and development of the Waste Management Plan.	Contractor	Detailed design/ Pre-construction/ During construction	
119	Waste/ Visual impact	All working areas are to be maintained, kept free of rubbish, and cleaned up at the end of each working day.	Contractor	During construction	
120	Waste	Any contaminated waste generated will be disposed of in accordance with the EPA approved methods of waste disposal.	Contractor	During construction	
121	Waste/ Climate Change	Waste will be minimised and will otherwise be collected and recycled or disposed of in accordance with Council waste disposal protocols and EPA guidelines.	Contractor	During construction	
122	Waste	Non-native vegetation material generated from tree and vegetation removal is to be mulched on-site and taken to a licenced waste facility.	Contractor	During construction	
123	Waste	The Contractor will arrange for a temporary waste transfer station for use by local residents, to be placed outside of the Activity. Consultation with the waste Contractor engaged by ARC is to be undertaken when determining the location.	Contractor	Detailed design/ Pre-construction/ During construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
124	Visual impact	Project work sites, including construction areas and supporting facilities (such as storage compounds and stockpiles) are to be managed to minimise visual impacts, including appropriate storage of equipment, parking, stockpile management and arrangements for the storage and removal of rubbish and waste materials.	Contractor	During construction	
125	Visual impact	Any shotcrete used will be kept to the minimal amount required and measures to prevent overspray, especially onto the surrounding area, will be put into place.	Contractor	During construction	
126	Socio-economic	A Community Involvement Plan (CIP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum): • regular community updates and transparency on Activity processes and decisions as appropriate; • mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions; and • contact name and number for complaints. The CIP will be prepared in accordance with the *Community Involvement and Communications Resource Manual* (RTA, 2008).	Contactor	Detailed design/ pre-construction	
127	Socio-economic	Ongoing community consultation is to be done for the duration of the Activity to gage the satisfaction and requirements of the community around the midday escorts. ARC should make periodic adjusts as required to the number of days and the scheduled days for the midday escorts based on community feedback.	ARC	Construction	
128	Socio-economic	A complaint handling procedure and register is to be included in the CEMP and is to include that all complaints are to be responded to within 24 hours.	Project Manager/ Contractor	During construction	
129	Climate Change	Vehicles and equipment will be switched off when not required for direct construction activities.	Contractor	Construction	
130	Cumulative construction impacts	Consultation to occur with proponents of the Oven Mountain Pumped Hydro Energy Storage project to: • Increase awareness of construction timeframes and impacts. • Coordinate road access. • Coordinate impact mitigation and management.	Armidale Regional Council and Contractor	Detailed design/ Pre-construction/ During construction	
131	Cumulative construction impacts	Consultation to occur with Kempsey Shire Council to: • Increase awareness of construction timeframes and impacts. • Coordinate road access. • Coordinate impact mitigation and management.	Armidale Regional Council and Contractor	Detailed design/ Pre-construction/ During construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
132	Cumulative construction impacts	The contractor is to develop and establish a Community Involvement Management Plan, which incorporates comprehensive interface agreements with relevant stakeholders.	Contractor	Detailed design/ Pre-construction/ During construction	

7.3 Licensing and approvals

Table 7.2 Summary of licensing and approvals required

Instrument	Requirement	Timing
Protection of the Environment Operations Act 1997 (s43)	Environment protection licence (EPL) for scheduled activities related to road construction, extractive activities, and crushing/ grinding/ separating from the EPA.	Prior to start of the Activity.
Forestry Act 2012 (Division 2, Part 4)	Licence to remove trees or forest materials from a State forest, timber reserve or flora reserve from the Department of Primary Industries. Areas of the Activity footprint that fall outside of the road reserve and within State Forest land would be subject to a licence and/ or agreement. The contractor will need to correspond with the appropriate State Forest office.	Prior to removing trees or forest materials from a State forest, timber reserve or flora reserve.
National Parks and Wildlife Act 1974	Parts of the Activity that encroach onto National Parks estate will require approval/ authorisation prior to commencement under the *National Parks and Wildlife Act 1974.*	Prior to start of the Activity on National Park estate.
National Parks and Wildlife Act 1974 (s90)	Aboriginal heritage impact permit from the Chief Executive of OEH. Sites at the Activity have been identified as requiring an AHIP if topsoil is disturbed. Refer to **Section 6.6** for additional detail.	Prior to start of the Activity.
Water Management Act 2000 (s91B)	Water supply work approval from DPE (Water). [Note exemptions under s34-36 of the *Water Management (General) Regulation 2011*.] A water supply work approval may be required for water use at the main compound (workers' camp). The contractor will need to correspond with the NSW Department of Planning and Environment – Water.	Prior to start of the Activity.
Fisheries Management Act 1994 (s200 - Circumstances in which a local government authority may carry out dredging or reclamation and s219-220- Passage of fish not to be blocked)	A local government authority must not carry out dredging work or reclamation work except under the authority of a permit issued by the Minister. ARC is to seek and obtain a Fisheries Permit prior to any dredge or reclamation works commencing. A permit would also be required if fish passage on water land identified as key fish habitat was blocked.	Apply and obtain a Fisheries Permit prior to dredge or reclamation works, or the blocking of fish habitat, commences on water land identified as key fish habitat.

8. Conclusion

This chapter provides the justification for the proposal taking into account its biophysical, social and economic impacts, the suitability of the site and whether or not the proposal is in the public interest. The proposal is also considered in the context of the objectives of the *EP&A Act*, including the principles of ecologically sustainable development as defined in Section 193 of the Environmental Planning and Assessment Regulation 2021.

8.1 Justification

Rehabilitation of Kempsey Road and Lower Creek Road is required to restore the condition of the road to its pre-disaster state. This would restore connectivity, improve safety, slope stability, increase drainage and assist in protecting ARC's Road assets occurring within the locality.

Additional objectives of the proposal are to:

- Stabilise the roadways associated with the Activity to prevent further erosion along the edge of Kempsey Road and Lower Creek Road, including:
  - drainage design and culvert restoration;
  - pavement rehabilitation/ road design;
  - downslope remediation and treatments/ geotechnical design; and
  - structure rehabilitation.
- undertake works to minimise traffic, environmental, social impacts; and
- ensure Kempsey Road and Lower Creek Road remain safe and trafficable transport routes.

With effective implementation of the safeguards and management measures of this REF, environmental impacts associated with undertaking the work would not be significant. Unavoidable impacts required for the work are not substantial and would not significantly affect the local environment and can be reasonably minimised and managed. Overall, there would benefits from the Activity as road safety, connectivity, and reliability would be improved.

8.2 Objects of the EP&A Act

Table 8.1 Objects of the EP&A Act

Instrument	Requirement
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development, and conservation of the State's natural and other resources.	Factored into the early design of the Activity and to be included in detailed design.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental, and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered in **Section 8.2.1** below.
1.3(c) To promote the orderly and economic use and development of land.	Not relevant to the Activity.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the Activity.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities, and their habitats.	This REF provides a thorough assessment of the environment and recommends extensive safeguards and management measures to minimise impacts of the Activity on the environment.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	This REF provides a thorough assessment of the environment and recommends extensive safeguards and management measures to minimise impacts on the environment.
1.3(g) To promote good design and amenity of the built environment.	Factored into the early design of the Activity and to be included in detailed design.

Instrument	Requirement
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the Activity.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the Activity.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Public consultation and communication has occurred through the early design phase of the Activity (refer to **Section 5**) and the community will continue to be consulted and informed about the Activity.

8.2.1 Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration throughout the development of the project.

ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are discussed below.

The precautionary principle

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

To satisfy the precautionary principle, this REF has conducted a thorough analysis of potential environmental, economic, and social concerns. This assessment has identified and examined potential impacts and developed appropriate safeguards and management measures to help avoid and/ or minimise impacts and safeguard the environment. Considering this assessment's findings, the Activity is unlikely to impose significant and/ or long-term adverse impacts on the environment, economy, or community. The safeguards and management measures outlined in this REF would be implemented to ensure sound environmental outcomes in all aspects of the Activity.

Intergenerational equity

Social equity is concerned with the distribution of economic, social, and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The Activity would not significantly affect the viability of threatened species, or any TECs or other environmental resources including water, soil, and air. Therefore, local environmental values would not be substantially adversely affected by the Activity and would be maintained for future generations. The Activity would have positive socio-economic effects in relation to maintenance of access and existing road infrastructure.

Conservation of biological diversity and ecological integrity

Conservation of biological diversity and ecological integrity is concerned with ensuring these are fundamental considerations of the Activity.

The impacts to ecological integrity and conservation of biological diversity at the Activity site have been thoroughly assessed as part of this REF. No threatened species, endangered populations, or TECs are likely to be significantly affected by the Activity. No populations of native species are likely to be made locally rare or unviable as a result of the Activity. Consequently, the ecological integrity and biological diversity would be maintained locally.

Improved valuation, pricing, and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources that may be affected by the carrying out of a project, including air, water, land and living things.

It is difficult, however, to assign a monetary value to the environment of a locality or to environmental resources not considered for commercial use. ARC have taken an approach to manage the potential environmental impacts of the Activity by identifying appropriate safeguards and management measures to avoid or mitigate adverse environmental effects. This would ensure that the integrity of the environment is not degraded, is managed, and where possible enhanced.

8.3 Conclusion

The proposed road restoration of Kempsey Road and Lower Creek Road is subject to assessment and determination under Division 5.1 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the Activity.

This has included consideration (where relevant) of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species and ecological communities and their habitats, and other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the Australian EPBC Act.

A number of potential environmental impacts from the Activity have been avoided or reduced during the early design development and options assessment. The proposal, as described in the REF, best meets the project objectives but would still result in some environmental impacts. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The Activity would also improve road conditions, safety, and transport access on ARC road assets. On balance, the proposal is considered justified, and the following conclusions are made.

Significance of impact under NSW legislation

The Activity would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared under Division 5.1, Subdivision 3 of the EP&A Act nor approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required. The proposal is subject to assessment under Division 5.1 of the EP&A Act. Development consent is not required as the Activity is permissible without consent under the Transport and Infrastructure SEPP.

Significance of impact under Australian legislation

The Activity is not likely to have a significant impact on matters of national environmental significance nor the environment of Commonwealth land within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*. A referral to the Australian Department of Climate Change, Energy, the Environment and Water is therefore not required.

9. Certification

This review of environmental factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the Activity.

REF Prepared by

Signature: 

Name: Michelle Campione-van Zetten

Position: Environmental Planner

Company name: GeoLINK

Date: 30/10/2024

REF Reviewed by

Signature: 

Name: Simon Williams

Position: Principal Environmental Planner

Company name: GeoLINK

Date: 30/10/2024

On behalf of Armidale Regional Council, I certify that I have reviewed and endorsed the contents of this REF document, and, to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines approved under clause 170 of the EP&A Regulation, and the information it contains is neither false nor misleading.

Signature:

Name:

Position:

Public Authority: Armidale Regional Council

Date:

10. References

Biodiversity Conservation Act 2016. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/act-2016-063

Biosecurity Act 2015. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/act-2015-024

Contaminated Land Management Act 1997. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/act-1997-140

Department of Climate Change, Energy, the Environment and Water. (2023). *Australian Heritage Database*. Retrieved from http://www.environment.gov.au/cgi-bin/ahdb/search.pl

Department of Climate Change, Energy, the Environment and Water 2023, *Interim Biogeographic Regionalisation for Australia* (IBRA), Version 7 (Subregions). Viewed November 2023, <https://datasets.seed.nsw.gov.au/dataset/b1284c2c-f3bd-4b50-ab07-e1b593b8ee67>

Department of Environment, Climate Change and Water. (2010). *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. Sydney: Department of Environment, Climate Change and Water. Retrieved from https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Aboriginal-cultural-heritage/due-diligence-code-of-practice-aboriginal-objects-protection-100798.pdf

Department of Planning, Industry and Environment (2021). S*aving our Species. Hygiene guidelines. Protocols to protect priority biodiversity areas in NSW from Phytophthora cinnamomi, myrtle rust, amphibian chytrid fungus and invasive plants*. Department of Planning, Industry and Environment, Parramatta.

Department of Planning, Industry and Environment (2023), *eSpade* [Online]. Available (http://www.https://www.environment.nsw.gov.au/eSpade2WebApp) publisher.

Department of the Environment (Cth) (2023). *Protected Matters Search Tool*. Available (https://pmst.awe.gov.au/#/map?lng=131.50634765625003&lat=-28.6905876542507&zoom=5&baseLayers=Imagery,ImageryLabels).

Environment Protection and Biodiversity Conservation Act 1999. Retrieved from https://www.legislation.gov.au/Details/C2021C00182

Environmental Planning and Assessment Act 1979. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/act-1979-203

Fisheries Management Act 1994. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/act-1994-038

Heritage Act 1977. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/act-1977-136

National Parks and Wildlife Act 1974. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/act-1974-080

Native Title Act 1993. Retrieved from https://www.legislation.gov.au/Details/C2023C00216

Native Title Tribunal. (undated). Native Title: an overview. Retrieved from http://www.nntt.gov.au/Information%20Publications/Native%20Title%20an%20overview.pdf

NSW Department of Customer Service. (2020). NSW Planning Portal Spatial Viewer. Retrieved from https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address

NSW Department of Planning and Environment (DPE). (2022). Guidelines for Division 5.1 assessments. [Online]. Retrieved Nov 2023, from (https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/Policy-and-legislation/SSI-Guidelines/Guidelines-for-Division-51-assessments.pdf?la=en)

NSW DPI Cattle Dip Site Locator (2023). *Cattle Dip Site Locator for Armidale Regional Council LGA* [Online]. Available (http://www.dpi.nsw.gov.au/agriculture/livestock/health/specific/cattle/ticks/cattle-dip-site-locator) publisher.

NSW EPA Contaminated Land Register (2023). *Contaminated Land Register for Armidale Regional Council LGA* [Online]. Available: (http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx) publisher.

NSW Heritage Office (2023). *State Heritage Register* [Online]. Available: (http://www.heritage.nsw.gov.au/07_subnav_09.htm) publisher.

NSW OEH (2012). *Erosion and Sediment Control on Unsealed Roads* [Online] (https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-quality/erosion-sediment-control-unsealed-roads-field-guide-120410.pdf).

NSW OEH (2023). *Aboriginal Heritage Information Management System* [Online] (http://www.environment.nsw.gov.au/licences/AboriginalHeritageInformationManagementSystem.htm).

NSW OEH (2010). *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. Available (https://www.environment.nsw.gov.au/research-and-publications/publications-search/due-diligence-code-of-practice-for-the-protection-of-aboriginal-objects-in-new-south-wales).

NSW Office of Environment and Heritage (2023). *NSW BioNet Database Search Tool*.

NSW Office of Environment and Heritage (2018). *A Review of Koala Tree Use Across New South Wales*, NSW Office of Environment and Heritage, Sydney, Australia.

Protection of the Environment Operations Act 1997. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/act-1997-156

Roads Act 1993. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/act-1993-033

State Environmental Planning Policy (Biodiversity and Conservation) 2021. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/epi-2021-0722

State Environmental Planning Policy (Primary Production) 2021. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/epi-2021-0729

State Environmental Planning Policy (Transport and Infrastructure) 2021. Retrieved from https://legislation.nsw.gov.au/view/html/inforce/current/epi-2021-0732

TfNSW (2024). *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects*. Retrieved from EMF-BD-GD-0039 Biodiversity Management Guideline: Protecting and Managing Biodiversity on Transport for NSW projects

Victoria EPA (2018). *Liquid storage and handling guidelines*, [Online] (https://www.epa.vic.gov.au/about-epa/publications/1698).

Terms and acronyms used in this REF

Term / Acronym	Description
ARC	Armidale Regional Council
BAR	*Biodiversity Assessment Report*
BC Act	*Biodiversity Conservation Act 2016 (NSW)*
BCD	Biodiversity and Conservation Division of the NSW Department of Planning and Environment
Biodiversity and Conservation SEPP	State Environmental Planning Policy (Biodiversity and Conservation) 2021
CEMP	Construction environmental management plan
EIA	Environmental impact assessment
EP&A Act	*Environmental Planning and Assessment Act 1979 (NSW)*. Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*. Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	*Fisheries Management Act 1994 (NSW)*
Heritage Act	*Heritage Act 1977 (NSW)*
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
MNES	Matters of national environmental significance under the *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*
NPW Act	*National Parks and Wildlife Act 1974 (NSW)*
OEH	*Office of Environment and Heritage* within the *Department of Planning and Environment*
POEO Act	*Protection of the Environment Operations Act 1997*
QA Specifications	Specifications developed by Transport for use with road work and bridge work contracts let by Transport
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the *EP&A Act*
Transport and Infrastructure SEPP	State Environmental Planning Policy (Transport and Infrastructure) 2021
Transport	Transport for NSW
WQO	Water Quality Objective

ARMIDALE Regional Council