

Sturt Highway safety improvements between Wagga Wagga and Buronga

Review of Environmental Factors

Transport for NSW | June 2022



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Prepared by EnviroKey Pty Ltd and Transport for NSW

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Document controls

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Signed:	
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Executive summary

The proposal

The Sturt Highway is a two-lane flexible pavement of mostly single carriageway that forms a state highway link starting east of Wagga Wagga with an intersection with the Hume Highway, to Buronga in NSW, and extending through to Adelaide in South Australia.

Transport for NSW has carried out a Route Safety Review (RSR) identifying key roadside infrastructure and line marking safety improvements along the Sturt Highway between Wagga Wagga and Buronga, about 550 kilometres in length.

Key features of the proposal include:

- repairing road edges and widening (up to 15 metres from existing carriageway edge line) at various locations including required ancillary works such as culvert and drainage structure widening
- reinstating a hazard-free roadside where possible by removing trees, maintenance of vegetation regrowth, batter flattening and table drain reshaping
- installing roadside safety barriers at various locations where a hazard free roadside cannot be achieved (nominally 10 metres from the existing carriageway edge line)
- providing a primer seal followed by a final seal at the road widenings
- upgrading intersections at various locations
- upgrading road signage
- installing new audio tactile line-marking in line with Transport policy
- reinstating line marking and raised pavement markers on completion
- reusing surplus material from other road projects located nearby.

The key objective of the proposal is to increase road user safety along five sections of the Sturt Highway. These sections being:

- Section 1: San Isidore to Gillenbah East
- Section 2: Gillenbah West to Hay East
- Section 3: Hay West to Balranald East
- Section 4: Balranald West to Euston East
- Section 5: Euston West to Gol Gol.

Need for the proposal

Transport and the NSW Government are committed to the Towards Zero initiative to reduce the road toll. To achieve this outcome, the Safe System approach has been adopted. The Safe System approach has four main pillars: safer people, safer vehicles, safer speeds and safer roads. This project is focusing on the safer roads pillar of the Safe System approach.

The Safe Systems approach recognises drivers are human and will make mistakes. Safer Roads projects aim to address the likelihood of a crash occurring through preventative safety measures such as wide centre line and audio tactile line marking. They aim to reduce the severity of a crash should it occur through the removal of road side hazards and implementation of safety barrier. Safety barrier is a recognised primary treatment in addressing the severity of a crash by up to 95 per cent.

A RSR has been carried out on the Sturt Highway. As part of the review, crash analysis for the five-year period between July 2013 and June 2018 revealed a total of 142 crashes occurred in this period. It was identified that 55 per cent of these crashes were run-off-road type crashes and 13 per cent were head-on

type crashes. Crash analysis identified a need to prevent vehicles from leaving the carriageway and to address roadside hazards.

The review culminated in a nomination for road safety initiatives funded between 2018 and 2023 as part of the Saving Lives on Country Roads program. This program of work aims to provide a consistent, identified safety standard along the full length of the route. The outcome of the program is to improve road safety through the installation of safety treatments targeting the likelihood and severity of crashes along extensive lengths of the route. This is referred to as a mass-action approach.

Proposal objectives and development criteria

The proposal forms part of a continuing process to improve road user safety on the Sturt Highway by carrying out a range of safety improvement work between Wagga Wagga and Buronga.

The objectives of the proposal include:

- aligning with the NSW Road Safety Plan 2021
- aligning with the NSW Towards Zero commitment to reduce road trauma
- targeting identified primary crash types
- reducing the likelihood and severity of fatal and serious injury type crashes
- minimising environmental impacts

Options considered

The options considered for the proposal included:

Option 1: Do nothing. Proposal outcomes would not be achieved and road user safety would not be improved. There would be no environmental impact should the proposal not proceed.

Option 2: Road edge repair and road widening at various locations, road signage upgrade, audio-tactile line marking and raised pavement marker installation, replacement and improvements to the road safety barriers.

Option 3: Repairing road edges and road widening at various locations, upgrading road signage, installing audio-tactile line marking and raised pavement markers, replacing and improving road safety barriers, and removing tree and maintaining vegetation in the desired hazard-free area.

Option 3 was the preferred option as it best meets the objectives of the proposal. This option would have some impact on vegetation and the surrounding environment. This option would have a higher construction cost but best meets the proposal objectives. The proposal is required to reduce the likelihood and severity of run-off-road type crashes along the Sturt Highway and to reduce trauma by providing a safer roadside environment. The RSR was commissioned to assist with identifying and nominating road safety projects as part of the Saving Lives on Country Roads program. This program funds safety improvements which contribute towards a standardised road cross-section and aims to improve road safety along extensive route lengths through mass-action upgrades such as audio tactile line marking, safety barrier installation, shoulder widening and median separation.

The impacts were deemed acceptable due to the improvements that would be made to the safety of road users of the Sturt Highway.

Statutory and planning framework

State Environmental Planning Policy (Transport and Infrastructure) 2021 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.

As the proposal is for the purpose of a road and are to be carried out by Transport, it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979*. Development consent is not required.

Community and stakeholder consultation

All necessary community and stakeholder consultation would be carried out by Transport, in accordance with the *Community Involvement Practice Notes and Resource Manual* and in accordance with T&ISEPP.

Consultation with National Parks and Wildlife Service (NPWS) has been carried out and advice received.

Community consultation that would be carried out as part of this proposal includes the following activities:

- notifying landowners to be affected by the proposal such as the sensitive noise receivers adjacent to the proposal
- placing notifications in local print media prior to the start of work detailing the likely timing of the proposal, potential changes to traffic conditions and project management contact details to open communication channels to provide further details or address complaints
- placing temporary electronic Variable Message Signs at both the western and eastern ends of the proposal to advise of the project and potential delays to motorists
- updating the Transport website: www.transport.nsw.gov.au/projects and live traffic website.

Aboriginal consultation was carried out between 29 June and 8 July 2021. Consultation was initiated through a registration process conducted by Lantern Heritage where Aboriginal people and groups had the opportunity to register.

Environmental impacts

The main environmental impacts of the proposal are related to biodiversity.

Native vegetation would be removed as part of this proposal. About 89.21 hectares of native vegetation would be affected, all of which would be permanently removed. This equates to about 3.5 per cent of the native vegetation within the road reserve.

Of the 29 plant community types recorded within the road reserve, these include five threatened ecological communities as listed by the NSW *Biodiversity Conservation Act 2016* and/or *Environment Protection and Biodiversity Conservation Act 1999*. The proposal includes impacts to these threatened ecological communities. This includes 6.33 hectares of Box-gum Woodland (5.88 hectares of which meets the criteria of the EPBC Act listing), 12.92 hectares of Inland Grey Box Woodland (12.6 hectares of which meets the EPBC Act listing criteria), 18.17 hectares of Myall Woodland (8.19 hectares of which meets the EPBC Act listing criteria), 1.01 hectares of Sandhill Pine Woodland and 0.85 hectares of *Acacia melvillei* shrubland.

Of the 5398 hollow-bearing trees recorded within the road reserve, 343 of these would be removed. The remaining impacts would be restricted to non-native vegetation/cleared land.

Based on the level of impacts to biodiversity, biodiversity offsets or supplementary measures require consideration by Transport.

There would be no ongoing impacts to other environmental factors considered in this REF.

Justification and conclusion

The REF has examined and considered to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity. The proposal would result in both positive and negative impacts. Safeguards are identified in this REF to manage and mitigate the identified negative impacts.

On balance, it is considered the adverse environmental impact of the proposal is outweighed by the improvement to road user safety and that the proposal is therefore justified. This REF has determined the

proposal is unlikely to have a significant impact on the environment and therefore the preparation of an Environmental Impact Statement (EIS) is not required.

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Appendix 2	Construction and acquisition plans
Appendix 3	Biodiversity assessment
Appendix 4	Non-aboriginal heritage database searches
Appendix 5	Aboriginal Cultural Heritage Constraints Mapping Report
Appendix 6	Consideration of clause 228(2) factors and matters of national environmental significance
Appendix 7	Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) Stage 1 assessment PACHCI Assessment letter

1. Introduction

1.1 Proposal identification

The Sturt Highway (HW14) is a two lane flexible pavement of mostly single carriageway that forms a state highway link starting east of Wagga Wagga with an intersection with the Hume Highway to Buronga in NSW, and extending through to Adelaide in South Australia.

Transport have carried out a Routine Safety Review (RSR) which has identified key roadside infrastructure and line marking safety improvements along the Sturt Highway between Wagga Wagga and Buronga about 550-kilometres in length.

Key features of the proposal include:

- Road edge repair and road widening (up to 15 metres from existing carriageway edge line) at various locations including required ancillary works such as culvert and drainage structure widening
- Reinstatement of a hazard free roadside where possible by; removing trees, maintenance of vegetation regrowth, batter flattening and table drain reshaping
- Installation of roadside safety barriers at various locations where a hazard free roadside cannot be achieved (nominally 10m from the existing carriageway edge line)
- Intersection upgrades at various locations
- Road signage upgrades
- Installation of new audio tactile line-marking in line with Transport policy
- Reinstatement of line marking and raised pavement markers on completion
- Beneficial re-use of surplus material from other road projects located nearby

The key objective of the proposal is to increase road user safety along five section of the Sturt Highway. These sections being:

- Section 1: San Isidore to Gillenbah East
- Section 2: Gillenbah West to Hay East
- Section 3: Hay West to Balranald East
- Section 4: Balranald West to Euston East
- Section 5: Euston West to Gol Gol.

The location of the proposal is shown in Figure 1-1 and each section identified in Figures 1-2 to 1-6.

1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by EnviroKey Pty Ltd on behalf of Transport. For the purposes of these works, Transport is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the REF is to describe the proposal, to document the likely impacts of the proposal 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 clause 171 of the Environmental Planning and Assessment Regulation 2021, the factors in *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (Is an EIS required? guidelines) (DUAP, 1995/1996), *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 (EPBC Act)*.

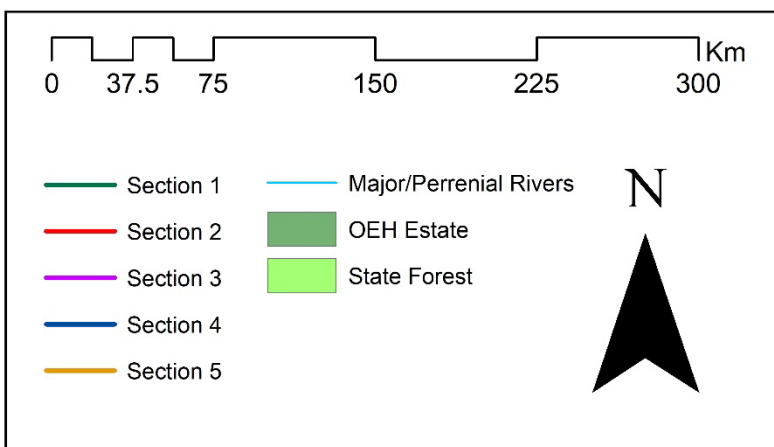
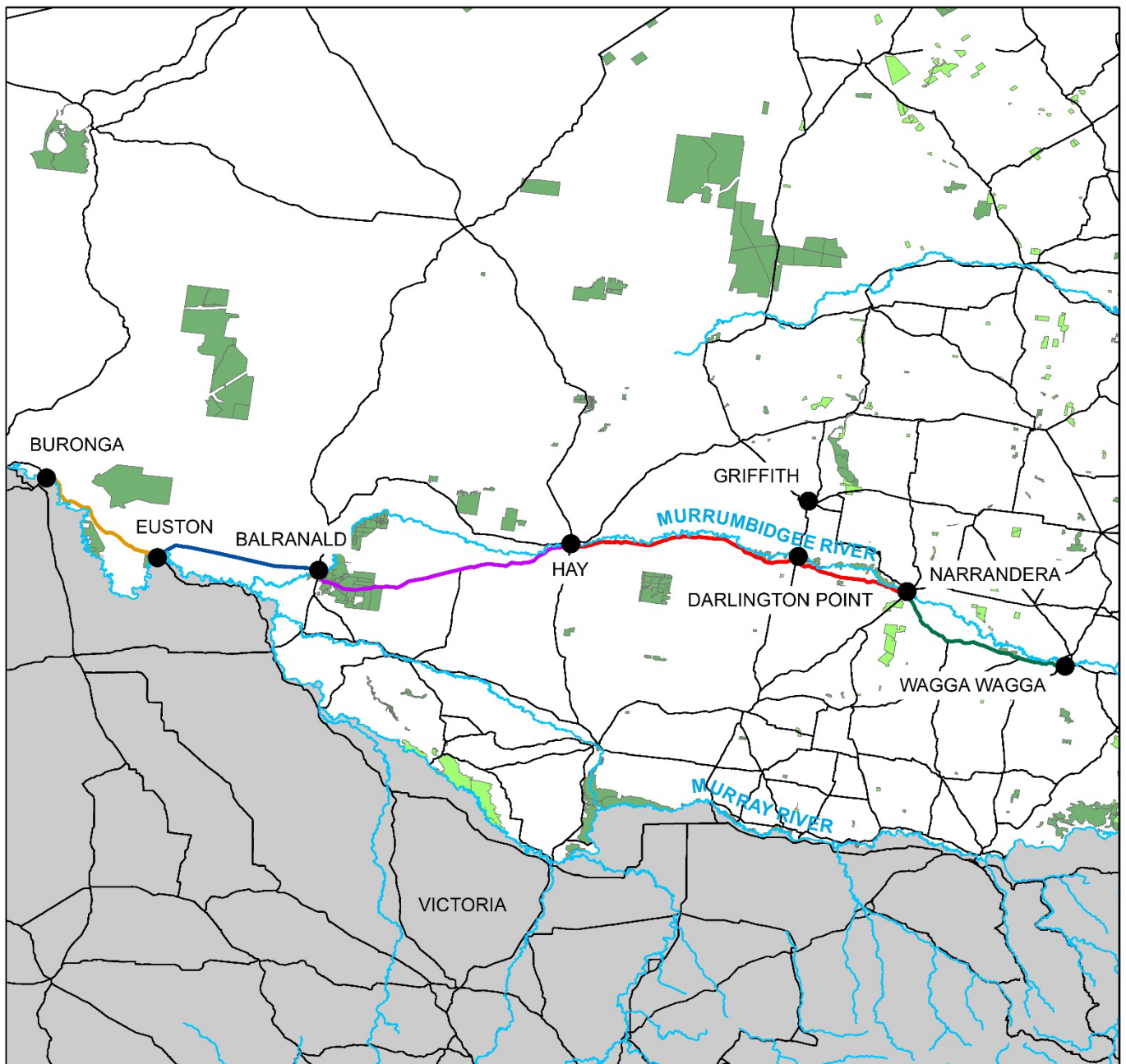
In doing so, the REF helps to fulfil the requirements of:

- Section 5.5 of the EP&A Act including that Transport 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 proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be 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 whether offsets are required and able to be secured

The potential for the proposal 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 the Environment and Energy for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.



Mapping Date: March 2021
 Map Datum: GDA 1994
 Data Sources:
 OEH Estate: OEH
 State Forest: Forests NSW
 Sections:
 Roads and Rivers: Geoscience Australia



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Figure 1-1: Location overview of the proposal.

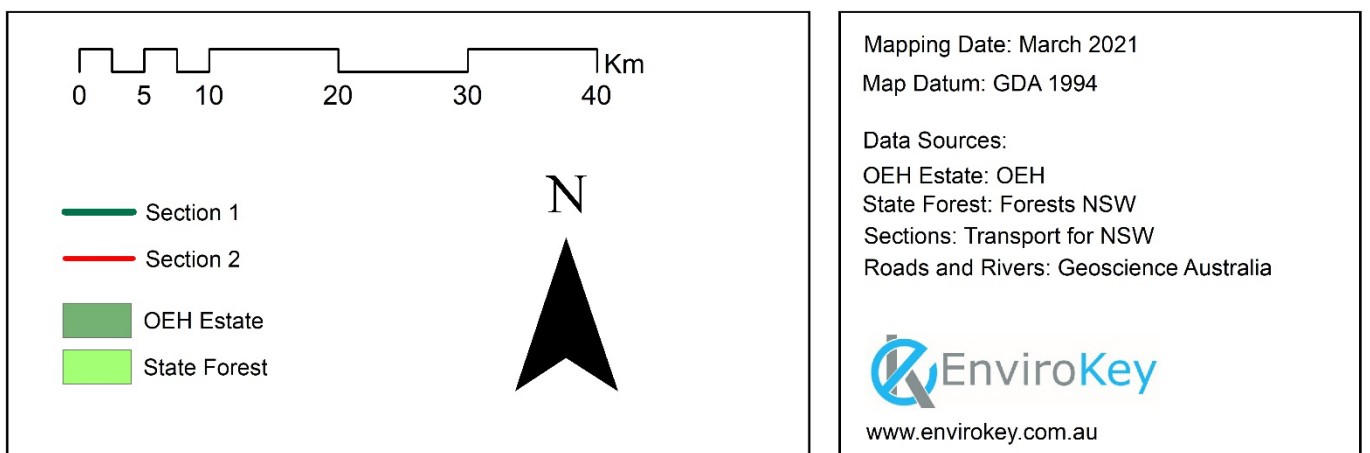
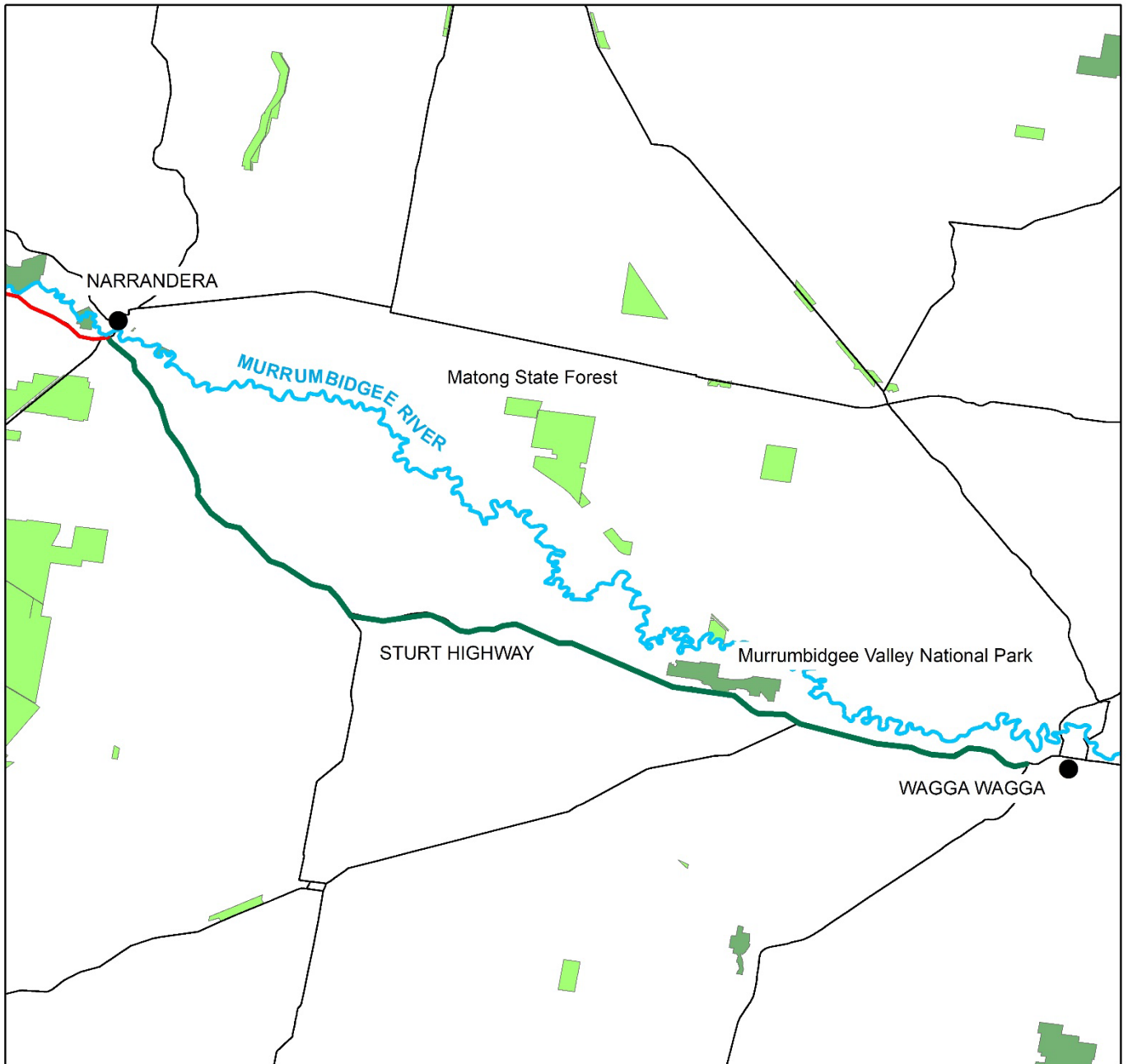


Figure 1-2: Identification of Section 1 of the proposal: San Isidore to Gillenbah East

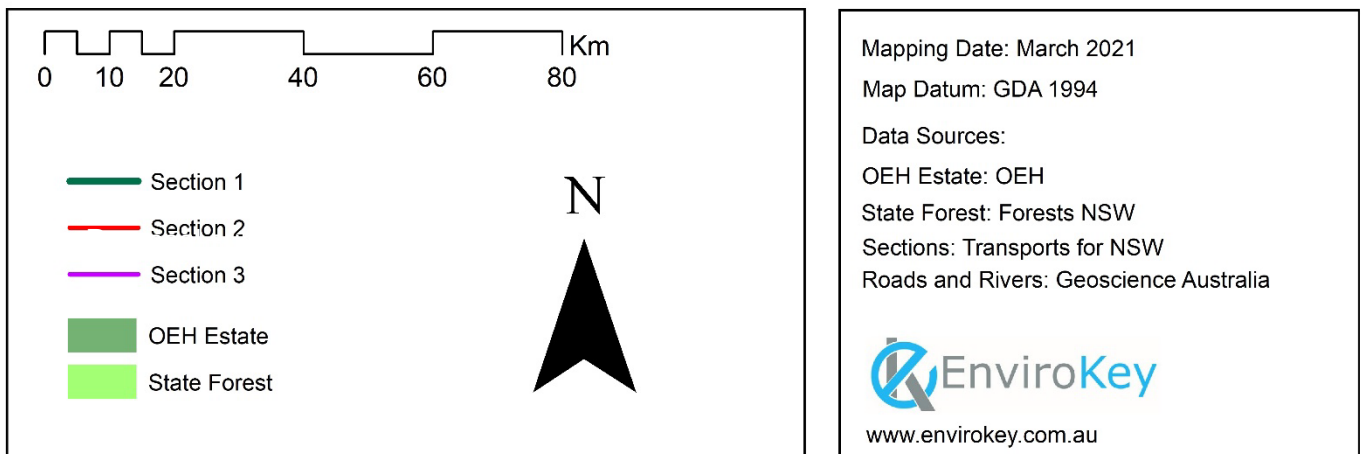
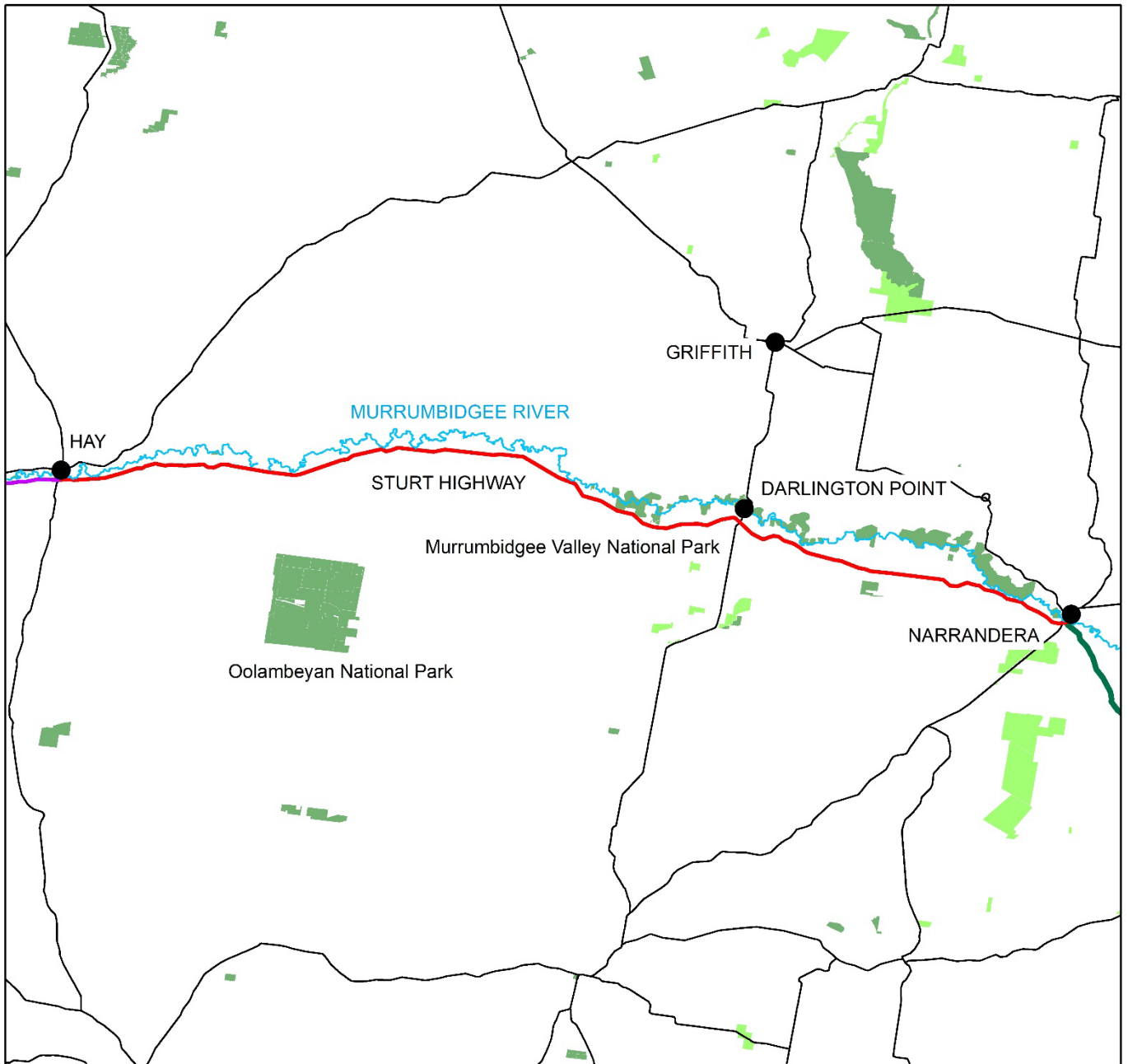


Figure 1-3: Identification of Section 2 of the proposal: Gillenbah West to Hay East

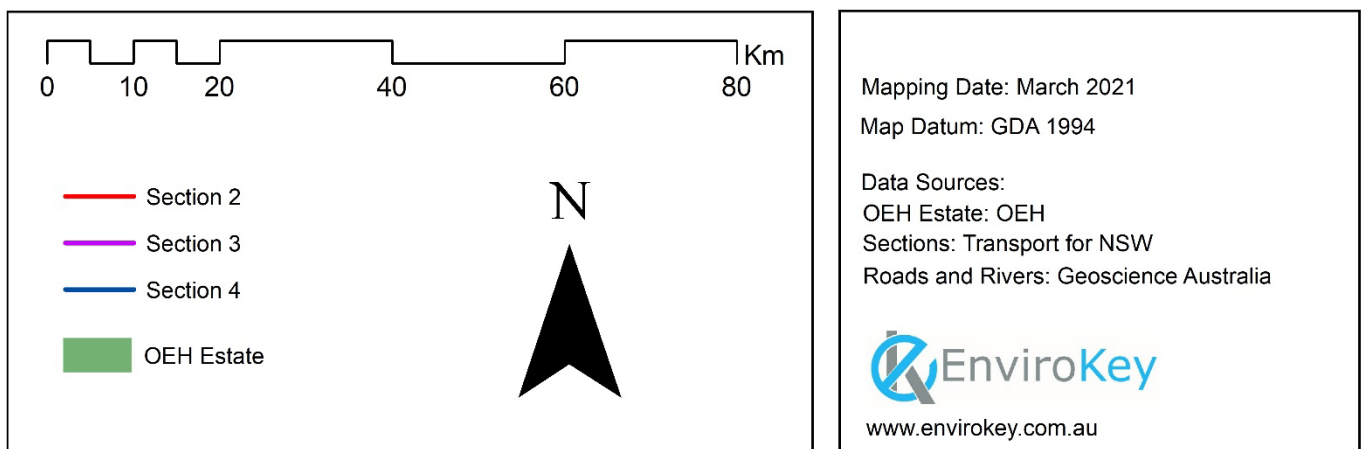
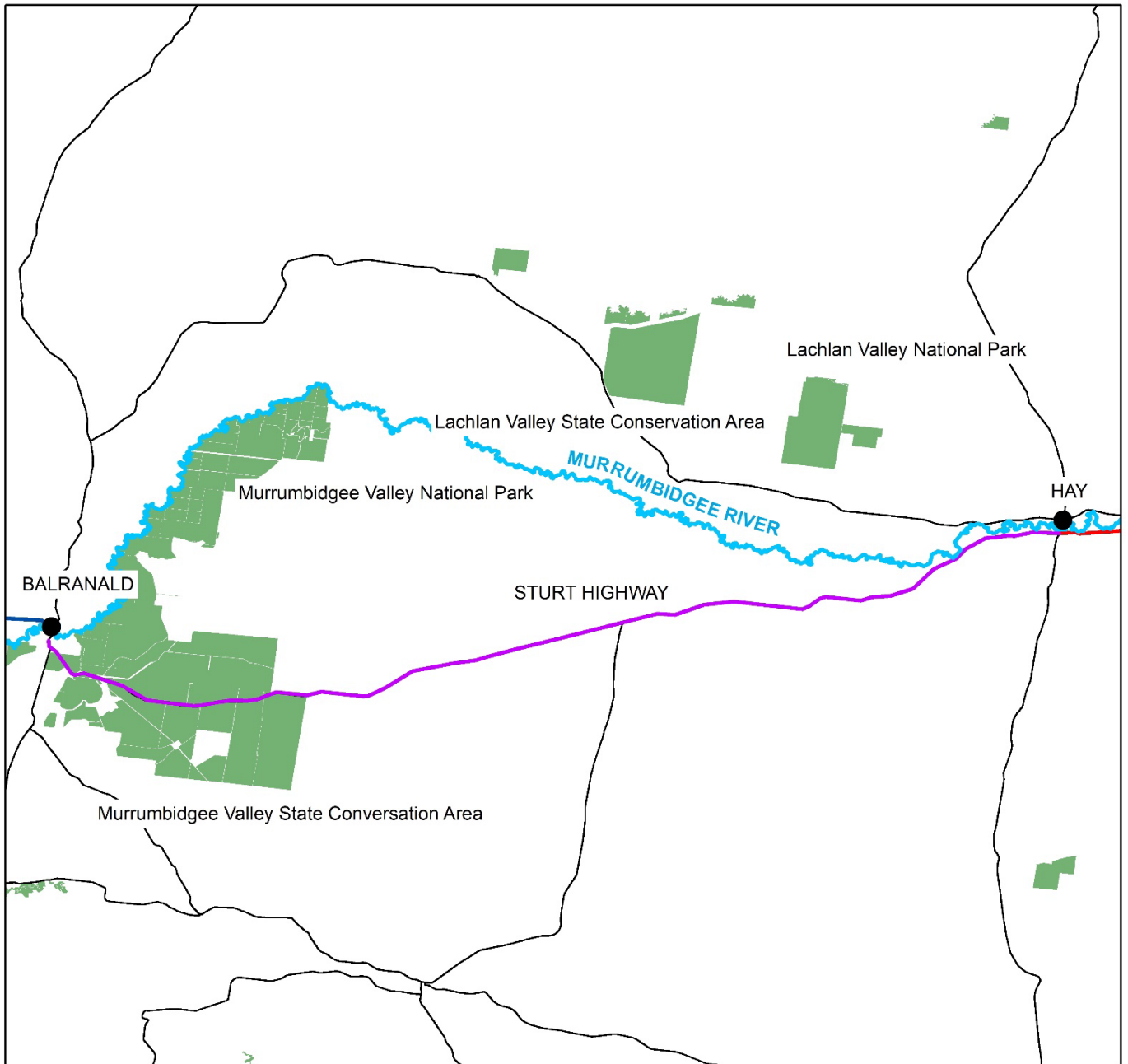


Figure 1-4: Identification of Section 3 of the proposal: Hay West to Balranald East

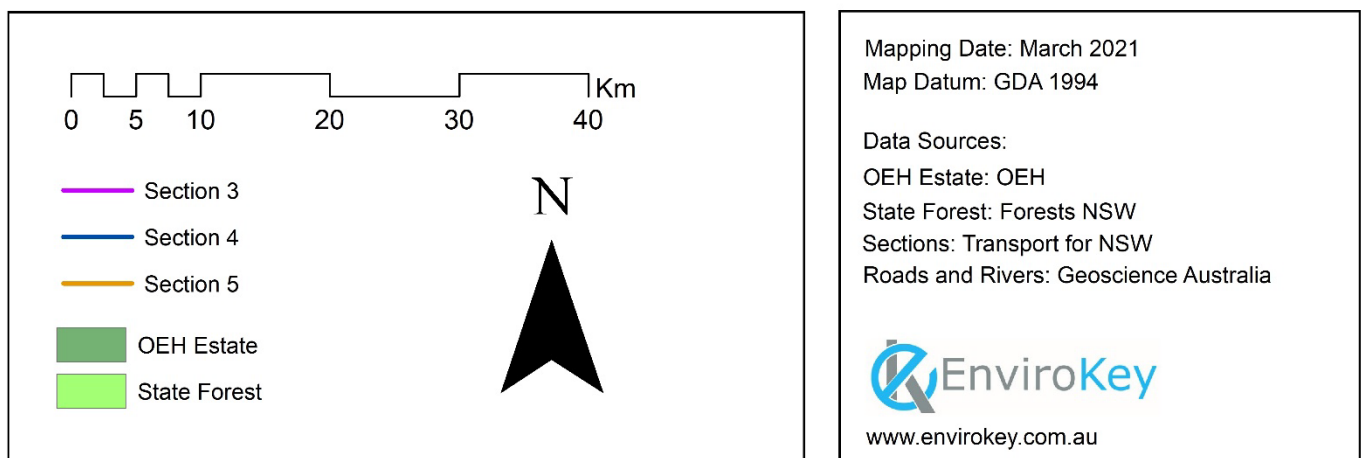
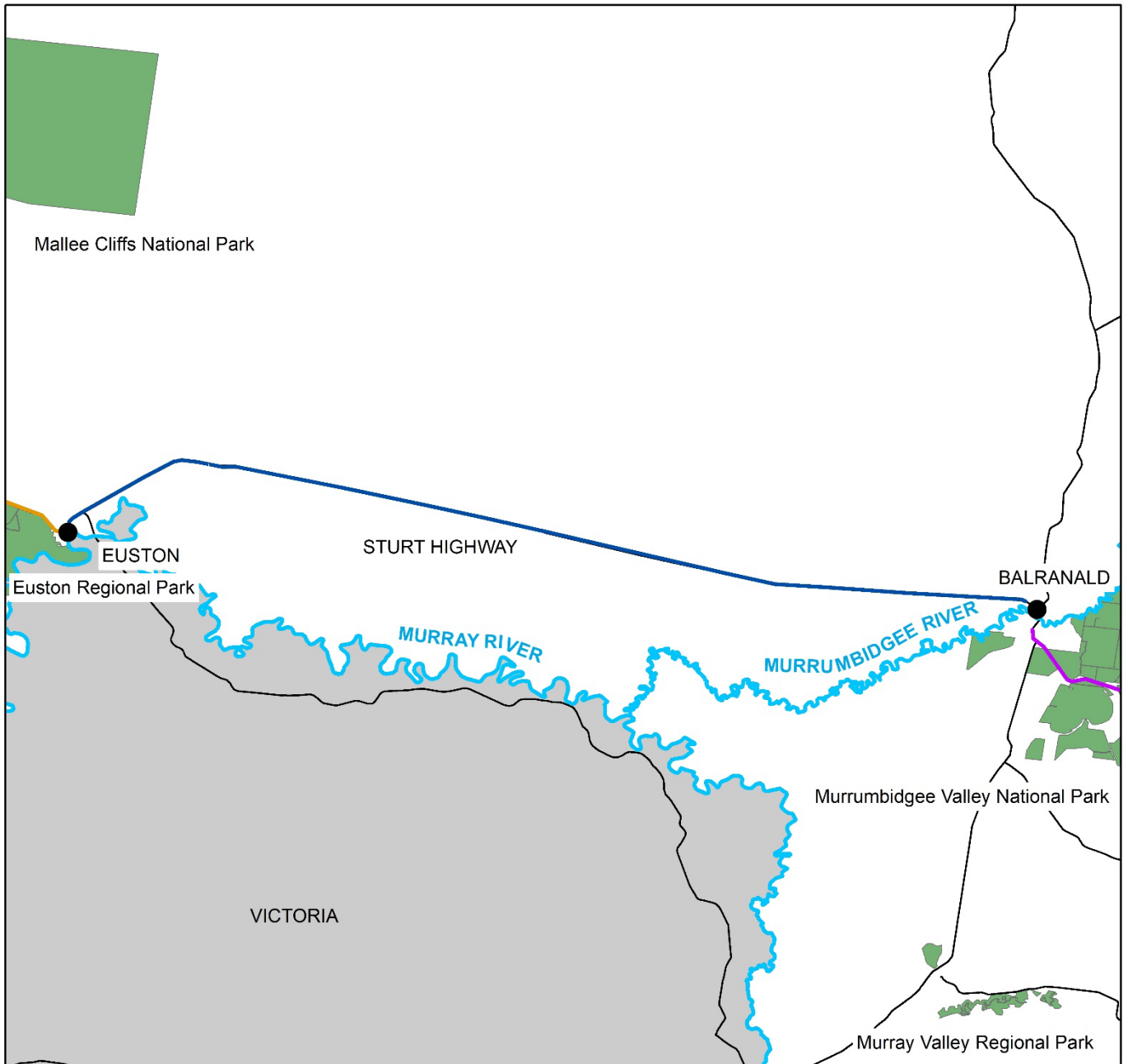
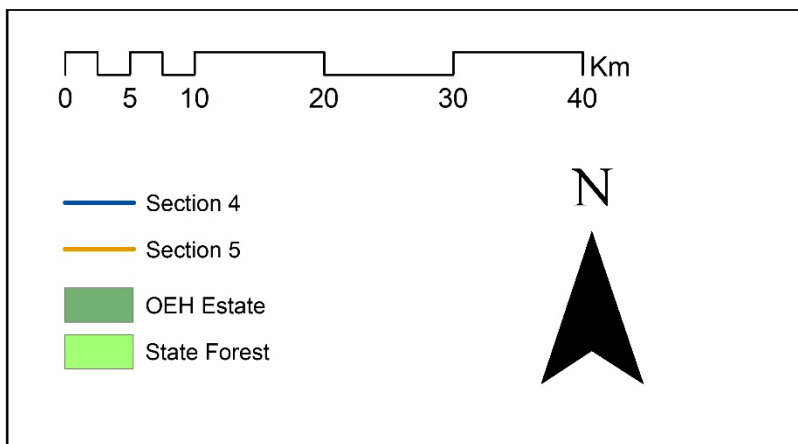
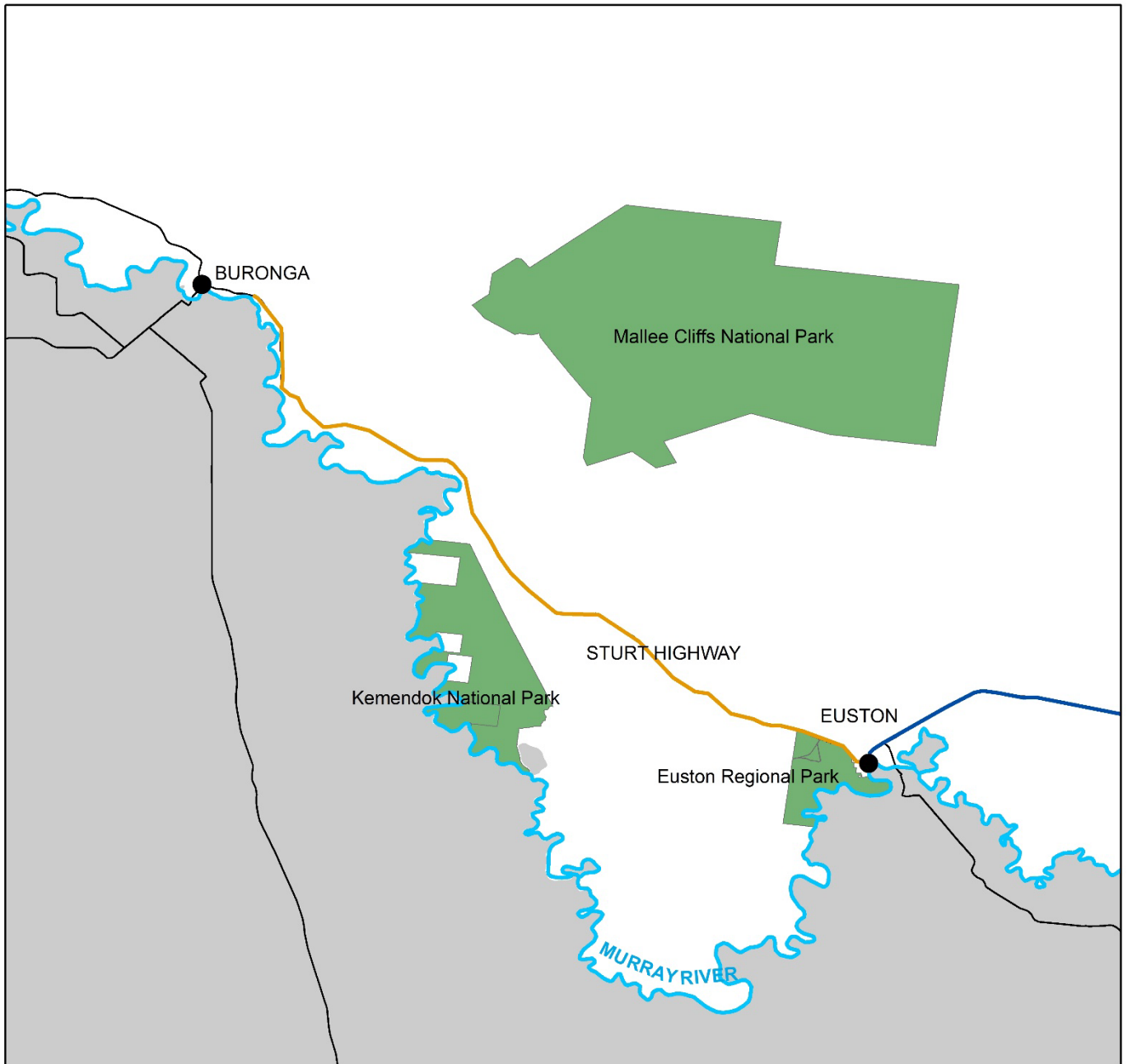


Figure 1-5: Identification of Section 4 of the proposal: Balranald West to Euston East



Mapping Date: March 2021
 Map Datum: GDA 1994

Data Sources:
 OEH Estate: OEH
 State Forest: Forests NSW
 Sections: Transport for NSW
 Roads and Rivers: Geoscience Australia



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Figure 1-6: Identification of Section 5 of the proposal: Euston West to Gol Gol

2. Need and options considered

2.1 Strategic need for the proposal

Transport and the NSW State government is committed to the Towards Zero initiative to reduce the road toll. To achieve this outcome, the Safe System approach has been adopted. The Safe System approach has four main pillars, Safer People, Safer Vehicles, Safer Speeds and Safer Roads. This project is focusing on the Safer Roads pillar of the Safe System approach.

The Safe Systems approach recognises that drivers are human and will make mistakes. A Safer Roads project aims to address the likelihood of a crash occurring through preventative safety measures such as wide centre line and audio tactile line marking and the severity of a crash should it occur through the removal of road side hazards and implementation of safety barrier. Safety barrier is a recognised primary treatment in addressing the severity of a crash by up to 95%.

A route safety review has been carried out on the Sturt Highway (HW14). As part of the review, crash analysis for the five-year period between July 2013 and June 2018 revealed a total of 142 crashes occurred in this period. It was identified that 55% of these crashes were run off road type crashes and 13% were head on type crashes. Crash analysis identified a need to prevent vehicles from leaving the carriageway and to address roadside hazards.

The review culminated in a nomination for road safety initiatives funded between 2018 and 2023 as part of the Saving Lives on Country Roads program. This program of works aims to provide a consistent, identified safety standard along the full length of the route. The outcome of the program is to improve road safety through the installation of safety treatments targeting the likelihood and severity of crashes along extensive lengths of the route. This is referred to as a mass-action approach.

The purpose of the proposed works is to reduce road trauma on the network and will be achieved by installing audio tactile line marking and wide centreline treatments along the full length of the route to reduce the likelihood of a crash occurring and by targeted roadside vegetation clearing at hazardous locations and installation of roadside safety barrier to shield road users from hazards that cannot be eliminated.

The locations identified under this program is based on Austroads Guide Part 6 Road Design – Safety and Barriers to contain high risk roadside hazards. The installation of appropriate hazard free areas and rollout of safety barriers aims to improve the Australian Risk Assessment Program Star Rating by combining with other treatments such as wide centreline and audio tactile line marking.

A Safe Systems Assessment report has been undertaken in line with the Austroads Safe Systems Assessment Framework to ensure that the proposed interventions align with the Safe Systems approach. Additionally, an economic analysis has been undertaken on the project scope to ensure that the project aligns with the Towards Zero program guidelines and has an acceptable benefit cost ratio and safety performance indicator (serious and fatal injuries prevented per million dollar spend).

2.2 Limitations of existing infrastructure

The Sturt Highway forms part of the state road network and is mostly a two lane single carriageway with a posted speed limit of 100 kilometres per hour and beyond Euroley (west of Gillenbah), the posted speed limit increases to 110 kilometres per hour. The road corridor and shoulders are of varying widths, and hazards within the desired hazard free area are common. It is these inconsistencies in the pavement and hazards within the roadside corridor that is likely to contribute to the severity of run off road type crashes which form 55% of the crashes on Sturt Highway.

2.3 Proposal objectives and development criteria

2.3.1 Proposal objectives

The proposal forms part of a continuing process to improve road user safety on the Sturt Highway by carrying out a range of safety improvement work between Wagga Wagga and Buronga.

The objectives of the proposal include:

- Align with the NSW Road Safety Plan 2021
- Align with the NSW Towards Zero commitment to reduce road trauma
- Target identified primary crash types
- Reduce the likelihood and severity of fatal and serious injury type crashes
- Minimising environmental impacts

2.3.2 Development criteria

The proposal forms part of a continuing process to improve road user safety on the Sturt Highway.

2.4 Alternatives and options considered

2.4.1 Methodology for selection of preferred option

The method used for the selection of the preferred option was to analyse the environmental, community, financial and safety outcomes of each option and whether they achieved the objectives of this proposal.

Development of the scope and REF has been an iterative process and included:

- An original scope focused on maximising safety outcomes
- Environment constraints mapping including vegetation and habitat constraints
- Workshops and reconsideration of scope to completely avoid high condition EEC, areas of potential threatened species habitat and culturally significant sites
- Further scope refinement and additional Flexible Barrier installed to replace vegetation removal

This iterative approach has ensured that Aboriginal cultural heritage and biodiversity impacts have largely been avoided or minimised. Detailed design is underway and individual projects are being given priority based on safety outcomes and value for money.

2.4.2 Identified options

The options considered for the proposal included:

Option 1: Do nothing. Proposal outcomes would not be achieved and road user safety would not be improved. There would be no environmental impact should the proposal not proceed.

Option 2: Road edge repair and road widening at various locations, road signage upgrade, audio-tactile line marking and raised pavement marker installation, replacement and improvements to the roadside safety barriers

Option 3: Road edge repair and road widening at various locations, intersection upgrades, road signage upgrade, audio-tactile line marking and raised pavement marker installation, replacement and improvements to the roadside safety barriers, and tree removal and vegetation maintenance to remove hazards where possible.

2.4.3 Analysis of options

Option 1 – ‘Do Nothing’

The do-nothing option involves not carrying out the proposal, continuing to use the highway.

Advantages:

- No impact on vegetation and the surrounding environment
- No community impact due to temporary traffic disruptions
- No property acquisition would be required
- No construction costs.

Disadvantages:

- No improvements in road user safety

Option 2 – Audio tactile line marking only

Advantages:

- No impact on vegetation and the surrounding environment
- Minor community impact due to temporary traffic disruptions
- No property acquisition would be required
- Minor construction costs.

Disadvantages:

- Minor improvements in road user safety

Option 3 – The proposal as described within this REF

Advantages:

- The likelihood and severity of run-off-road type crashes would be reduced
- Significant improvements to road user safety

Disadvantages:

- Greater impact on vegetation and the surrounding environment than Options 1 and 2
- Higher construction costs
- Community impact due to temporary traffic disruptions

2.5 Preferred option

Option 3 was the preferred option as it best meets the objectives of the proposal. This option would have some impact on vegetation and the surrounding environment. This option would have a higher construction cost but best meets the proposal objectives. The proposal is required to reduce the likelihood and severity

of run-off-road type crashes along the Sturt Highway and to reduce trauma by providing a safer road side environment. The Route Safety Review was commissioned to assist with the identification and nomination of road safety projects as part of the Saving Lives on Country Roads program. This program funds safety improvements which contribute towards a standardised road cross-section and aims to improve road safety along extensive route lengths through mass-action upgrades such as audio tactile line marking, roadside safety barrier installation, shoulder widening and median separation.

The impacts were deemed acceptable due to the improvements that would be made to the safety of road users of the Sturt Highway as well as reduced environmental impacts with consideration of the 'integration' principle of ecologically sustainable development (ESD).

2.6 Design refinements

The proposal has had a number of design refinements informed by detailed field survey. The various safety treatments available allows for changes in scope that ensure the avoid and minimise principals of biodiversity conservation are incorporated into the scope. The Aboriginal Cultural Heritage constraints mapping report and Transport Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) Stage 1 assessment were also considered. Site and features have been avoided by changing scope during development. These refinements included minimising impacts to threatened species and threatened ecological communities and Aboriginal cultural heritage where possible. Notably, any proposed work has been removed from the southern side of the Sturt Highway between 0.12km from the start of segment 14536 to 0.55km from the start of segment 14536. This identified area contained the Pine Donkey Orchid (*Diuris tricolor*) that is listed as vulnerable under the NSW *Biodiversity Conservation Act 2016*.

Additional refinements were made to the design in February 2022. As a result, this REF was updated in April 2022 to reflect the addition of curve widening at various locations. Further refinements were carried out with consideration of Aboriginal heritage in June 2022.

3. Description of the proposal

3.1 The proposal

Transport propose to carry out a range of safety improvement work on the Sturt Highway (HW14) between Wagga Wagga and Buronga.

Key features of the proposal include:

- Road edge repair and road widening (up to 15 metres from existing carriageway edge line) at various locations including required ancillary works such as culvert and drainage structure widening
- Reinstatement of a hazard free roadside where possible by; removing trees, maintenance of vegetation regrowth, batter flattening and table drain reshaping
- Install roadside safety barriers at various locations where a hazard free roadside cannot be achieved (nominally 10m from the existing carriageway edge line)
- Provide a primer seal followed by a final seal at the road widenings
- Intersection upgrades at various locations
- Road signage upgrades
- Installation of new audio tactile line-marking in line with Transport policy
- Reinstatement of line marking and raised pavement markers on completion
- Beneficial re-use of surplus material from other road projects located nearby.

For the purpose of this REF, the proposal description above, and a GIS shapefile (Objective ID A43067779 220427-HW14_S1_Impact-MGA55; Objective ID A43067781 220427-HW14_S2_Impact-MGA55; Objective ID A43067784 220427-HW14_S3_Impact-MGA55; Objective ID A43067780 220427-HW14_S4_Impact-MGA55 and Objective ID A43067785 220427-HW14_S5_Impact-MGA55) of the proposal footprint provided by Transport was used to determine the footprint for likely impacts.

3.2 Design

3.2.1 Design criteria

The design criteria for the proposal is to carry out safety improvement work for this section of the Sturt Highway.

3.2.2 Engineering constraints

There are no known engineering constraints associated with this proposal.

3.3 Construction activities

3.3.1 Work method

The proposal would involve the following work methods:

- Establishment of compounds, stockpiles sites, laydown areas and exclusion zone fencing
- Implementation of temporary traffic control
- Installation of erosion and sediment controls
- Clearing and mulching of vegetation identified for removal
- Slashing of vegetation
- Widening of the road formation, culvert structures and construction of table drains
- Maintain or improve stormwater drainage as required, including inspection of existing culverts and replacement/upgrade/extension as required
- Edge repairs to pavement
- Installation of roadside safety barrier
- Where possible, provide 6:1 or flatter batters
- Provision of audio tactile marking in areas located further than 300 metres from any residence
- Reinstatement of road signage, line marking, guide posts and other delineation
- Site clean-up, stabilisation and rehabilitation of disturbed areas
- Removal of traffic controls.

Any stockpile sites would be subject to the criteria set out in the Transport document *Stockpile Site Management Guideline EMS-TG-10*.

It is anticipated that vehicles would be stored overnight at the site compounds.

3.3.2 Construction workforce

The proposal would result in the utilisation of contractors, Transport personnel and other construction personnel.

3.3.3 Construction hours and duration

Work is expected to start in September 2022 and funding is expected to run for up to 2 years.

Construction would primarily occur during the following standard work times:

- 7am to 6pm Monday to Friday
- 8am to 1pm Saturday.

However, to minimise the overall duration of works (and the duration of impacts on nearby residences), works may be required to be completed outside of these hours.

Additionally, to minimise impacts on the road network, all work would also need to be in accordance with road occupancy licence (ROL) requirements and this may require some evening and/or night work.

For scheduled out-of-hours work, potentially impacted sensitive receivers would be consulted and kept informed of construction progress to minimise any impacts. In addition, management and mitigation measures detailed within the CEMP would be implemented as required to further mitigate any construction impacts.

Out-of-hours work would be carried out in accordance with the Noise Criteria Guideline (Roads and Maritime Services, 2015), Construction Noise and Vibration Guideline (Roads and Maritime Services, 2016)

and Construction and Maintenance Noise Estimator Tool. Prior advice would be given to the community regarding work hours, and any planned out of hours work.

3.3.4 Plant and equipment

The following plant and equipment would be used for the proposed work:

- Excavators and loaders
- Trucks
- Rollers
- Water carts
- Graders
- Bitumen spray truck
- Aggregate spreaders
- Back-hoe
- Bobcat
- Light vehicles
- Concrete trucks
- Line-marker Plant/Truck
- Road profiler
- Vibrating compactors
- Road stabiliser
- Lime spreader
- Material transfer vehicle
- Elevated work platform
- Lighting tower
- Portable toilet/crib room/site officer
- Mulcher
- Generator
- Guardrail installation equipment
- Cranes
- Hand tools
- Temporary traffic lights

3.3.5 Earthworks

Earthworks would be undertaken to carry out the proposal. As the proposal is still subject to detailed design, earthwork quantities (cut and fill) are unknown.

Any excess material would be managed according to the Environment Technical Direction ETD 2015I020 - Legal offsite disposal of Roads and Maritime Services waste dependent on historical road or other construction work in the area.

3.3.6 Source and quantity of materials

Material for earthworks would be required. Some fill, base, sub-base, select gravel and bridging rock would be sourced from existing commercial quarries in the local area. Additionally, materials for barriers, culverts and other drainage structures such as concrete would also be required.

3.3.7 Traffic management and access

A Traffic Control Management Plan would be prepared in line with the Roads and Maritime *Traffic Controls and Work Sites Manual- Version 5 (2018)*. In general, the Sturt Highway is a two lane single carriageway; therefore lane closures would be required during the construction activities. For example, the west bound lane would be closed while work is carried out on the southern side of the road. This would most likely require a timed traffic light system to effectively manage the length of time required for the traffic queues which would occur in both directions on the Sturt Highway with no longer than 10-minute delays.

It is likely that construction work would also impact on traffic movements due to an increase in truck and machinery movements accessing the site. Increased truck/vehicle movements are likely to be restricted to the area of the proposal during construction hours. However, additional movements would be required when constructing the new road formation. Impact from construction activities would cease at the completion of work. It is not expected that additional vehicular tracks would be required on either side of the proposed construction area.

3.4 Ancillary facilities

Site compounds, stockpile sites and other ancillary facilities would be required during construction.

Areas suitable for site compound/stockpile sites are identified in this REF with existing Transport registered stockpile sites to be used where possible. A total of 52 existing stockpile sites were identified along the length of the proposal (Table 3-1). Examples of these shown in Figure 3-1 and each is identified in Appendix 3 (Figure 3-1 to 3-54). Ancillary facilities have been assessed as part of this REF. All stockpile sites would be subject to the Stockpile Site Management Procedure and QA Specification R44 – Earthworks.

The stockpile sites would be subject to the criteria set out in Roads and Maritime's 'Stockpile Site Management Guideline' (Roads and Maritime 2015c), Stockpile sites would be managed in line with the following guidelines where practicable:

- Located in areas not prone to flash flooding and more than 50 metres from a watercourse
- Have ready access to the road network or direct access to the construction corridor

- Located in previously disturbed areas that do not require the clearing of native woodland vegetation
- Located in areas of low ecological and heritage conservation significance
- Located outside the drip line of trees
- Located on relatively level land.

Stockpile sites would be used to store plant and equipment, to provide a site office, limited parking and amenities for construction staff. Chemicals and fuels for construction would be stored in appropriate storage areas within the site compound.

Table 3-1: Number of existing stockpile sites identified within each section of the proposal

Section of the proposal	No of existing stockpile sites identified
1	10
2	15
3	11
4	9
5	7



Stockpile site 7, section 1



Stockpile site 10, section 2



Figure 3-1: Examples of existing stockpile sites along the proposal length.

3.5 Public utility adjustment

There is some potential that public utility adjustment would be required for ancillary work such as minor adjustment of utilities and drainage structures however, this is currently unknown and currently under investigation by Transport.

3.6 Property acquisition

The proposal would not require property acquisition.

4. Statutory and planning framework

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Transport and Infrastructure) 2021

State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP T& I) aims to facilitate the effective delivery of infrastructure across the State.

Clause 2.108 of SEPP T & I 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.

As the proposal is for the safety improvement work on the Sturt Highway and is to be carried out by Transport, it can be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979*. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under State Environmental Planning Policy (Coastal Management) 2018, State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (State Significant Precincts) 2005.

Part 2.2 of the 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 SEPP T&I(where applicable), is discussed in chapter 5 of this REF.

State Environmental Planning Policy (Infrastructure) 2007 was superseded by the State Environmental Planning Policy (Transport and Infrastructure) 2021 on 1 March 2022 during REF finalisation and determination.

4.1.2 Local Environmental Plans

Wagga Wagga Local Environmental Plan 2010, Narrandera Local Environmental Plan 2013, Leeton LEP 2014, Murrumbidgee Local Environmental Plan 2013, Hay Local Environmental Plan 2011, Balranald Local Environmental Plan 2010, Wentworth Local Environmental Plan 2011

Given the length of the proposal, seven Local Environment Plans (LEP), are of relevance. The proposal would be carried out on land zoned SP2 Infrastructure within the road reserve and should acquisition be required, this is likely to be on land zoned Rural. Within these zones, road work is permitted with consent. However, Clause 94 of the T&ISEPP 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.

There are no other restrictions associated with these planning instruments.

4.2 Other relevant NSW legislation

4.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) provides the framework for the assessment of Transport activities. Transport proposals are assessed and approved or determined under the following regimes:

1. **Division 5.1 of Part 5** applies to the majority of Transport road projects. Usually a review of environmental factors (REF) is prepared to assess the environmental impact of a project prior to commencing the work.
2. **Division 5.2 of Part 5** applies to State significant infrastructure. These major projects require approval from the Minister for Planning. An environmental impact statement is prepared in accordance with the requirements of the Director-General of the Department of Planning and Environment.

The Environmental Planning and Assessment Regulation 2022 included changes to the State Environmental Planning Policy (Infrastructure) which is now the Transport and Infrastructure SEPP, and the Clause 228 checklist, which is now Clause 171.

4.2.2 Biodiversity Conservation Act 2016

The purpose of the BC Act is:

- To conserve biological diversity at bioregional and state scales
- To maintain the diversity and quality of ecosystems
- To support biodiversity conservation in the context of a changing climate
- To assess the extinction risk of species and ecological communities, and identify key threatening processes
- To establish a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity.

The threatened species assessment process under section 5A of the EP&A Act includes a Test of Significance (also known as the Five-part test). These factors must be considered by decision makers regarding the effect of a proposed development or activity on threatened species or ecological communities, or their habitats.

An assessment of the potential impacts of the proposal on threatened species, ecological communities and Outstanding Biodiversity Values listed on the BC Act was carried out in accordance with section 5A of the EP&A Act and section 7.3 of the BC Act. A Test of Significance was conducted to characterise the significance of any potential impacts within Appendix 3 and concluded that there would be no significant impact on threatened species or ecological communities, or their habitats.

4.2.3 Fisheries Management Act 1994

The NSW *Fisheries Management Act 1994* aims to conserve fish stocks, key habitats, threatened species, populations and ecological communities of fish and marine vegetation. It also aims to promote viable commercial fishing, aquaculture industries and recreational fishing.

The provisions of the *Fisheries Management Act 1994* relating to the development approval process operate similarly to the above BC Act. The Act identifies threatened aquatic species, populations and ecological communities and requires an identical test of significance.

Significant impact triggers the need for a species impact statement for Part 4 and Part 5 projects. Activities relevant to this proposal that trigger the requirement for Transport to notify the Minister for Fisheries are as follows:

- Dredging or reclamation of waterways, including removal of snags (28 days notification) (sections 198 and 199).

As the proposed work would not be undertaken within any waterway, the proposal does not require consultant with DPI Fisheries.

An evaluation for the potential for biota listed under the FM Act and significance assessment where appropriate was carried out in Appendix 3.

4.2.4 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) provides an integrated system of licensing for certain activities within the objective of protecting the environment. The object of the Act is to achieve the protection, restoration and enhancement of the quality of the NSW environment. The Act provides for the issuing of three types of environment protection notices: clean-up, prevention and prohibition notices.

Clean-up notices can be issued to deal with pollution incidents (e.g. a spill of pollutants). Prevention notices can be issued where an activity is being carried out in an environmentally unsatisfactory manner. Clean-up and prevention notices are issued by the regulatory authority for the activity or premises concerned. In emergencies, the EPA can issue a clean-up notice even though it is not the regulatory authority in the circumstances.

4.2.5 National Parks and Wildlife Act 1974

The objectives of this Act are the conservation of nature, objects, places or features of cultural value within the landscape, fostering public appreciation understanding and enjoyment of nature and cultural heritage and their conservation and providing for the management of land reserved under this Act in accordance with the management principles applicable for each type of reservation. The objects are to be achieved by applying the principles of ESD.

This proposal would not impact on any land, objects, places or features of cultural value (Aboriginal and non-Aboriginal) reserved under this Act. Nonetheless, this REF applies the principles of ESD.

4.3 Commonwealth legislation

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (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 3 and chapter 6 of the REF.

A referral is not required for proposed road activities that may affect nationally listed threatened species, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015.

Potential impacts to these biodiversity matters are also considered as part of chapter 6 of the REF and Appendix 3.

Findings – matters of national environmental significance

The assessment of the proposal'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 proposal has not been referred to the Australian Government Department of Agriculture, Water, and the Environment under the EPBC Act.

4.3.2 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.

Aboriginal Heritage is considered further within Appendix 5.

4.4 Confirmation of statutory position

The proposal is categorised as development for the purpose of a road and is being carried out by or on behalf of a public authority. Under clause 2.108 of the SEPP T&I the proposal is permissible without consent. The proposal is not State significant infrastructure or State significant development. The proposal can be assessed under Division 5.1 of the EP&A Act.

Transport is the determining authority for the proposal. This REF fulfils Transport'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

5.1 Consultation strategy

All necessary community and stakeholder consultation would be carried out by Transport in accordance with the *Community Involvement Practice Notes and Resource Manual*.

5.2 Community involvement

Community consultation that would be carried out as part of this proposal includes the following activities:

- Notification of landowners to be affected by the proposal such as the sensitive receivers adjacent to the proposal and landowners affected by proposed property acquisition
- Notifications would be placed in local print media prior to the commencement of work detailing the likely timing of the proposal, potential changes to traffic conditions and project management contact details (to open communication channels to provide further details or address complaints)
- Temporary electronic Variable Message Signs (VMS) placed at both the western and eastern ends of the proposal to advise of the project and potential delays to motorists
- Meetings and briefings with stakeholders, businesses and residences (as required)
- Letters, phone calls, emails and targeted correspondence
- Project updates on the Transport website: www.transport.nsw.gov.au/projects live traffic website.

5.3 Aboriginal community involvement

Aboriginal community involvement and heritage impact was considered in accordance with the *Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation (Resource 7) (PACHCI)*

Additionally, consultation was carried out as part of the Aboriginal Cultural Heritage Constraints Mapping report by Lantern Heritage. Summaries of the various stages in the consultation process are provided in Appendix 5, together with inputs received to date by registered Aboriginal parties (RAPs). Examples of correspondence and notifications sent out to Aboriginal groups and individuals are provided in the Aboriginal Cultural Heritage Constraints Mapping Report provided in Appendix 5.

5.4 SEPP consultation

Council consent would not be required for this proposal. Transport needs to take into account the items listed in Clauses 2.10 to 2.16 of the SEPP (Transport and Infrastructure). These clauses relate to consultation requirements for work which may be carried out without consent but which trigger the items listed in the following table. If any of these items are triggered, the public authority, or persons representing the public authority would not be able to carry out the work. Once the items in the following table are triggered, the public authority must give written advice to the council of the intention to carry out the development and also take into consideration any response to the notice received from the council. Appendix 1 outlines items in clause 2.10 to 2.16 of the SEPP and the potential impact.

Based on the assessment undertaken in Appendix 1, the proposal does trigger the need for consultation under SEPP T&I. This would only be relevant where the proposal is adjacent to a national park or lands gazetted under the NP&W Act. Nonetheless, Transport would also notify the General Manager of Wagga Wagga City Council, Narrandera Shire Council, Murrumbidgee Council, Leeton Shire Council, Hay Shire Council, Balranald Shire Council and Wentworth Shire Council of the proposed work.

5.5 Ongoing or future consultation

Transport would advise residents and road users of the potential delays to motorists with the use of temporary electronic Variable Message Signs (VMS) that would be placed along the Sturt Highway to advise of the project and potential delays to motorists. The work would also be added to the Transport Live Traffic Website as 'scheduled road work' to provide advance notice to motorists to inform them of the potential for delays and to allow for travel time adjustment where possible. Notifications would also be placed in local print media advising the community of the proposed work and, where possible contact via email, letters and phone calls would be made. A stakeholder database and issues register would also be managed by Transport. Meetings and briefings would also be arranged for ongoing consultation as needed.

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 proposal. All aspects of the environment potentially impacted upon by the proposal are considered. This includes consideration of:

- Potential impacts on matters of national environmental significance under the EPBC Act
- The factors specified in the guidelines *Is an EIS required?* (DUAP 1995/1996) as required under clause 228(1) of the Environmental Planning and Assessment Regulation 2000 and the *Roads and Related Facilities EIS Guideline (DUAP 1996)*. The factors specified in clause 228(2) of the Environmental Planning and Assessment Regulation 2000 are also considered in Appendix 5.
- Site-specific safeguards and management measures are provided to mitigate the identified potential impacts.

6.1 Biodiversity

A biodiversity assessment has been done for the project and is included in this REF as Appendix 3. Section 6.1 is a summary of the biodiversity assessment.

6.1.1 Database searches

A series of database searches were carried out to identify the diversity of flora and fauna potentially occurring in the study area. The database searches conducted are included in Table 6-1.

Table 6-1: Database searches

Database	Search For	Search Area	Timing
BioNET Atlas	Threatened species, migratory species, JAMBA, CAMBA, ROKAMBA	10 kilometre radius	10/03/2021
OEH Threatened species profile search	Threatened flora, fauna and ecological communities	Study area	10/03/2021
EPBC Act Protected Matters Search	Threatened flora and fauna, endangered populations, ecological communities and migratory species	10 kilometre radius	02/03/2021
OEH vegetation information system (VIS)	Vegetation communities and descriptions	Study area	18/03/2021
OEH Vegetation Types Database	Vegetation communities	Study area	18/03/2021
Department of Environment's directory of important wetlands	Important wetlands	Along the length of the proposal	09/11/2020
Priority weeds database	Declared priority weeds	Riverina and Western DPI search areas	03/05/2021

Additionally, a literature review for any relevant local information was conducted on 10 May 2021. Where appropriate, the contents of these documents are considered throughout the REF.

The database searches identified a number of threatened ecological communities, threatened flora and/or threatened or migratory fauna species within a 10 kilometre buffer of the proposed work (OEH, 2021a, OEH, 2021d) (Appendix 3). A threatened and migratory species evaluation for the potential for these species to occur onsite has been undertaken (Appendix 3).

6.1.2 Existing environment

A field survey was undertaken on 21 March – 3 April 2021 by experienced ecologists, during which 29 Plant Community Types (PCT) including five threatened ecological communities (TEC) were recorded (Appendix 3). The TEC were as follows:

- Sandhill Pine Woodland (BC Act)
- Acacia melvillei Shrubland (BC Act)
- Myall Woodland (BC Act & EPBC Act)
- Box-gum Woodland (BC Act & EPBC Act)
- Inland Grey Box Woodland (BC Act & /EPBC Act)

Cleared land dominated by non-native vegetation was also present.

A total of 513 Hollow Bearing Trees (HBT) were identified within 10 metres of the existing edge line). Many of these occurred within a single PCT (PCT 170 Chenopod sandplain mallee woodland/shrubland) with 101 HBT present. Within mallee trees, hollows are generally small in size (less than 10cm diameter). Interestingly, there were 75 and 71 HBT mapped within Cleared land and Highly-disturbed land respectively. Many of the HBT within these areas occurred as isolated trees and/or dead trees (stags) and their scattered extent meant that they were not assigned to a PCT given the scale of the mapping applied to such a long, lineal proposal.

Within the study area (ie, the road reserve) but outside of the 10 metre buffer applied to the edge line, HBT were mapped in clusters. A single point was mapped and from this point, the number of HBT within 50 metres in this portion of the study area were assigned to that point, creating a HBT cluster. Using this method, 4,885 HBT were detected outside of the 10 metre buffer (Appendix 3).

A review of OEH regional mapping in accordance with the Framework for Biodiversity Assessment Methodology (OEH, 2014) shows that all TEC are relatively widespread within the locality, including within a 550 metre buffer (OEH, 2018, OEH, 2017, OEH, 2021b).

HW14 intersects the Murrumbidgee River (at Balranald) and comes within 100 metres of the Murray River near Buronga and Gol Gol. The Sturt Highway traverses numerous creeks and is directly adjacent to numerous waterways along the length including Bullenbong, Old Man, Sandy, Poison Waterholes (Section 1), Gillenbah, Yanco, Euroley, Uri, Gum (Section 2), Washpen, Yanga (Section 3), and Box Creek (Section 4) (Appendix 3). With consideration of the DPI document *Policy and guidelines for fish habitat conservation and management*, Poison Waterholes (Section 1), Gillenbah, Uri, Gum (Section 2), Washpen, Yanga (Section 3), and Box Creek are best considered to be Class 2 Moderate key fish habitat. They are named waterways with intermittent flow and sporadic refuge, breeding or feeding areas with semi-permanent pools forming within the waterway after rain events and contain freshwater aquatic vegetation. Bullenbong, Old Man, Sandy, (Section 1), Yanco, Uri, and Gum Creeks (Section 2), and the Murrumbidgee and Murray Rivers would be considered Class 1 Major key fish habitat given the permanent nature of these waterways and their potential to contain threatened or protected fish species.

All waterways have some level of degradation given the largely agricultural nature of the landscape that these waterways occur within. There has been widespread clearing that has occurred across their catchments resulting in increased water velocity overland and subsequently bank erosion and sediment load into each waterway. Despite all of this, water quality appeared relatively good in all waterways, although no specific water quality testing was carried out.

A detailed Biodiversity Assessment was prepared for the proposal and is included as Appendix 3.

6.1.3 Potential impacts

Construction

The BA in Appendix 3 details the direct and indirect impacts of the proposal that includes:

- Permanent loss of 89.21 hectares of native vegetation
- Permanent loss of 45.03 hectares of cleared land
- Permanent loss of 343 hollow-bearing trees
- Temporary loss of 6.40 hectares of native vegetation
- Temporary loss of 1.5 hectares of cleared land

Operation

No operational impacts are anticipated as a result of the proposal.

Conclusion on significance of impacts

Initially, two species of flora were unable to be assessed in this BA as targeted surveys during an appropriate time of the year (spring) were required to determine presence. These being the Pine Donkey Orchid and Sandhill Pine Orchid. Target surveys revealed the presence of Pine Donkey Orchid within PCT 19 west of Narrandera. Based on the design, the proposal in that location only (as defined in the BA) would result in a significant impact to Pine Donkey Orchid. However, the proposal was modified to exclude this location from the proposed work and therefore, no impacts to this threatened flora species would occur.

For all species that are known to or have a moderate to high likelihood of occurring within the study area, and therefore, be potentially impacted by the proposal, assessments of significance under the BC Act and EPBC Act were conducted that concluded that the proposal is unlikely to have a significant impact. Therefore, a species impact statement or a referral to the Commonwealth is not required.

6.1.4 Biodiversity offsets

A review of the biodiversity offset thresholds identified within Table 1 of the Transport *Guidelines for biodiversity offsets*, identifies that the proposal requires consideration by Transport for biodiversity offsets or supplementary measures.

Biodiversity impacts would be mitigated or offset in accordance the current TfNSW Guidelines for biodiversity offsets or future Offset guidelines. A Biodiversity Offset Strategy will be developed and implemented. It will account for funded aspects of the work and will be staged in line with delivery phases.

6.1.5 Safeguards and management measures

Impact	Mitigation measures	Responsibility	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated
Removal of threatened flora habitat	The limit of works (including compounds and parking areas) must be clearly and physically demarcated with flagging/fencing or similar.	Project Engineer	Prior to construction	Effective	None
	Limit of clearing fencing must be placed around any threatened flora locations with an appropriate buffer distance as determined by the Project Environmental Officer or Ecologist	Project Engineer	Prior to construction	Effective	None
	No work of any kind would take place in the identified population of Pine Donkey Orchid.	Project Engineer	Prior to construction	Effective	None
	All personnel would be made aware of Pine Donkey Orchid and Santalum murrayanum given their known presence within the road corridor. This should be part of tool-box talks to all onsite personnel.	Project Engineer	Prior to construction	Effective	None
	The unexpected species find procedure is to be followed under <i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011) if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the proposal site	Project Engineer	During construction	Effective	None
Removal of native vegetation	Only vegetation assessed within this BA is to be removed. Should any additional clearing be necessary, further onsite assessment is required	Project Engineer	During construction	Effective	None
	Parking options should be limited to existing hard stand areas	Project Engineer	During construction	Effective	None
	Native vegetation removal will be minimised through detailed design.	Project Engineer	Detailed design	Effective	None
	Pre-clearing surveys will be undertaken in accordance with Guide 1: Pre-clearing process of	Project Engineer	Prior to construction	Effective	None

Impact	Mitigation measures	Responsibility	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated
	the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).				
	Vegetation removal will be undertaken in accordance with <i>Guide 4: Clearing of vegetation and removal of bushrock</i> of the <i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011).	Project Engineer	During construction	Effective	None
	All pathogens (eg Chytid, Myrtle Rust and Phytophthora) are to be managed in accordance with the <i>Transport Biodiversity Guidelines – Guide 7 (Pathogen Management)</i> and DECC Statement of Intent 1: Infection of native plants by <i>Phytophthora cinnamomi</i> (for <i>Phytophthora</i>).	Project Engineer	During construction	Effective	None
	Pruning of mature trees is to be in accordance with Part 5 of the Australian Standard 4373-2007 Pruning of amenity trees.	Project Engineer	During construction	Effective	None
	Biodiversity impacts would be mitigated or offset in accordance the TfNSW Guideline for biodiversity offsets	Project Engineer	Prior to construction	Effective	None
Removal of fauna habitat	Removal of any HBT would only be carried out in accordance with a HBT Removal Procedure. The Procedure must specifically include actions to minimise potential impacts to Superb Parrot, Squirrel Glider and microchiropteran bats and must include procedures for supervision, salvage and relocation by a suitable qualified and experienced person.	Project Engineer	During construction	Effective	None
	Any Grey-crowned Babbler nests would be the subject of a pre-clearance survey to determine if breeding is occurring. Should breeding be present, works should	Project Engineer	During construction	Effective	None

Impact	Mitigation measures	Responsibility	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated
	be temporarily postponed to avoid direct impacts during any breeding event. Should this be unavoidable, any offspring within the nest can be salvaged and directed to a suitably qualified and experienced person for raising.				
	Habitat removal will be undertaken in accordance with Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).	Project Engineer	During construction	Effective	None
	The unexpected species find procedure is to be followed under Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) if threatened fauna, not assessed in the biodiversity assessment, are identified in the proposal site.	Project Engineer	During construction	Proven	None
	Fauna will be managed in accordance with <i>Guide 9: Fauna handling</i> of the <i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011)	Project Engineer	During construction	Proven	None
	Prior to clearing any vegetation within PCT 2 or PCT 11 within section 1 and section 2, an ecologist must be onsite to confirm that Koala are not present within the proposed impact area. Should any Koala be observed, any proposed work within 50 metres of any individual sighted must cease.	Project Engineer	Prior to construction	Effective	None
Waterways and water quality	No work is to be carried out within any of the waterways within the road reserve	Project Engineer	During construction	Proven	None
	Aquatic habitat will be protected in accordance with Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA	Project Engineer	During construction	Effective	None

Impact	Mitigation measures	Responsibility	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated
	projects (RTA 2011) and Section 3.3.2 Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013 (DPI (Fisheries NSW) 2013).				
Weeds	Declared priority weeds are to be managed according to requirements under the Biosecurity Act, 2015 and Guide 6 (Weed Management) of the Roads and Maritime Services Biodiversity Guidelines 2011	Project Engineer	During construction	Proven	None

6.2 Aboriginal heritage

6.2.1 Existing environment

An Aboriginal cultural heritage constraints mapping report was prepared by Lantern Heritage (Appendix 5).

An extensive site search was conducted of the Aboriginal Heritage Information Management System (AHIMS) database on the 22th March 2021 by Heritage NSW. The search was conducted with a buffer of 1km either side of the Sturt Highway proposal area.

Six hundred and ninety-three (693) sites or objects were listed as being present within the search area (see Appendix 5). By section there are:

- section 1, 209 sites
- section 2, 161 sites
- section 3, 236 sites
- section 4, 41 sites, and
- section 5, 46 sites recorded on AHIMS.

Of these sites, 53 are located within the Sturt Highway road corridor reserve.

It must be noted that the number of sites physically located within the road corridor may be significantly different to what is recorded on AHIMS. This is the result of errors in the translation of site coordinates from earlier mapping systems, as well as the lack of spatial information recorded on AHIMS that shows the physical extent of site boundaries. For example, the GPS coordinates of a site recording may show that the site is located outside the road reserve, however, the actual dimensions of the site boundary may extend within the reserve. As such, Lantern Heritage has expanded the limits of the AHIMS search results to include sites within a 100m buffer of proposed impacts. This brings the total number of sites recorded within the road reserve and within 100m of proposed impacts to 90.

The existing environment is described in detail in Appendix 5.

6.2.2 Potential impacts

Various aspects of the proposed works for the Sturt Highway project have the potential to result in direct and/or indirect harm to 90 recorded AHIMS sites. Table 11 of Appendix 5 provides a summary of the anticipated impacts in terms of where sites are relative to the road reserve. This impact assessment considers all sites located within the road reserve according to AHIMS as well as sites recorded within 100m of the Sturt Highway road corridor reserve.

Areas of sensitivity were mapped by Lantern Heritage and provided in Appendix 5 and these have been used to further revise the project impact footprint and develop safeguards in accordance with the Transport PACHCI procedure. A PACHCI Stage 1 assessment was carried out by the Transport Aboriginal Cultural Heritage Officer between December 2021 and April 2022 (Appendix 6). This assessment concluded that the proposed work is unlikely to have an impact on Aboriginal cultural heritage.

6.2.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Aboriginal Heritage	<ul style="list-style-type: none"> <i>The Standard Management Procedure - Unexpected Heritage Items</i> (Roads and Maritime, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place Work will only recommence once the requirements of that Procedure have been satisfied. 	Project Engineer	Prior to commencing work	Section 4.9 of QA G36 <i>Environment Protection</i>
	<ul style="list-style-type: none"> The current AHIMS site card for site WW113 will be reviewed by the Transport Project Engineer/Works Supervisor prior to works commencing and location identified in design drawings. 	Project Engineer and Works Supervisor	Prior to commencing work	Appendix 7

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<ul style="list-style-type: none"> Exclusion measures (flagging) will be in place around AHIMS site WW113 prior to works commencing in the area and crews toolboxed 	Project Engineer	Prior to commencing work	Appendix 7
	<ul style="list-style-type: none"> No work will commence near AHIMS WW113 until the Transport Aboriginal Cultural Heritage Officer has verified adequate exclusion measures are in place 	Project Engineer	Prior to commencing work	Appendix 7

6.3 Groundwater

6.3.1 Existing environment

According to the Atlas of Groundwater Dependant Ecosystems (GDE), the Sturt Highway is largely located on the vast floodplains of the Murrumbidgee River and to a lesser extent, the Murray River (Figure 6-1 to Figure 6-5). The proposal does not involve excavation or any other activity that is likely to interfere with groundwater

The field survey did not identify any potential ground water seepages in the vicinity of the proposed work however, they are possible considering the presence of subterranean ground water.

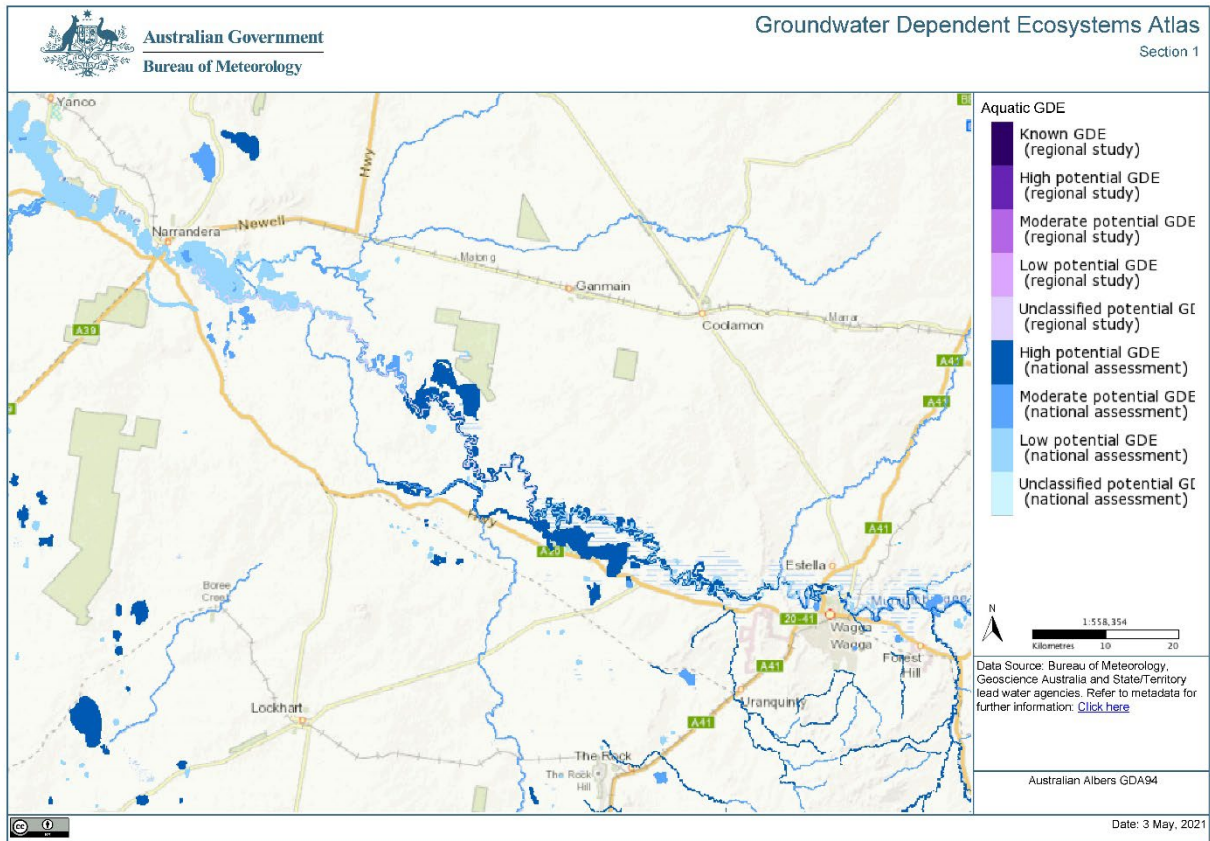


Figure 6-1: Aquatic GDE as identified by the Groundwater Dependent Ecosystems Atlas within section 1

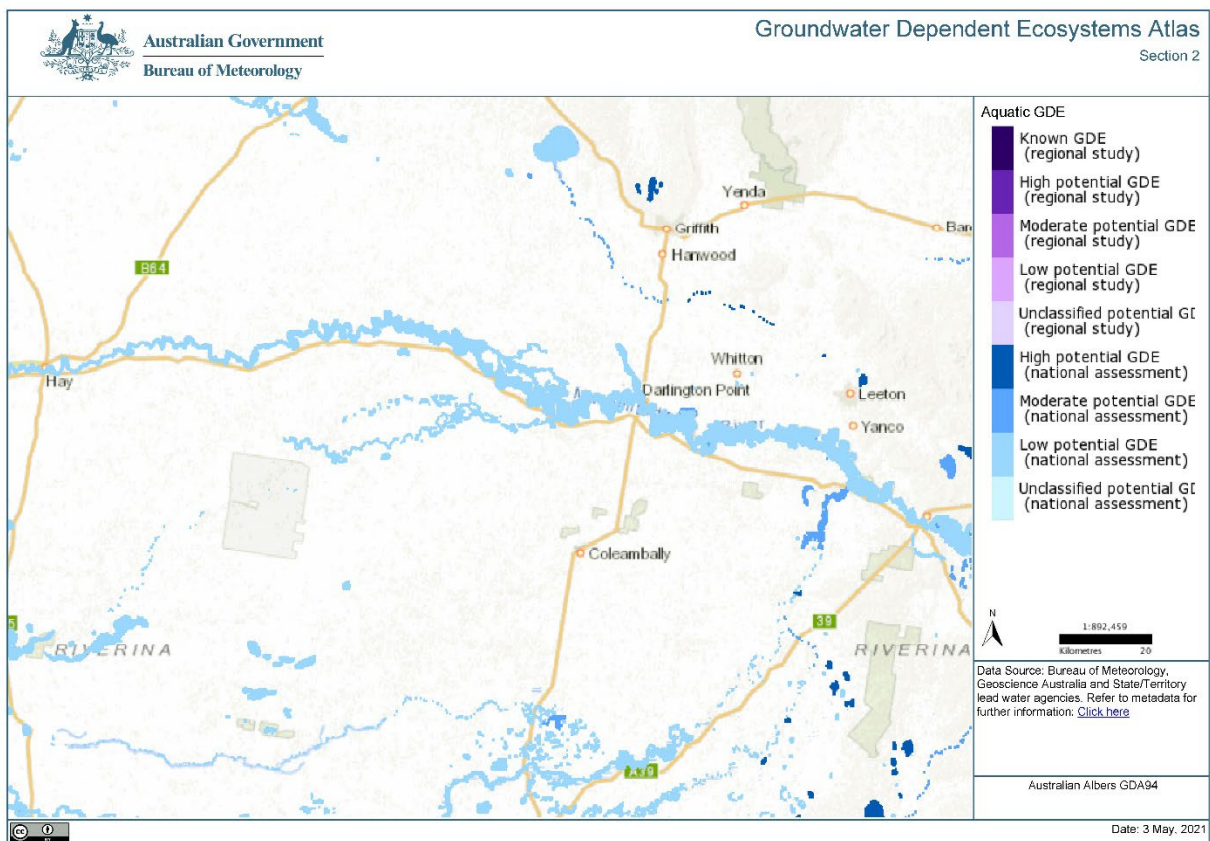


Figure 6-2: Aquatic GDE as identified by the Groundwater Dependent Ecosystems Atlas within section 2

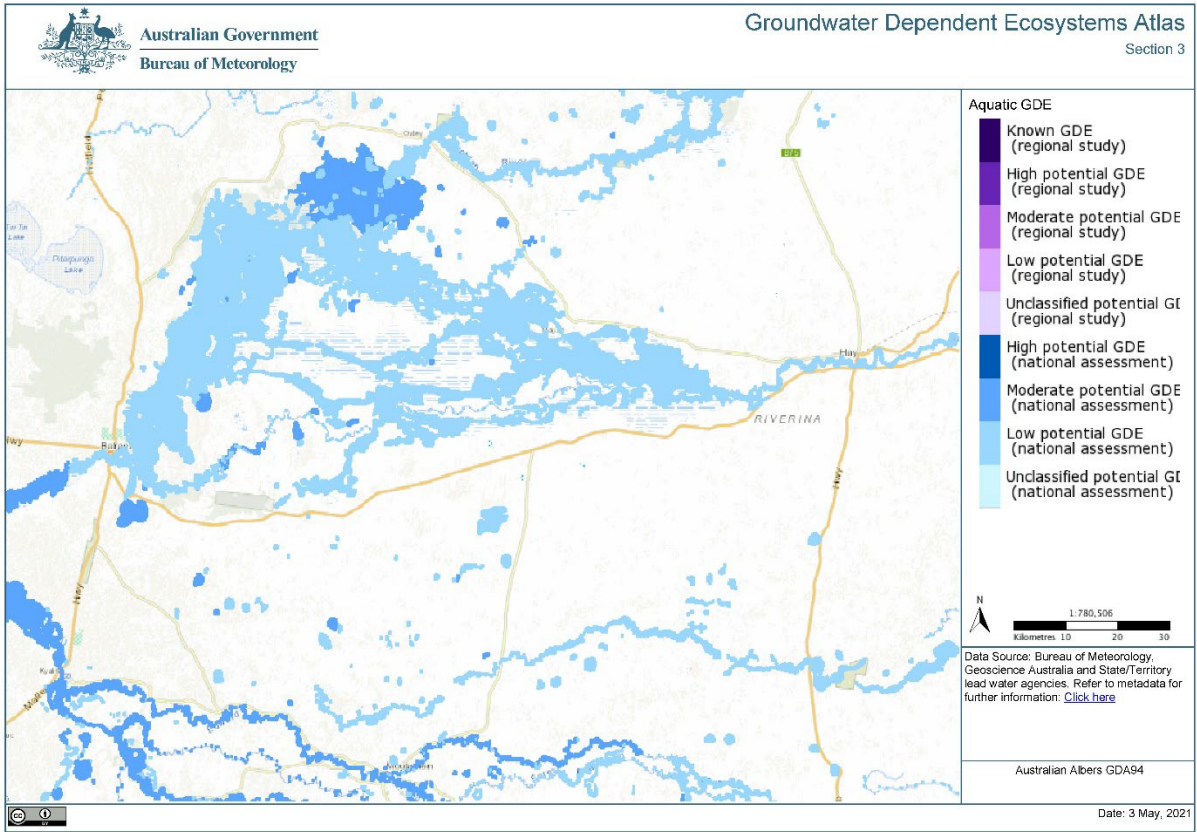


Figure 6-3: Aquatic GDE as identified by the Groundwater Dependent Ecosystems Atlas within section 3

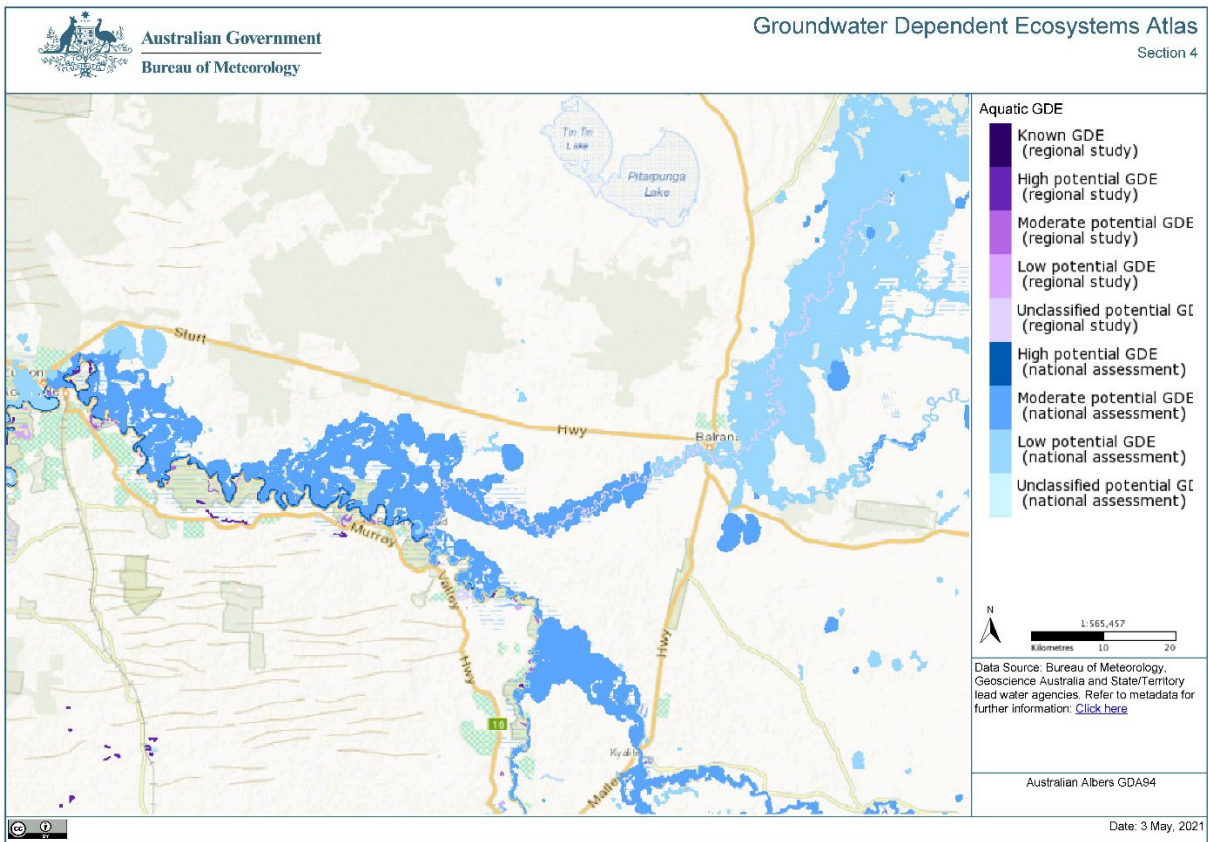


Figure 6-4: Aquatic GDE as identified by the Groundwater Dependent Ecosystems Atlas within section 4

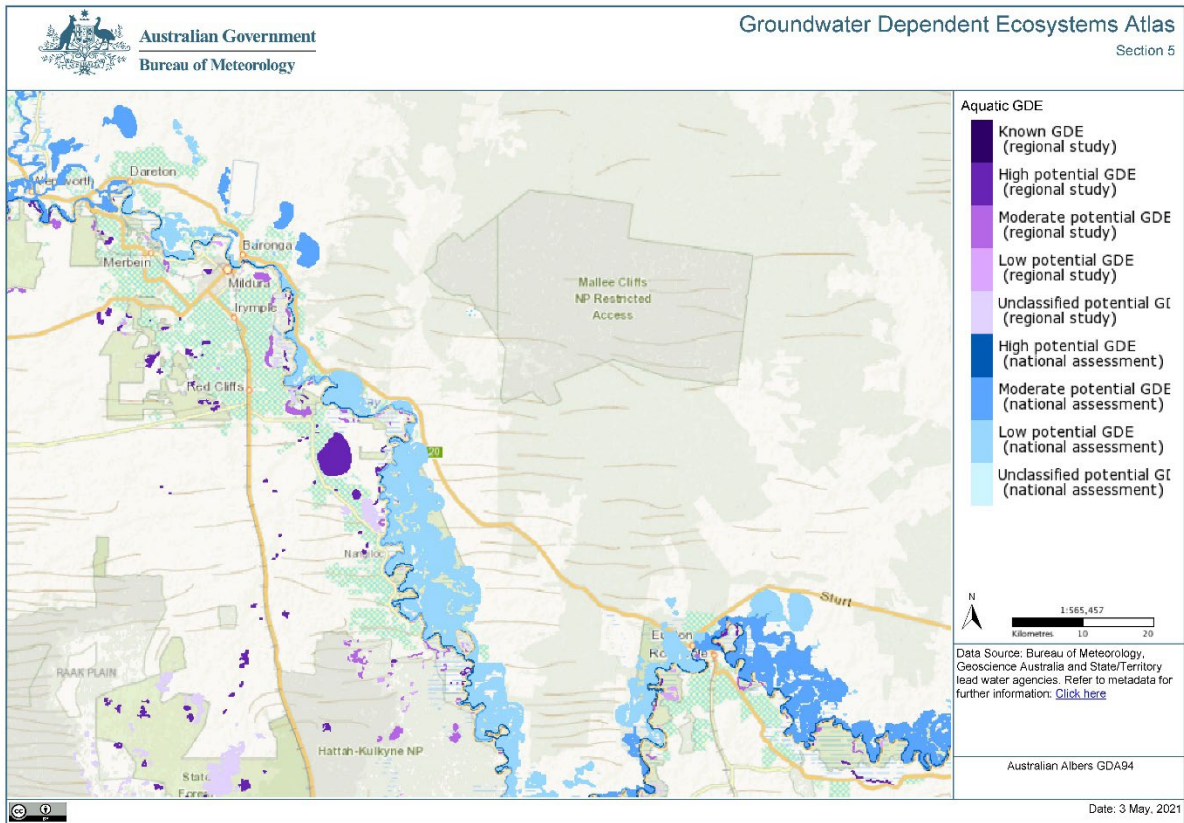


Figure 6-5: Aquatic GDE as identified by the Groundwater Dependent Ecosystems Atlas within section 5

6.3.2 Potential impacts

No potential impacts are likely given the proposed construction methodology.

6.3.3 Safeguards and management measures

No specific safeguards or management measures are considered necessary.

6.4 Soils and Water

6.4.1 Existing environment

According to the Mitchell Landscapes dataset (Mitchell, 2002), the proposal is located within numerous Mitchell Landscape systems (Table 6-2).

Table 6-2: Mitchell landscapes along the proposal

Mitchell Landscapes	
Section 1	Length (km)

Mitchell Landscapes	
Cocoparra Ranges and Footslopes	2.8
Lockhart Hills and Footslopes	1.9
Murrumbidgee - Tarcutta Source-bordering	2.8
Brokong Plains	6.6
Wonga Hills and Ranges	4.0
Coffin Rock Granite Hills	6.3
Murrumbidgee - Tarcutta Channels and Floodplains	65.8
Section 2	Length (km)
Murrumbidgee - Tarcutta Channels and Floodplains	12.6
Murrumbidgee Channels and Floodplains	64.8
Murrumbidgee Scalded Plains	83.6
Murrumbidgee Source-bordering Dunes	2.4
Murrumbidgee Depression Plains	6.5
Section 3	Length (km)
Murrumbidgee Channels and Floodplains	16.0
Murrumbidgee Scalded Plains	88.4
Murrumbidgee Lakes, Swamps and Lunettes	2.5
Murrumbidgee Depression Plains	21.2
Section 4	Length (km)
Mallee Cliffs Sandplains	65.1
Mallee Cliffs Linear Dunes	1.2
Murray Lakes, Swamps and Lunettes	0.1
Murray Channels and Floodplains	7.6
Murrumbidgee Channels and Floodplains	4.2
Section 5	Length (km)

Mitchell Landscapes	
Mallee Cliffs Sandplains	41.4
Mallee Cliffs Linear Dunes	20.4
Murray Channels and Floodplains	9.5

Soils are generally moderately erodible in these landscapes and the potential for soil erosion and sedimentation have been considered in this REF.

The Sturt Highway is largely located on the vast floodplains of the Murrumbidgee River and to a lesser extent, the Murray River (Figure 6-1 to Figure 6-5). HW14 also intersects the Murrumbidgee River (at Balranald) and comes within 100 metres of the Murray River near Buronga and Gol Gol. The Sturt Highway traverses numerous creeks and is directly adjacent to numerous waterways along the length including Bullenbong, Old Man, Sandy, Poison Waterholes (Section 1), Gillenbah, Yanco, Euroley, Uri, Gum (Section 2), Washpen, Yanga (Section 3), and Box Creek (Section 4). Dozens of minor waterways are also present.

6.4.2 Potential impacts

The proposal would require the removal of vegetation, excavation and the deposition of fill and the resulting soil disturbance would expose these areas to erosion, runoff and sedimentation hazards during rainfall events. This would occur across each of the proposal sections.

Impact could result from strong winds blowing over exposed soils causing dust disturbances. It is not expected that any fill material would require long term stockpiling within the proposal area as excavated material would be required in the fill areas.

Machinery and the fuel storage areas for machinery could become potential sources of contamination. Leakage or spillage of fuels from construction machinery could result in soil contamination which is most likely to occur where construction machinery is repeatedly used or parked periodically while not in use. Any proposed site compounds or stockpile sites would be located away from of any watercourse in accordance with the Roads and Maritime *Stockpile Site Management Guideline, 2015*.

6.4.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Accidental spill	<ul style="list-style-type: none"> An Emergency spill kit must be kept onsite at all times. All staff must be made aware of the location of the spill kit and trained in its use If an incident (e.g. spill) occurs, the Transport <i>Environmental Incident Classification and Management Procedure</i> would be followed and the Transport Contract Manager notified as soon as practicable. 	Project Engineer	Construction	Section 4.3 of QA G36 <i>Environment Protection</i>

Impact	Environmental safeguards	Responsibility	Timing	Reference
Soil and water	<p>Erosion and sediment control measures must be implemented and maintained to:</p> <ul style="list-style-type: none"> • 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 • Divert clean water around the site. (In accordance with the Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book)). <p>Erosion and sedimentation controls must be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request</p> <p>Erosion and sediment control measures must not be removed until the work is complete and areas are stabilised</p> <p>A progressive erosion and sediment control plan is to be prepared for the works.</p> <p>The maintenance of established stockpile sites during construction must be in accordance with the Transport Stockpile Site Management Guideline, (EMS-TG-10).</p>	Project Engineer	Detailed design / Pre-construction	Section 2.2 of QA G38 <i>Soil and Water Management</i>
Chemical runoff	<ul style="list-style-type: none"> • Fuels, chemical and liquids must be stored in an impervious bunded area a minimum of 50 metres away from: <ul style="list-style-type: none"> – Rivers, creeks, or any areas of concentrated water flow. – Flooded or poorly drained areas. 	Project Engineer	Construction	

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<ul style="list-style-type: none"> - Slopes above 10%. • Cleaning of spray bars (or equivalent equipment) is to occur in suitable areas (e.g. not table drains) and not cause water pollution • Refuelling of plant and equipment must occur in impervious bunded areas located a minimum of 50 metres away from drainage lines of waterways unless within a bunded stockpile site • Vehicle wash down and/or cement truck washout must occur in a designated bunded area • Moveable plant such as pumps and generators must be bunded 			
Water Quality	<ul style="list-style-type: none"> • There must be no release of dirty water into drainage lines and/or waterways • Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/slicks) must be carried out on a regular basis to identify any potential spills or deficient erosion and sediment controls • Water quality control measures must be used to prevent any materials (e.g. concrete, grout, sediment etc.) entering drain inlets or waterways • Construction Water will be managed within sustainable limits of the area and catchment. It may be necessary to reduce or limit water extraction and some construction activities if water supply is heavily constrained. Contact the Regional (Program) Environmental Manager when water supply becomes an issue and direction will be provided 	Project Engineer	Construction	
Soil contamination	<ul style="list-style-type: none"> • If soil contamination is discovered during construction, works will cease immediately, the site will be temporarily fenced and access would be restricted. Soil sampling and analysis would be conducted to assess the 	Project Engineer	Construction	Section 4.3 of QA G36 Environment Protection

Impact	Environmental safeguards	Responsibility	Timing	Reference
	extent and nature of the contamination.			

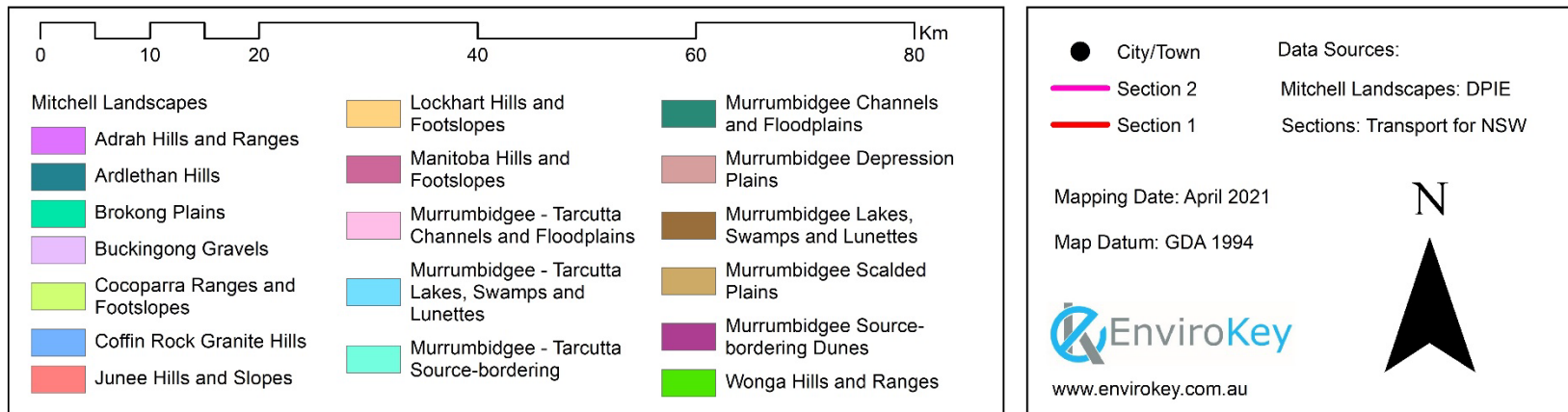
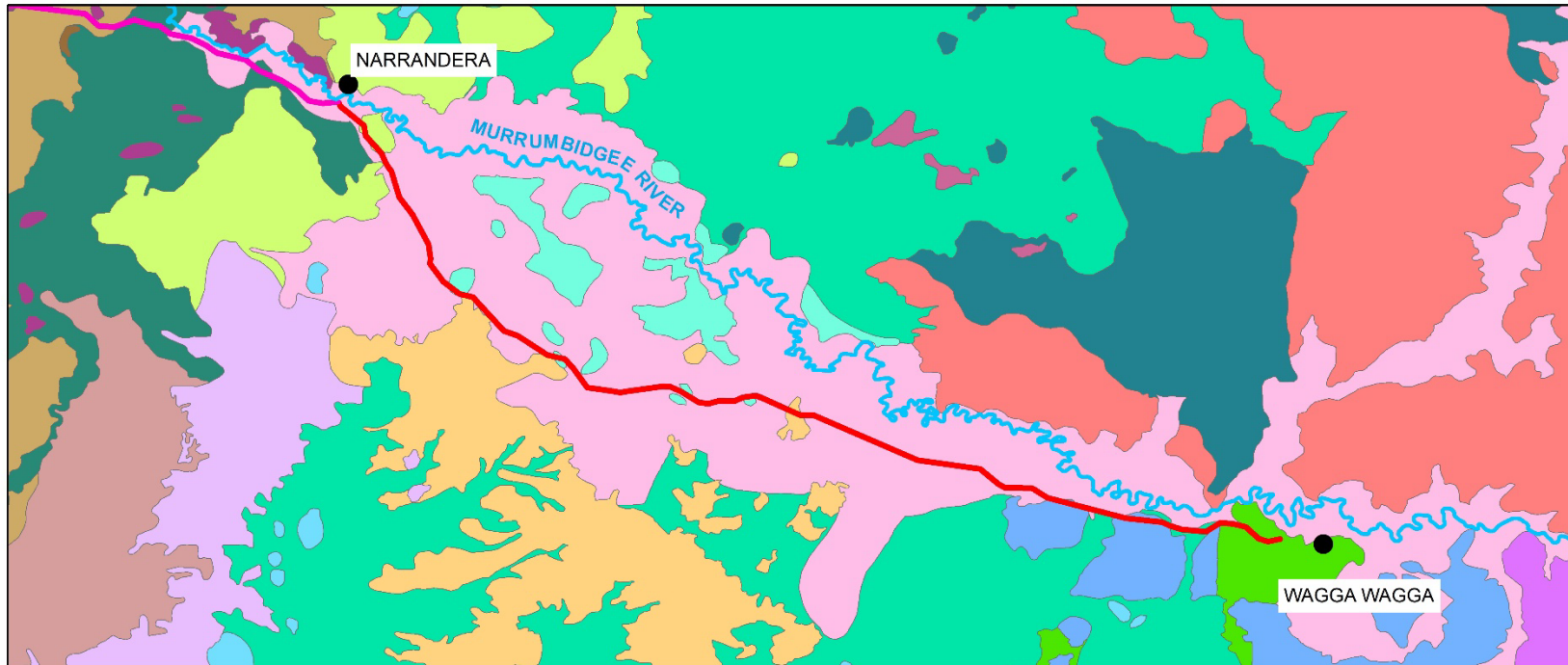


Figure 6-6: Mitchell landscapes within section 1 of the proposal

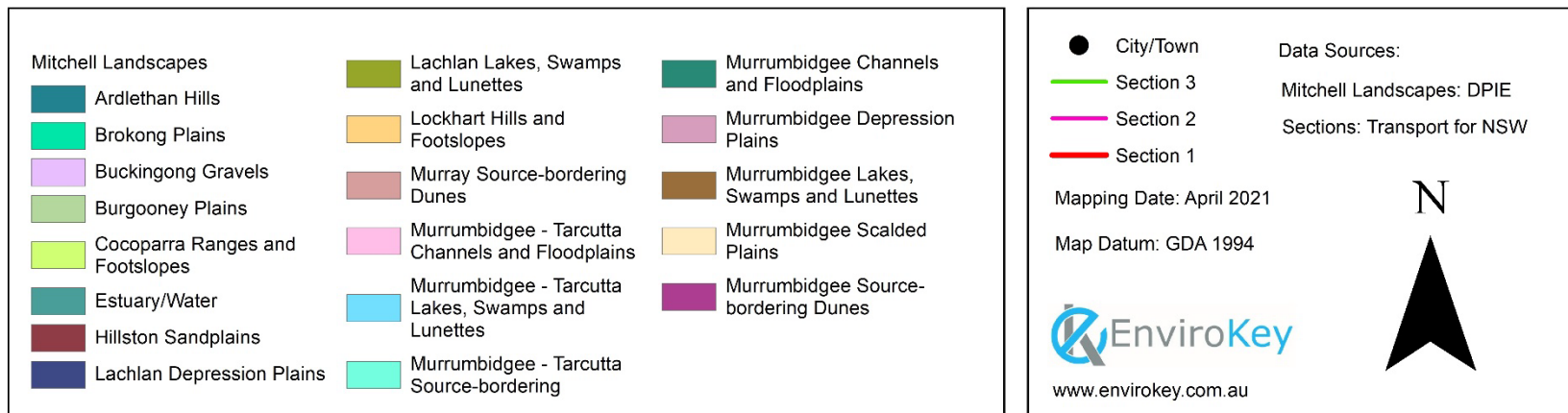
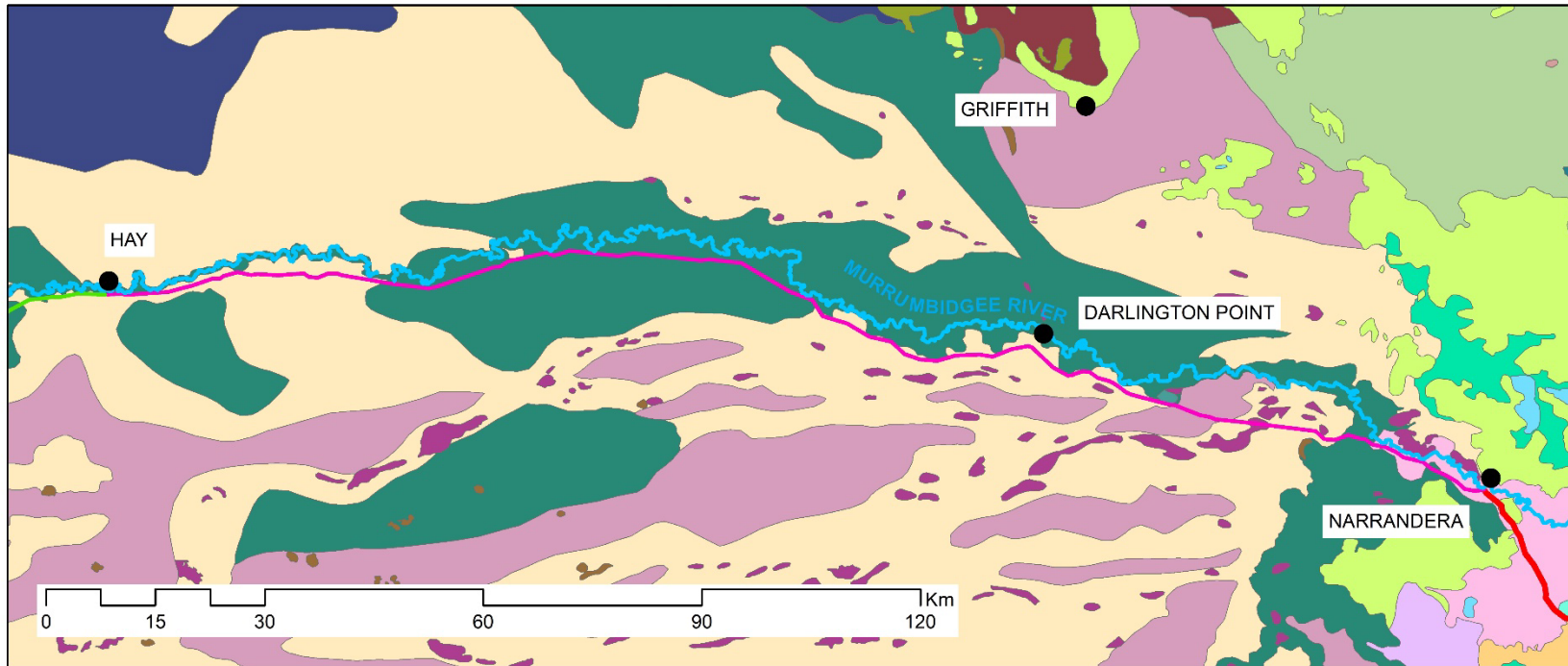


Figure 6-7: Mitchell landscapes within section 2 of the proposal

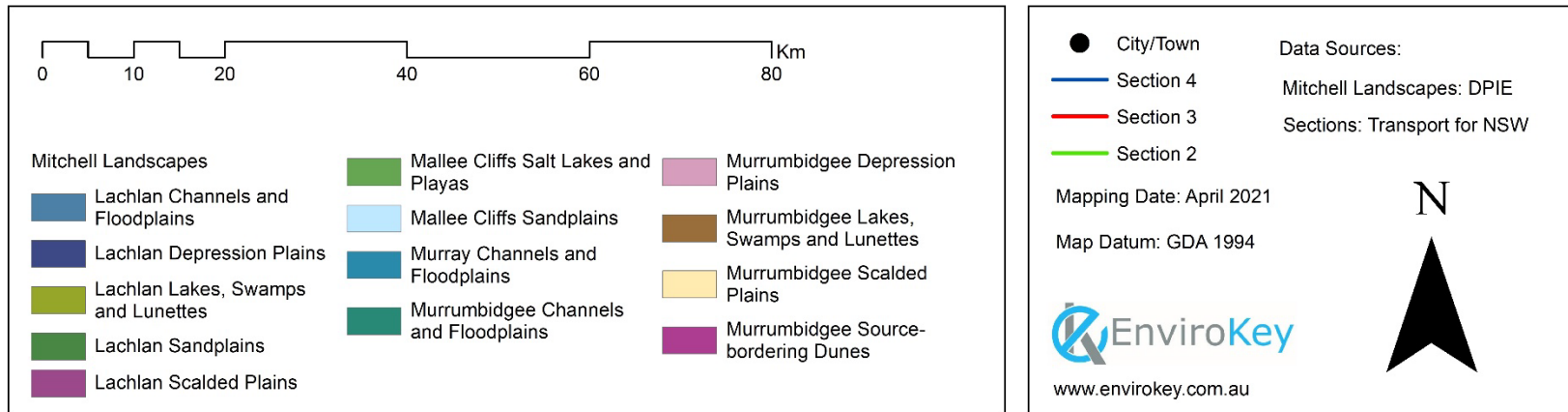


Figure 6-8: Mitchell landscapes within section 3 of the proposal

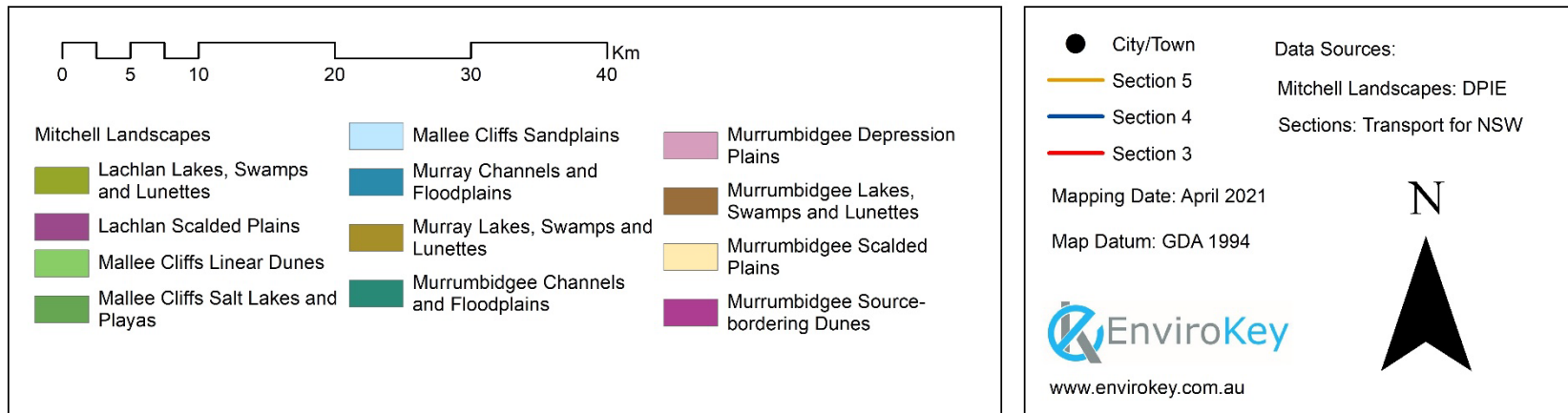
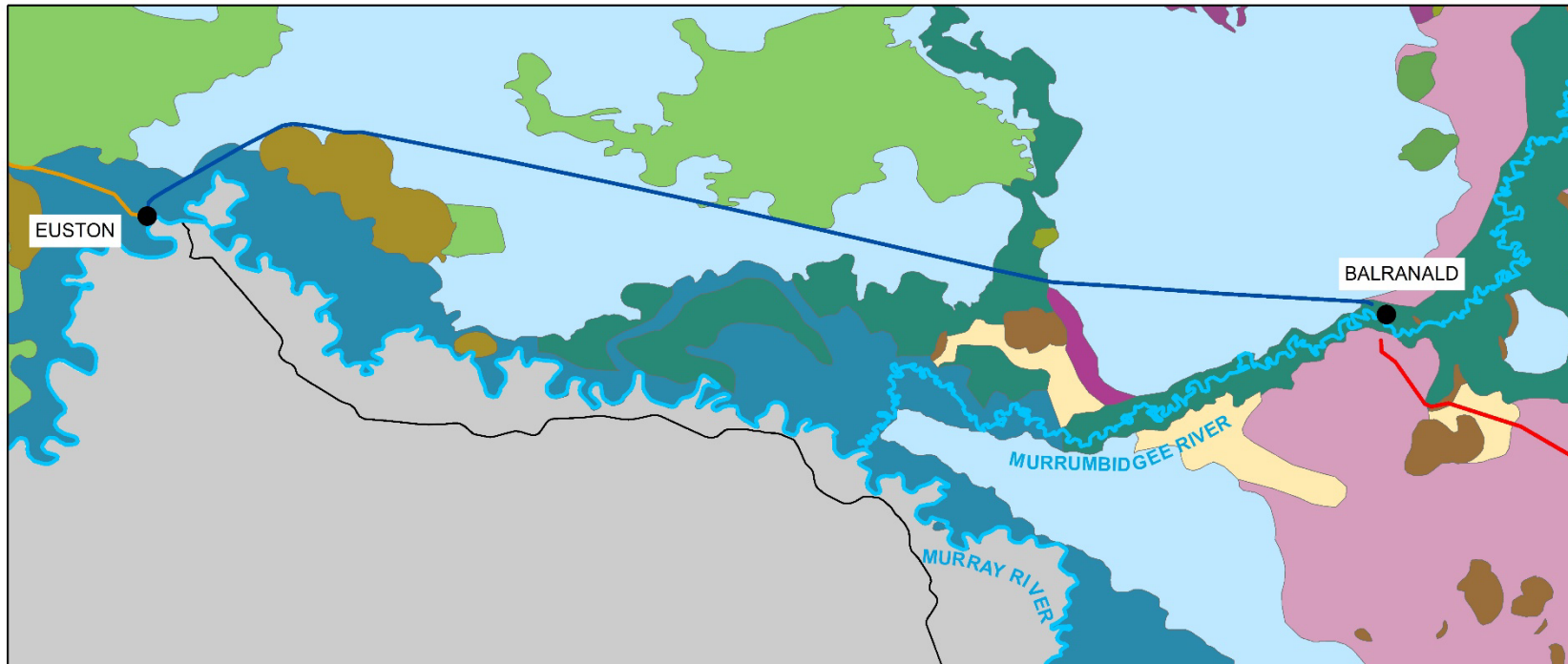


Figure 6-9: Mitchell landscapes within section 4 of the proposal

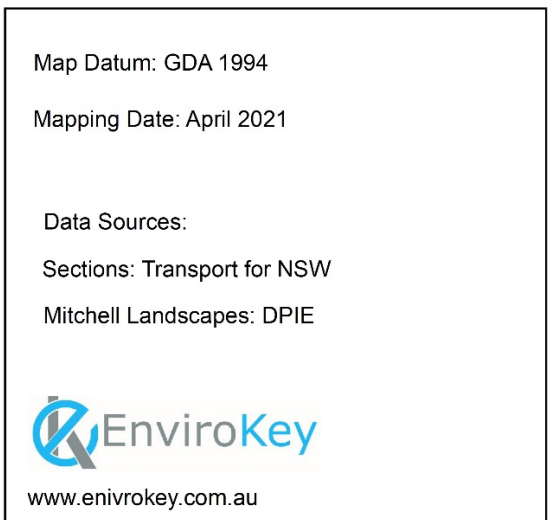
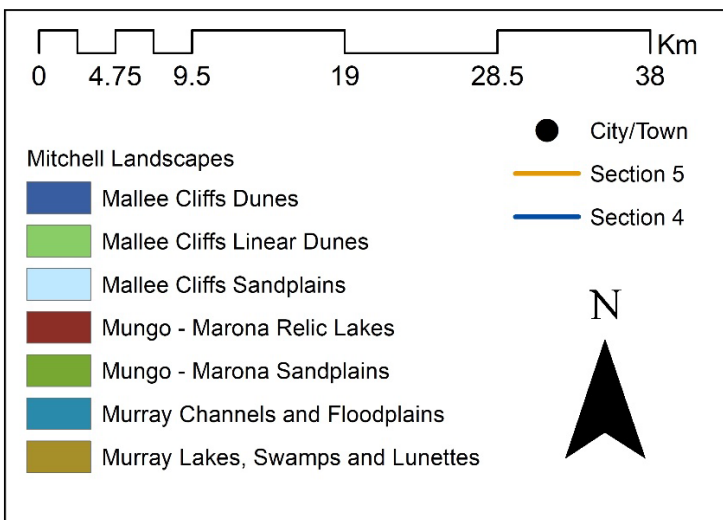
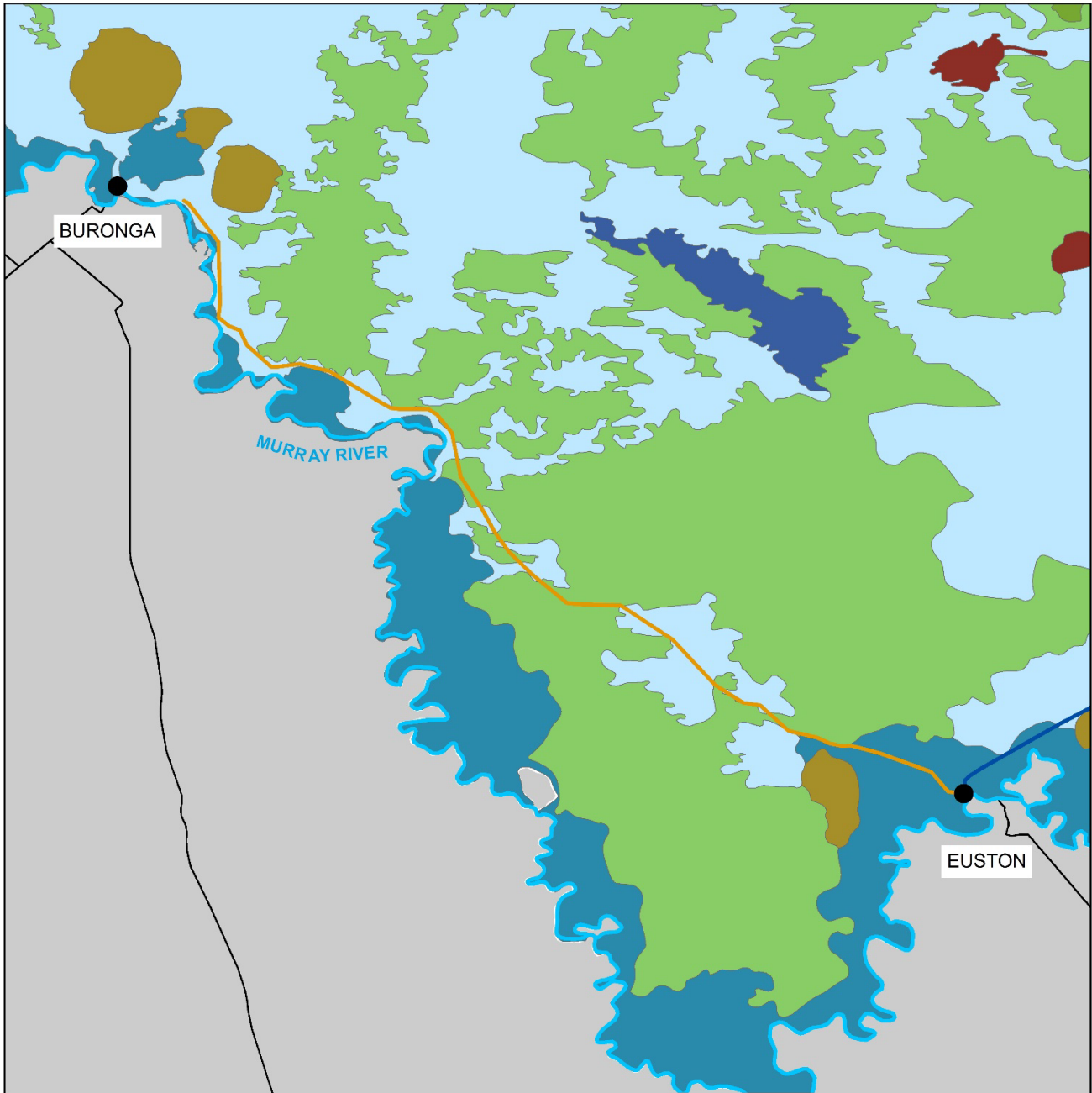


Figure 6-10: Mitchell landscapes within section 5 of the proposal

6.5 Traffic and transport

6.5.1 Existing environment

The Sturt Highway provides a state highway link between the Hume Highway to Buronga in NSW, and extending through to Adelaide in South Australia. As expected over a 550 kilometre proposal length, there are thousands of private property accesses consisting of partially sealed and gravel surfaces and hundreds of intersections with other highways, main roads and local roads. Traffic count data is recorded at two locations within the proposal (Euroley and Balranald) with these stations recording about 1,235 and 1,068 vehicles per day respectively, with heavy vehicles making up about 50 percent of those.

6.5.2 Potential impacts

Construction

The proposal would require the temporary closure of one lane as work proceeds on one side of the road. For example, the west bound lane would be closed, with a contraflow put in place with traffic control at either end directing west bound traffic into the east bound lane. This would disrupt traffic flow at the proposal site causing short delays for traffic. These short delays would only be temporary for the length of time taken to complete the proposal. Short, temporary delays are also anticipated at the access point to any stockpile site.

Operation

There would be no operational impacts as a result of the proposal.

6.5.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	<p>A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the <i>Traffic Control at Work Sites Manual</i> (RTA, 2010) and <i>QA Specification G10 Control of Traffic</i> (Roads and Maritime, 2008). The TMP will include:</p> <ul style="list-style-type: none">• A road occupancy licence (ROL)• measures to maintain access to local roads and properties• site specific traffic control measures (including signage) to manage and regulate traffic movement	Project Engineer	Detailed design / Pre-construction	Section 4.8 of QA G36 <i>Environment Protection</i>

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<ul style="list-style-type: none"> 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. 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 monitoring, review and amendment mechanisms. 			

6.6 Noise and vibration

6.6.1 Existing environment

The existing environment is characterised by undulating agricultural areas closer to Wagga Wagga with the landscape becoming increasingly flat to the west. In some areas, linear rises occur close to major rivers providing additional undulation. Along the length of the proposal, it is estimated that there would be more than 1000 residences. For those receivers closer to the highway, the general background noise levels are expected to be moderate in the context of existing highway traffic.

Generally, the existing environment near the proposal is mostly influenced by road traffic and bird and animal noise with the established background noise level reflective of the relatively quiet surrounds typical of rural settings. Along the Sturt Highway, a reasonably moderate level of traffic consisting of light and heavy vehicles would contribute most to this existing environment.

With consideration of the Transport Construction and Maintenance Noise Estimator, the noise category based on AS 1055.3-1997 is R1. Based on R1, relative background noise levels (RBL (LA90) during the day would be 40 dBA, 35 dBA during the evening, and 30 dBA during the night. It is expected that the noise levels experienced at the sensitive receivers would be lower than this, given that they are a further distance from the existing road pavement. Background noise levels near the proposal are considered to be moderate with consideration of the proximity to the road.

6.6.2 Potential impacts

Work associated with the proposal would be carried out near residences located in a rural setting but at varied distances and aspects from the construction work. Construction activities would likely result in an

increase in noise levels for residences located in close proximity due to the operation of construction machinery. The *Interim Construction Noise Guidelines* (2009) sets out management levels for construction noise while the NSW EPA *Road Noise Policy* (2011) guides the road traffic noise assessments.

Noise impacts associated with the proposal would only occur for the construction period. Therefore, the potential noise levels as a result of the proposed work would be considered the worst-case scenario at the closest receiver. Additionally, the noise levels of individual machinery and/or activities would be below the interim guidelines and it is unlikely that all plant would be used at the same time. Therefore, any potential impacts are unlikely to be significant in the short term. Table 6-3 below summarises the noise level estimates using the Transport estimator based on various relevant scenarios to the closest receiver to the proposal based on 28 metres.

Table 6-3: Estimate of noise levels to closest receiver (28 metres) to the proposal using the Transport Construction and Maintenance Noise Estimator and adopting the R1 noise environment assuming line of site.

SCENARIO	TOTAL SPL LAeq (15minute) (dBA)
Site establishment	72
Compound site establishment	76
Compound operation	71
Corridor clearing	78
Utility, property and service adjustment	73
Drainage infrastructure	72
Bulk earthworks	80
Profiling	74
Local road works	77
Paving/asphalting	70
Road furniture installation	67

Based on the estimated noise impacts identified in Table 6-3 for the closest sensitive receiver to the proposal (28 metres), the daytime level is 27 dBA above the noise management level for standing working hours using the ‘road furniture installation’ scenario. This confirms that notification and verification safeguards are required should work be carried out in Standard Working Hours. Additional measures would be required for OOHW. There will be some operational noise from the audio tactile line marking (ATLM). However, no ATLM would be placed within 300 metres of a residence.

To identify when additional measures are required based on distance, this REF assessed the representative distance for various scenarios based on the R1 representative noise environment for when notification and verification measures during standard hours are not required (Table 6-4).

Table 6-4: Representative distance identified using the Transport Construction and Maintenance Noise Estimator and adopting the R1 noise environment assuming line of site for when no additional mitigation measures are needed for work in standard hours

SCENARIO	Representative Distance for when no additional mitigation measures (notification and verification) are needed for work in Standard hours (metres)
Site establishment	132
Compound site establishment	181
Compound operation	121
Corridor clearing	211
Utility, property and service adjustment	143
Drainage infrastructure	132
Bulk earthworks	246
Profiling	154
Local road works	195
Paving/asphalting	112
Road furniture installation	84

6.6.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Noise and vibration	<ul style="list-style-type: none"> Works would be carried out during normal working hours (ie, 7am to 6pm Monday to Friday; 8am to 1pm Saturdays). OOHW may also be required and would be managed in accordance with Transport guidelines. Noise impact will be minimised in accordance with Transport Noise Mitigation Guidelines Measures including allowing adequate distance that rollers can come to adjacent buildings and/or using non-vibrating rollers will be used 	Project Engineer	Construction	Section 4.6 of QA G36 <i>Environment Protection</i>

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<p>to minimise or prevent vibration impact</p> <ul style="list-style-type: none"> All plant must be shut down when not in use and parked / started as far as possible from sensitive receivers Where practical, site noise must be minimised including radio use, yelling, impact noise, simultaneous noise and plant operation. 			
Noise and vibration	<p>All sensitive receivers likely to be affected will be notified at least 7 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:</p> <ul style="list-style-type: none"> the project the construction period and construction hours contact information for project management staff complaint and incident reporting how to obtain further information. 	Project Engineer	Detailed design / pre-construction	
Noise and vibration	All noise complaints will be investigated and mitigation measures implemented where feasible. Consideration of noise	Project Engineer	Construction	

6.7 Non-Aboriginal heritage

6.7.1 Existing environment

To enable an understanding of the existing environment, a search of relevant online databases was carried out in April and May 2021. The databases consulted included:

- EPBC Act Protected Matters Search Tool (Appendix 6) within a 10 kilometres radius of the proposal (DoE, 2021)
- Australian Heritage Database (Wagga Wagga City Council, Leeton Shire Council, Narrandera Shire Council, Murrumbidgee Council, Hay Shire Council, Balranald Shire Council, Wentworth Shire Council and using the term 'Sturt Highway') (AHPI, 2021)
- State Heritage Inventory (using the term 'Sturt Highway')
- s.170 NSW State Agency Heritage Register, using the term 'Sturt Highway'(OEH, 2021c).

The relevant results of the searches are provided in Appendix 4.

Along the Sturt Highway, 21 heritage items were identified from the NSW State Heritage Inventory which includes local government and state government listings. Additional listings were also identified on the Australian Heritage Database. By removing the listings that are located east of Wagga Wagga and west of Gol Gol (outside of the proposal), 16 items are of relevance to this REF (Table 6-5).

Table 6-5: Non-aboriginal heritage items, their listing status and relevant section of the proposal

Item Name	Listing Status	Relevant Section of the proposal
Arajoel Homestead Complex	Wagga Wagga LEP	Section 1
Bullenbong Creek Bridge	S170 register	Section 1
Cottage and Pise Building	Wagga Wagga LEP	Section 1
Dry Lagoon Area	Register of the National Estate (non-statutory)	Section 2
Lake Benanee Burial Ground	Balranald LEP	Section 3
Narrandera Rail Bridge	Register of the National Estate	Section 2
Poisoned Waterholes Creek Bridge	Narrandera LEP	Section 1
Pomingalarna	Wagga Wagga LEP	Section 1
Sandigo Hall	Narrandera LEP	Section 1
The Homestead	Murrumbidgee LEP	Section 2
Timber Bridge	Wagga Wagga LEP	Section 1
Toganmain Woolshed Precinct	Murrumbidgee LEP	Section 2
Tubbo Station	Murrumbidgee LEP Register of the National Estate (non-statutory)	Section 2
Yanco Creek Bridge	Leeton LEP	Section 2
Yarragundry School (former)	Wagga Wagga LEP	Section 1
Yarragundry Woolshed	Wagga Wagga LEP	Section 1

6.7.2 Potential impacts

The proposed activity is located fully within the existing road reserve. Given this, the proposal is unlikely to have a significant effect on heritage items or curtilages of heritage items. Additionally, no stockpile or compound sites would be located on land identified as heritage items.

6.7.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Non-Aboriginal heritage	<ul style="list-style-type: none"> No machinery or materials for the proposal would be placed near any heritage item listed in Table 6-5. <i>The Standard Management Procedure - Unexpected Heritage Items</i> (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. Work will only re-commence once the requirements of that Procedure have been satisfied. 	Project Engineer/Work Supervisor	Detailed design / pre-construction	Section 4.10 of QA G36 <i>Environment Protection</i>

6.8 Landscape character and visual impacts

6.8.1 Existing environment

The existing environment and the potential impact of the proposal is considered in the context of the Transport *Landscape character and visual amenity Guidance Note* (EIA-N04).

Landscape Character

The landscape character is predominantly an open modified landscape that has been shaped by historical clearing and generally consist of agricultural land with scattered native vegetation and non-native vegetation. As with many areas in western and southern NSW, the road corridor in many instances contains the majority of native vegetation in the direct vicinity of the highway. However, in many areas along the proposal, extensive stands of native vegetation do occur.

Structures within the landscape generally comprise dwellings and agricultural sheds. The Sturt Highway generally runs east-west through this rural landscape. Examples of the general landscape are provided (Figure 6-11 & Figure 6-12).



Figure 6-11: Example of vegetation close to the existing road near Sandigo (section 1)



Figure 6-12: The Hay Plains. This is 57 kilometres east of Balranald (section 3).

Visual Catchment

The visual catchment of the proposed work is defined by the area within which the work would be clearly visible. Topography and large tracts of vegetation has an influence on the visual catchment and in many parts of the proposal, the land is generally flat and has some native vegetation.

For the purpose of this REF, the primary zone is considered the area that includes properties in close proximity to the site of the proposed work as well as immediately adjacent the site to road users. The secondary zone covers properties and places that will have distant views of the proposed work.

6.8.2 Potential impacts

Landscape Character

The proposal would be visible to motorists travelling on the road and those in adjoining properties. However, these impacts would be minimal in the context of the wider open landscape. The magnitude of the project is therefore considered to be low, giving a rating of low impact on landscape character.

Visual Catchment

The potential level of impacts is detailed in Table 6-6. This table details the magnitude of the proposed work in terms of visual change in the landscape, as well as the degree of sensitivity based on the quality of the view. A rating is then given based on magnitude and sensitivity.

Table 6-6: Summary of potential impacts

Setting	Magnitude	Sensitivity	Rating
Landscape Character	Low	Moderate	Low
Visual Catchment	Low	Moderate	Low

The potential visual amenity impacts of the proposed work would include the removal of vegetation (native and introduced) and exposed soil surfaces. The removal of native vegetation (trees and groundcover) would expose areas of bare soils, which would represent a short-term, temporary change to visual amenity while regeneration occurs. Exposure of soils can also increase the potential for weeds to spread due to the disturbance which is often beneficial to many of these species. The properties most affected by the proposed work are those in the primary zone and those directly adjacent to the proposal. Other viewpoints within the primary zone should experience low impact largely due to landscape character and the presence of screening vegetation.

Residents and road users would be the main receivers of these changes to the visual amenity. Road users would only be subject to fleeting views as they pass the proposal. Given these factors, the magnitude of the potential impact is considered to be low overall.

The proposed works are unlikely to degrade the existing landscape character of the locality, given the relatively minor nature of the proposal in context of the surrounding land and the landscape which covers a proposal length of 550 kilometres.

6.8.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Landscape character and visual impact	<ul style="list-style-type: none"> Landscaping is to be managed in accordance with Roads and Maritime Landscape guideline, 2013 	Project Engineer/Work Supervisor	Post-construction	

6.9 Blasting

Consistent with recent approvals for NSW infrastructure projects, vibration and overpressure limits for blasting are expected to be:

- Vibration (PPV): 10 millimetres per second
- Overpressure: 120 dBL.

Heritage buildings and structures are not to be assumed to be more sensitive to vibration unless they are found to be structurally unsound. Where heritage buildings and structures are found to be structurally unsound, a more conservative cosmetic damage objective of 2.5 mm/s PPV (from DIN 4150) would be adopted.

If blasting is proposed, blasting limits, including for overpressure and ground vibration, will be confirmed in a project specific Blast Management Plan.

The proposal does not involve blasting or other activity that is likely to generate significant ground vibration or air overpressure impacts at nearby receivers.

6.9.1 Potential impacts

Blasting can be used as an alternative to rock breaking and may shorten the duration of noisy rock breaking activities. Blasting has the potential to result in brief ground vibration and air overpressure impacts at nearby receivers.

The level of vibration would be controlled by adjusting the amount of explosive that is detonated at any instant having regard to the distance to nearby receivers. Airblast is the pressure wave produced by the blast and transmitted through the atmosphere and can again be controlled by the blast size and by having regard to receiver distances and weather conditions.

Details of procedures to manage both vibration and airblast impacts would be included in a Blast Management Plan. Must comply with “Technical Procedure TP-R044C Earthworks – Blasting”

6.9.2 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Blasting	Should blasting be required, a Blasting Management Plan (BMP)	Project Engineer	Construction	Additional measure

Impact	Environmental safeguards	Responsibility	Timing	Reference
	would be prepared. At a minimum, the BMP would include: <ul style="list-style-type: none"> • Applicable blast criteria • Review of associated risks • Blast design and execution • Mitigation measures • Compliance management 			
Blasting	Restrict blasting operations to the detail of Technical Procedure TP-RO44C Earthworks – Blasting	Preject Engineer	Construction	Additional measure

6.10 Socio-economic

6.10.1 Existing environment

The Sturt Highway is an important freight haulage road and therefore has a high proportion of heavy vehicle usage. Primarily the highway is for interstate and regional commuter travel and for goods brought along the Sturt Highway to Sydney including fresh produce from the region.

While the Sturt Highway along the 550-kilometre length of the proposal has extensive land use, the dominant land use is agricultural grazing and cropping. Numerous state highways, main roads and local roads intersect the Sturt Highway, and there are likely to be thousands of property access points along the proposal length. Closer to towns, the Sturt Highway is likely to have daily commuters travelling to Wagga Wagga, Narrandera, Leeton, Balranald, Hay, Euston, Mildura, Buronga, Robinvale and other towns and regional centres for work.

24 roadside memorials were identified along the proposal Figure 6-13 to Figure 6-17. The locations of these are detailed in Appendix 3 on Figure 3-1 to Figure 3-54 and the number within each section provided in Table 6-7.

Table 6-7: Number of roadside memorials identified within each section of the proposal

Section of the proposal	No of roadside memorials identified
1	6
2	5
3	5
4	4
5	4



Roadside memorial no. 1



Roadside memorial no. 2



Roadside memorial no. 5



Roadside memorial no. 4

Figure 6-13: Examples of roadside memorials in section 1



Roadside memorial no. 1



Roadside memorial no. 2



Roadside memorial no. 3



Roadside memorial no. 4



Roadside memorial no. 5

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Figure 6-14: Examples of roadside memorials in section 2



Roadside memorial no. 1



Roadside memorial no. 2



Roadside memorial no. 3



Roadside memorial no. 4



Roadside memorial no. 5

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Figure 6-15: Examples of roadside memorials in section 3



Roadside memorial no. 1



Roadside memorial no. 2



Roadside memorial no. 3



Roadside memorial no. 4

Figure 6-16: Examples of roadside memorials in section 4

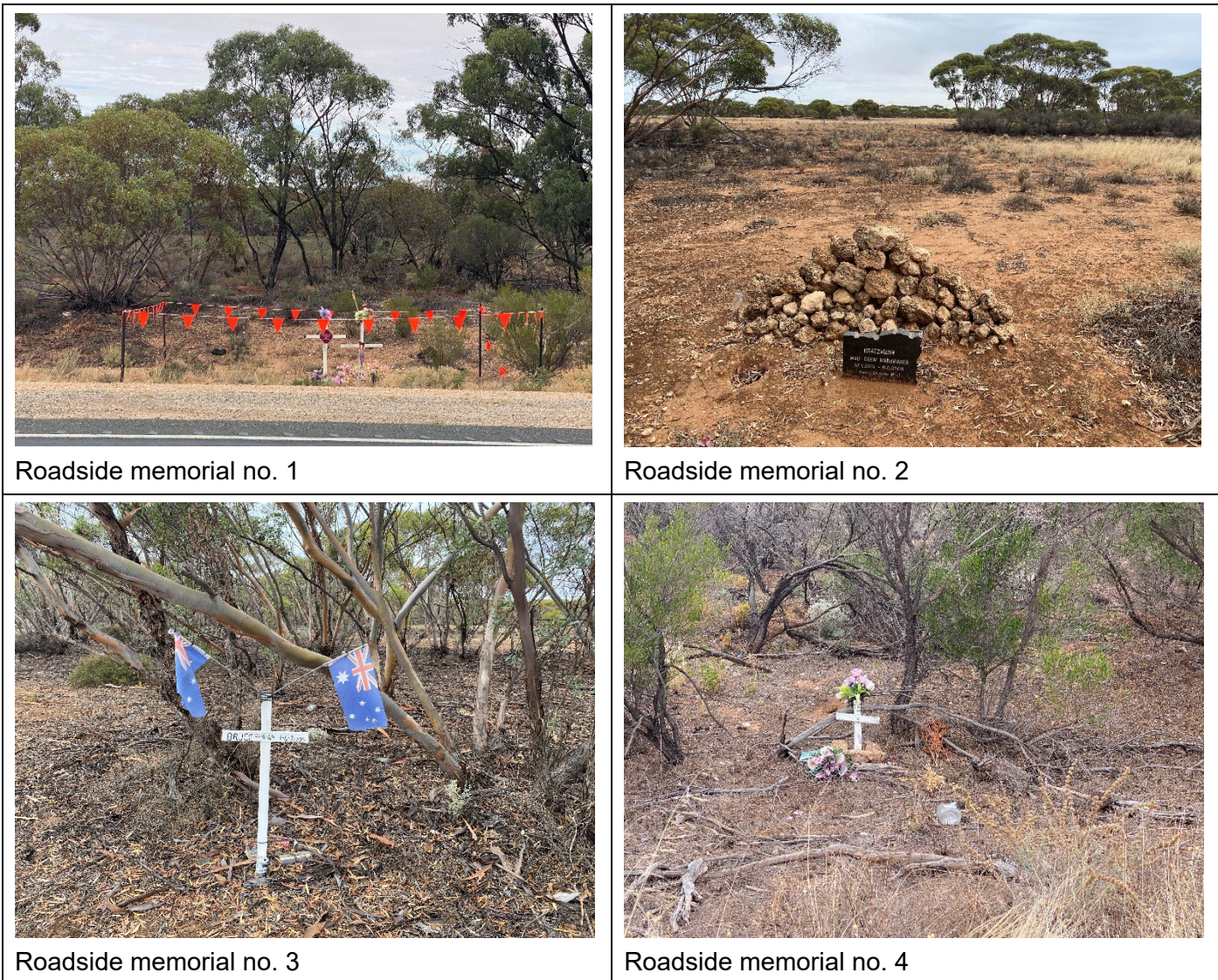


Figure 6-17: Examples of roadside memorials in section 5

6.10.2 Potential impacts

The potential impact to socio-economic factors that are related to this proposal include the disruption to local businesses and farmers reducing their ability operate on a normal basis and delays in commuter travel times. This would be associated with the traffic disruptions caused by the proposed work.

These disruptions are considered to be minor and offset by the improvement in the road safety which would increase safety of the road in the long term. The mitigation measures to minimise the impact including a traffic management plan have been considered further in Section 6.4 - Traffic and Transport.

Any potential impact to any tribute would only be in accordance with the Transport *Roadside Tribute Policy (PN148)*.

6.10.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Socio-economic	Potential impact to any roadside tribute must only be in accordance with the Transport Roadside Tribute Policy (PN148).	Project Engineer/Work Supervisor	Pre-construction	
	All complaints are to be recorded on a complaint register and attended to promptly	Project Engineer/Work Supervisor	Construction	
	Existing access for nearby and adjoining properties is to be maintained at all times during the works unless otherwise agreed to by the affected property owner.	Project Engineer/Work Supervisor	Construction	
	Local council will be consulted prior to removal of any native tree plantings	Project Engineer/Work Supervisor	Pre-construction	Socio-economic

6.11 Other impacts

6.11.1 Existing environment and potential impacts

Environmental factor	Existing environment	Potential impacts
Air quality	<p>A review of the National Pollutant Inventory website (http://www.npi.gov.au) revealed that there are no listed sources of pollution within the locality of the proposal.</p> <p>Given that there are no pollution sources listed in the locality, there are unlikely to be any large scale facilities that affect air quality within the vicinity of the proposal. It is likely that dust and exhaust fumes from vehicular traffic from the Sturt Highway would be the main source of air pollution in the vicinity of the proposal given the rural setting. Accordingly, air quality within the vicinity of the proposal is considered to be moderate to good.</p>	<p>The proposal would be unlikely to generate significant dust or air quality impact. Small quantities of dust could occur from cutting and filling activities. Stockpiled material may also generate dust. There is the potential that a lime spreader would be utilised where needed for the proposal. Levels of dust are unlikely to impact any private residences.</p> <p>Construction equipment and plant used on site would emit exhaust fumes and would contribute to local air quality. However, in the context of the existing vehicular movements along the Sturt Highway, this is expected to be negligible.</p>
Waste	<p>Transport are committed to ensuring responsible management of unavoidable waste and to promoting the reuse of such waste through appropriate measures. This is done in accordance with the resource management hierarchy principles contained in the <i>Waste Avoidance and Resource Recovery Act 2001</i>. The resource management hierarchy principles in order of priority as outlined in the <i>Waste Avoidance and Resource Recovery Act 2001</i> are:</p> <ul style="list-style-type: none"> • Avoidance of unnecessary resource consumption • Resource recovery (including reuse, reprocessing, recycling and energy recovery) • Disposal. 	<p>The proposed work is expected to result in the following waste, some of which would be able to be recycled or reused:</p> <ul style="list-style-type: none"> • Excess or unsuitable excavated materials • Paper and office waste from project management activities • Waste from staff and construction personnel (food, packaging) • Vegetation removed from the road corridor • Redundant barrier rail <p>The proposed work would result in the use of a number of resources, including but not limited to:</p> <ul style="list-style-type: none"> • Bitumen • Concrete

Environmental factor	Existing environment	Potential impacts
	By adopting the above principles, Transport encourages the most efficient use of resources and reduces cost and environmental harm in accordance with the principles of ESD.	<ul style="list-style-type: none"> • Select fill • Water • Resources associated with the operation of construction machinery, and motor vehicles.

6.11.2 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Air quality	<ul style="list-style-type: none"> • Construction activities will be managed to minimise the emission of dust, smoke, and other substances. • Exposed surfaces will be watered regularly to minimise dust emissions. • Clearing of natural vegetation will be minimised where possible. • During periods of high winds, dust generating activities will cease. • Stabilisation of disturbed surfaces will take place as soon as practicable. • Stockpiles or areas that may generate dust will be managed to suppress dust emissions in accordance with Roads and Maritime Stockpile Site Management Guideline (RTA 2011a). • Plant and machinery will be turned off when not in use as much as possible and will be fitted with emission control devices complying with Australian Design Standards where practicable. • Construction plant and equipment will be maintained in a good working condition in order to limit impacts on air quality. • No burning of any materials will occur. 	Project Engineer/Work Supervisor	Construction	Section 4.4 of QA G36 <i>Environment Protection</i>
Waste	<p>A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to:</p> <ul style="list-style-type: none"> • measures to avoid and minimise waste associated with the project 	Contactor	Detailed design / pre-construction	Section 4.2 of QA G36 <i>Environment Protection</i>

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<ul style="list-style-type: none"> • classification of wastes and management options (re-use, recycle, stockpile, disposal) • statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions • procedures for storage, transport and disposal • monitoring, record keeping and reporting. <p>The WMP will be prepared taking into account the <i>Environmental Procedure - Management of Wastes on Roads and Maritime Services Land</i> (Roads and Maritime, 2014) and relevant Transport Waste Fact Sheets.</p>			
Waste	<p>Resource management hierarchy principles will be followed:</p> <ul style="list-style-type: none"> - Avoid unnecessary resource consumption as a priority. - Recover resources as far as is practicable (including reuse of materials, reprocessing, and recycling and energy recovery). - Disposal is undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001). 	Project Engineer/Works Supervisor	Construction	Waste
Waste	<ul style="list-style-type: none"> • Bulk project waste (eg fill) sent to a site not owned by Transport (excluding EPA licensed landfills) for land disposal is to have prior formal written approval from the landowner in accordance with Transport Environment Technical Direction ETD 20151020 • If coal tar asphalt is identified and is to be removed, it is to be disposed of to landfill in accordance with Transport Environmental Direction No.21 – Coal Tar Asphalt Handling and Disposal. • All waste will be disposed of at appropriately approved and licensed facilities. • Cleared weed free vegetation will be mulched and reused on-site to stabilise disturbed soils where possible. Weedy mulch will either be composted to sterilise propagules and seeds, or not reused. • Waste will not be burned at the site • All wastes will be managed and disposed of in accordance with the Waste Classification Guidelines (DECC 2008b) and managed in accordance with the POEO Act 	Project Engineer/Works Supervisor	Construction	Waste

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<ul style="list-style-type: none"> • Garbage receptacles will be provided and recycling of materials encouraged. Rubbish will be transported to an appropriate waste disposal facility • Where appropriate, excess roadside materials will be disposed of according to the following (in order): <ul style="list-style-type: none"> - Transfer to nearby Transport projects for immediate use. - Transfer to an approved Transport stockpile site for future use during projects or routine maintenance. - Transfer to a Transport approved site for reuse on concurrent private/local government project. - Disposal at an approved materials recycling or waste disposal facility. - As otherwise provided for by the relevant waste legislation. • Waste material, other than vegetation and tree mulch, will not be left on site once the works have been completed. 			

6.12 Cumulative impacts

6.12.1 Broader program of work

The proposal is part of a broader program of work to carry out safety improvement work along the Sturt Highway. This would result in a significant safety improvement for road users.

6.12.2 Potential impacts

Environmental factor	Construction	Operation
Biodiversity	Impacts to biodiversity for other proposals along the Sturt Highway are likely to occur as a result of ongoing safety improvement works. This would be both permanent and temporary impacts.	It is unlikely that cumulative impact from operations would occur.

6.12.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	Biodiversity impacts would be mitigated or offset in accordance with the TfNSW guideline for biodiversity offsets.	Project Engineer	As determined in the Biodiversity Offset Strategy	

7. Environmental management

7.1 Environmental management plans

A number of 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 proposal. Should the proposal 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 proposal and must be reviewed and certified by the Transport Environment and Sustainability Manager, South West, 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 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 proposal, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works 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
GEN1	General - minimise environmental impacts during construction	<p>A CEMP will be prepared and submitted for review and endorsement of the Transport Senior Environment and Sustainability Officer prior to commencement of the activity.</p> <p>As a minimum, the CEMP will address the following:</p> <ul style="list-style-type: none"> any requirements associated with statutory approvals details of how the project will implement the identified safeguards outlined in the REF issue-specific environmental management plans roles and responsibilities communication requirements induction and training requirements procedures for monitoring and evaluating environmental performance, and for corrective action reporting requirements and record-keeping procedures for emergency and incident management procedures for audit and review. <p>The endorsed CEMP will be implemented during the undertaking of the activity.</p>	Project Engineer	Pre-construction / detailed design	QA G36 Environment Protection

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
GEN2	General - notification	All businesses, residential properties and other key stakeholders (eg schools, local councils) affected by the activity will be notified at least seven days prior to commencement of the activity.	Contractor / Transport project manager	Pre-construction	
GEN3	General – environmental awareness	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular "toolbox" style briefings. Site-specific training will be provided to personnel engaged in activities or areas of higher risk.	Project Engineer	Pre-construction / detailed design	
BIO1	Biodiversity	<ul style="list-style-type: none"> The limit of works (including compounds and parking areas) must be clearly and physically demarcated with flagging/fencing or similar Limit of clearing fencing must be placed around any threatened flora locations with an appropriate buffer distance as determined by the Environment and Sustainability Officer or Ecologist No work of any kind would take place in the identified population of Pine Donkey Orchid. All personnel would be made aware of Pine Donkey Orchid and Santalum murrayanum given their known presence within the road corridor. This should be part of tool-box talks to all onsite personnel An Environmental Work Method Statement for Clearing and Grubbing must be prepared and approved by the Environment and Sustainability Officer prior to starting work. The EWMS must include at least the following 	Project Engineer	Prior to construction	QA G36 Environment Protection

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> - A description of the work activity, including any plant and equipment to be used - Identification of any environmentally sensitive areas - The sequence of tasks for the activity - Identification of potential environmental risks/impacts due to the activity - Mitigation measures to reduce the identified environmental risk, including assigned responsibilities to site personnel - A process for assessing the performance of the implemented mitigation measures (performance outcomes) - A detailed site diagram showing all work areas, controls, sensitive areas, and no-go-zones - A process for monitoring and managing wet weather events during works All site personnel must sign-on to the EWMS and be aware of their responsibilities within the EWMS. 			
BIO2	Biodiversity	<ul style="list-style-type: none"> • Only vegetation assessed within this REF is to be removed. Should any additional clearing be necessary, further onsite assessment is required • Parking options should be limited to existing hard stand areas • Native vegetation removal will be minimised through detailed design. 	Project Engineer	During construction	QA G36 Environment Protection

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> • Pre-clearing surveys will be undertaken in accordance with <i>Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)</i>. • Vegetation removal will be undertaken in accordance with <i>Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)</i>. • All pathogens (eg Chytid, Myrtle Rust and Phytophthora) are to be managed in accordance with the Transport Biodiversity Guidelines – Guide 7 (Pathogen Management) and DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora). • Pruning of mature trees is to be in accordance with Part 5 of the Australian Standard 4373-2007 Pruning of amenity trees. • Biodiversity impacts would be mitigated or offset in accordance with the TfNSW guideline for biodiversity offsets • Removal of any HBT would only be carried out in accordance with a HBT Removal Procedure. The Procedure must specifically include actions to minimise potential impacts to Superb Parrot, Squirrel Glider and microchiropteran bats and must include procedures for supervision, salvage and relocation by a suitable qualified and experienced person. • Any Grey-crowned Babbler nests would be the subject of a pre-clearance survey to determine if breeding is occurring. Should breeding be present, works should 			

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p>be temporarily postponed to avoid direct impacts during any breeding event. Should this be unavoidable, any offspring within the nest can be salvaged and directed to a suitably qualified and experienced person for raising.</p> <ul style="list-style-type: none"> • Habitat removal will be undertaken in accordance with <i>Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)</i>. • The unexpected species find procedure is to be followed under <i>Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) if threatened fauna, not assessed in the biodiversity assessment, are identified in the proposal site</i>. • Fauna will be managed in accordance with <i>Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)</i> • Prior to clearing any vegetation within PCT 2 or PCT 11 within section 1 and section 2, an ecologist must be onsite to confirm that Koala are not present within the proposed impact area. Should any Koala be observed, any proposed work within 50 metres of any individual sighted must cease • No work is to be carried out within any of the waterways within the road reserve Aquatic habitat will be protected in accordance with <i>Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity on</i> 			

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p><i>RTA projects (RTA 2011)</i> and Section 3.3.2 Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013 (DPI (Fisheries NSW) 2013).</p> <ul style="list-style-type: none"> The unexpected species find procedure is to be followed under <i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011) if threatened flora or fauna, not assessed in the biodiversity assessment, are identified in the proposal site Declared priority weeds are to be managed according to requirements under the Biosecurity Act, 2015 and <i>Guide 6 (Weed Management) of the Roads and Maritime Services Biodiversity Guidelines 2011</i> 			
ABR1	Aboriginal Cultural Heritage	<ul style="list-style-type: none"> <i>The Standard Management Procedure - Unexpected Heritage Items</i> (Roads and Maritime, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport does not have approval to disturb the object/s or where a specific safeguard for managing the disturbance (apart from the Procedure) is not in place Work will only re-commence once the requirements of that Procedure have been satisfied. 	Project Engineer	Prior to commencing work	Section 4.9 of QA G36 <i>Environment Protection</i>
ABR2	Aboriginal Cultural Heritage	<ul style="list-style-type: none"> The current AHIMS site card for site WW113 will be reviewed by the Transport Project Engineer/Works Supervisor prior to works commencing and location identified in design drawings. 	Project Engineer/Work Supervisor	Prior to commencing work	Section 4.9 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
ABR3	Aboriginal Cultural Heritage	<ul style="list-style-type: none"> Exclusion measures (flagging) will be in place around AHIMS site WW113 prior to works commencing in the area and crews toolboxed 	Project Engineer	Prior to commencing work	Section 4.9 of QA G36 <i>Environment Protection</i>
ABR4	Aboriginal Cultural Heritage	<ul style="list-style-type: none"> No work will commence near AHIMS WW113 until the Transport Aboriginal Cultural Heritage Officer has verified adequate exclusion measures are in place. 	Project Engineer	Prior to commencing work	Section 4.9 of QA G36 <i>Environment Protection</i>
SOI1	Soil and Water	<ul style="list-style-type: none"> An Emergency spill kit must be kept onsite at all times. All staff must be made aware of the location of the spill kit and trained in its use If an incident (e.g. spill) occurs, the Transport <i>Environmental Incident Classification and Management Procedure</i> would be followed and the Transport Contract Manager notified as soon as practicable. 	Project Engineer	Construction	Section 4.3 of QA G36 <i>Environment Protection</i>
SOI2	Soil and Water	<p>Erosion and sediment control measures must be implemented and maintained to:</p> <ul style="list-style-type: none"> 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 Divert clean water around the site. (In accordance with the Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book)). 	Project Engineer	Detailed design / Pre-construction	Section 2.2 of QA G38 <i>Soil and Water Management</i>

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p>Erosion and sedimentation controls must be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request</p> <p>Erosion and sediment control measures must not be removed until the work is complete and areas are stabilised</p> <p>A progressive erosion and sediment control plan is to be prepared for the works.</p> <p>The maintenance of established stockpile sites during construction must be in accordance with the Transport Stockpile Site Management Guideline, (EMS-TG-10).</p>			
SOI3	Soil and Water	<ul style="list-style-type: none"> • Fuels, chemical and liquids must be stored in an impervious bunded area a minimum of 50 metres away from: <ul style="list-style-type: none"> - Rivers, creeks, or any areas of concentrated water flow. - Flooded or poorly drained areas. - Slopes above 10%. • Cleaning of spray bars (or equivalent equipment) is to occur in suitable areas (e.g. not table drains) and not cause water pollution • Refuelling of plant and equipment must occur in impervious bunded areas located a minimum of 50 metres away from drainage lines of waterways unless within a bunded stockpile site • Vehicle wash down and/or cement truck washout must occur in a designated bunded area • Moveable plant such as pumps and generators must be bunded 	Project Engineer	Construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SOI4	Soil and Water	<ul style="list-style-type: none"> • There must be no release of dirty water into drainage lines and/or waterways • Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/slicks) must be carried out on a regular basis to identify any potential spills or deficient erosion and sediment controls • Water quality control measures must be used to prevent any materials (e.g. concrete, grout, sediment etc.) entering drain inlets or waterways • Construction Water will be managed within sustainable limits of the area and catchment. It may be necessary to reduce or limit water extraction and some construction activities if water supply is heavily constrained. Contact the Environment and Sustainability Manager when water supply becomes an issue and direction will be provided • If soil contamination is discovered during construction, works will cease immediately, the site will be temporarily fenced and access would be restricted. Soil sampling and analysis would be conducted to assess the extent and nature of the contamination. 	Project Engineer	Construction	
TRA1	Traffic and transport	<p>A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the <i>Traffic Control at Work Sites Manual</i> (RTA, 2010) and <i>QA Specification G10 Control of Traffic</i> (Roads and Maritime, 2008). The TMP will include:</p> <ul style="list-style-type: none"> • A road occupancy license (ROL) • confirmation of side routes • measures to maintain access to local roads and properties • site specific traffic control measures (including signage) to manage and regulate traffic movement 	Project Engineer	Detailed design / Pre-construction	Section 4.8 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> 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. 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 monitoring, review and amendment mechanisms. 			
NOI1	Noise and vibration	<ul style="list-style-type: none"> Works would be carried out during normal working hours (ie, 7am to 6pm Monday to Friday; 8am to 1pm Saturdays). OOHW may also be required and would be managed in accordance with Transport guidelines. Noise impact will be minimised in accordance with Transport Noise Mitigation Guidelines Measures including allowing adequate distance that rollers can come to adjacent buildings and/or using non-vibrating rollers will be used to minimise or prevent vibration impact All plant must be shut down when not in use and parked / started as far as possible from sensitive receivers Where practical, site noise must be minimised including radio use, yelling, impact noise, simultaneous noise and plant operation. All noise complaints will be investigated and mitigation measures implemented where feasible. Consideration of noise 	Project Engineer	Construction	Section 4.6 of QA G36 <i>Environment Protection</i>
NOI2	Noise and vibration	All sensitive receivers likely to be affected will be notified at least 7 days prior to commencement of any works	Project Engineer	Detailed design / pre-construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p>associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of:</p> <ul style="list-style-type: none"> the project the construction period and construction hours contact information for project management staff complaint and incident reporting how to obtain further information. 			
NAH1	Non-Aboriginal heritage	<ul style="list-style-type: none"> No machinery or materials for the proposal would be placed near any heritage items as listed in Table 6-5. 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. Work will only re-commence once the requirements of that Procedure have been satisfied. 	Project Engineer	Detailed design / pre-construction	Section 4.10 of QA G36 <i>Environment Protection</i>
LCV1	Landscape character and visual impact	<ul style="list-style-type: none"> Landscaping is to be managed in accordance with Roads and Maritime Landscape guideline, 2013 	Project Engineer	Post-construction	
ARQ1	Air quality	<ul style="list-style-type: none"> Construction activities will be managed to minimise the emission of dust, smoke, and other substances. Exposed surfaces will be watered regularly to minimise dust emissions. Clearing of natural vegetation will be minimised where possible. During periods of high winds, dust generating activities will cease. Stabilisation of disturbed surfaces will take place as soon as practicable. Stockpiles or areas that may generate dust will be managed to suppress dust emissions in accordance with 	Project Engineer	Construction	Section 4.4 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p>Roads and Maritime Stockpile Site Management Guideline (RTA 2011a).</p> <ul style="list-style-type: none"> Plant and machinery will be turned off when not in use as much as possible and will be fitted with emission control devices complying with Australian Design Standards where practicable. Construction plant and equipment will be maintained in a good working condition in order to limit impacts on air quality. <p>No burning of any materials will occur.</p>			
BLA1	Blasting	<p>Should blasting be required, a Blasting Management Plan (BMP) would be prepared. At a minimum, the BMP would include:</p> <ul style="list-style-type: none"> Applicable blast criteria Review of associated risks Blast design and execution Mitigation measures Compliance management 	Project Engineer	Construction	Additional Measure
BLA2	Blasting	<ul style="list-style-type: none"> Restrict blasting operations to the detail of Technical Procedure TP-RO44C Earthworks – Blasting 	Project Engineer	Construction	Additional measure
SOC1	Socio-economic	<ul style="list-style-type: none"> Potential impact to any roadside tribute must only be in accordance with the Transport Roadside Tribute Policy (PN148). 	Project Engineer	Pre-construction	
SOC2	Socio-economic	<ul style="list-style-type: none"> All complaints are to be recorded on a complaint register and attended to promptly Local council will be consulted prior to removal of any native tree plantings 	Project Engineer	Construction	

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
SOC3	Socio-economic	<ul style="list-style-type: none"> Existing access for nearby and adjoining properties is to be maintained at all times during the works unless otherwise agreed to by the affected property owner. 	Project Engineer	Construction	
WAS1	Waste	<p>A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to:</p> <ul style="list-style-type: none"> measures to avoid and minimise waste associated with the project classification of wastes and management options (reuse, recycle, stockpile, disposal) statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions procedures for storage, transport and disposal monitoring, record keeping and reporting. <p>The WMP will be prepared taking into account the <i>Environmental Procedure - Management of Wastes on Roads and Maritime Services Land</i> (Roads and Maritime, 2014) and relevant TransportWaste Fact Sheets.</p> <ul style="list-style-type: none"> Resource management hierarchy principles are to be followed: <ul style="list-style-type: none"> Avoid unnecessary resource consumption as a priority Avoidance is followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery). Disposal is undertaken as a last resort (in accordance with the Waste Avoidance & Resource Recovery Act 2001) 	Project Engineer	Detailed design / pre-construction/ construction	Section 4.2 of QA G36 <i>Environment Protection</i>

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<ul style="list-style-type: none"> • Bulk project waste (eg fill) sent to a site not owned by Transport (excluding EPA licensed landfills) for land disposal is to have prior formal written approval from the landowner in accordance with Transport Environment Technical Direction ETD 2015I020 • If coal tar asphalt is identified and is to be removed, it is to be disposed of to landfill in accordance with Transport Environmental Direction No.21 – Coal Tar Asphalt Handling and Disposal. • All waste will be disposed of at appropriately approved and licensed facilities. • Cleared weed free vegetation will be mulched and reused on-site to stabilise disturbed soils where possible. Weedy mulch will either be composted to sterilise propagules and seeds, or not reused. • Waste will not be burned at the site • All wastes will be managed and disposed of in accordance with the Waste Classification Guidelines (DECC 2008b) and managed in accordance with the POEO Act • Garbage receptacles will be provided and recycling of materials encouraged. Rubbish will be transported to an appropriate waste disposal facility • Where appropriate, excess roadside materials will be disposed of according to the following (in order): <ul style="list-style-type: none"> - Transfer to nearby Transport projects for immediate use. - Transfer to an approved Transport stockpile site for future use during projects or routine maintenance. - Transfer to a Transport approved site for reuse on concurrent private/local government project. - Disposal at an approved materials recycling or waste disposal facility. 			

No.	Impact	Environmental safeguards	Responsibility	Timing	Reference
		<p>- As otherwise provided for by the relevant waste legislation.</p> <ul style="list-style-type: none"> Waste material, other than vegetation and tree mulch, will not be left on site once the works have been completed. 			
CBI1	Cumulative impact – biodiversity	Biodiversity impacts would be mitigated or offset in accordance the TfNSW Guideline for biodiversity offsets	Project Engineer	Prior to construction	

7.3 Licensing and approvals

A road occupancy licence (ROL) would be required prior to any work commencing.

Water extraction license (s) may be required from the Natural Resources Access Regulator (NRAR) and would be obtained where necessary in consultation with the Transport Environment and Sustainability Manager.

8. Conclusion

8.1 Justification

The “do nothing” option would result in no impact to vegetation, threatened species and the surrounding environment. It also means that the safety of the Sturt Highway would not be improved for road users in the foreseeable future. Transport has an obligation to provide safe conditions for road users. The proposal would improve the safety of the Sturt Highway by carrying out the proposed work.

This overall improvement in safety is considered to outweigh the potential impact associated with the proposal and therefore the proposal is justified.

8.2 Objects of the EP&A Act

Table 8-1: Objects of the EP&A Act

Object	Comment
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.	The proposal encourages proper management of the road network and would improve the social and economic welfare of the community by improving the safety of the Sturt Highway.
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 Sections 8.2.1 – 8.2.4 below.
1.3(c) To promote the orderly and economic use and development of land.	Not relevant to the proposal.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposal.
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 lists safeguards and management measures to mitigate and minimise the potential impact on the environment including native animals and plants including threatened species.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	Not relevant to the proposal.
1.3(g) To promote good design and amenity of the built environment.	Not relevant to the proposal.
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 proposal.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment	Not relevant to the proposal.

Object	Comment
between the different levels of government in the State.	
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Transport would carry out community consultation with adjoining residents and other key stakeholders.

8.2.1 The precautionary principle

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

This REF has been prepared using the precautionary principle. That is, if threats are perceived as possibly leading to serious or irreversible environmental damage, then either the non-development of the proposal would occur, or that the proposal would need to be modified to ensure that such threats do not exist. Comprehensive field survey and the subsequent identification of biodiversity values including threatened ecological communities and threatened species habitat, has informed the final design of the proposal and led to minimising potential impacts to threatened biota.

This has been the approach in relation to proposed safeguards detailed in Chapter 6 and summarised in Chapter 7.

8.2.2 Intergenerational equity

‘Inter-generational equity’ means that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. The proposal would lead to significant safety improvements to road users of the Sturt Highway while maintaining environmental values within the road corridor.

The proposal would not impact on natural or cultural features to a level that would compromise the health, diversity or productivity of the environment to a level that would impact on future generations.

8.2.3 Conservation of biological diversity and ecological integrity

This principle requires that “*costs to the environment should be factored into the economic costs of a project*”.

Throughout the REF process, field survey results have informed design to minimise impacts to the environment where possible. The REF has examined the environmental consequences of the proposal and identified mitigation measures for areas which have the potential to experience adverse impact. Requirements imposed in terms of implementation of these mitigation measures would result in an economic cost to Transport. The implementation of mitigation measures would increase both the capital and operating costs of the proposal. This signifies that environmental resources have been given appropriate valuation.

The design for the proposal has been developed with an objective of minimising potential impact on the surrounding environment. This indicates that the concept design for the proposal has been developed with an environmental objective in mind.

8.2.4 Improved valuation, pricing and incentive mechanisms

This principle requires that environmental assets should be appropriately valued. This REF has considered abiotic and biotic ecosystem factors together with social values in identifying potential impact and providing a range of environmental safeguards to minimise the impact of the proposal.

These factors ensure that the proposed activity is consistent with the principles of ESD.

8.3 Conclusion

The proposal to carry out a range of safety improvement work on the Sturt Highway (HW14) between Wagga Wagga and Buronga is subject to assessment 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 proposed 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 Federal EPBC Act.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some impacts on native vegetation. Safeguards and management measures as detailed in this REF would mitigate or minimise these expected impacts. The proposal would also improve road user safety of the Sturt Highway. On balance the proposal is considered justified and the following conclusions are made.

Significance of impact under NSW legislation

The proposal would be unlikely to cause a significant impact on the environment based on the modification of the proposal around the known Pine Donkey Orchid site west of Narrandera. It is not necessary for an environmental impact statement to be prepared and 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. Consent from Council is not required.

Significance of impact under Australian legislation

The proposal is not likely to have a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999*. A referral to the Australian Department of the Environment and Energy is 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 proposal.



Steve Sass

Director

EnviroKey Pty. Ltd.

Date: 09/06/2022

I have examined this review of environmental factors and accept it on behalf of Transport for NSW.



Jesse Baaner

Project Manager

Transport for NSW South Region

Date: 02/08/2022

10. References

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<http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx>.
- OEH 2021c. State Heritage Inventory.
<http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx>.
- OEH 2021d. Threatened species, populations and ecological communities of NSW. *NSW Office of Environment & Heritage.* , www.threatenedspecies.environment.nsw.gov.au.

Terms and acronyms used in this REF

Term / Acronym	Description
BC Act	<i>Biodiversity Conservation Act 2016</i> (NSW).
CEMP	Construction environmental management plan
EIA	Environmental impact assessment
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (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	<i>Fisheries Management Act 1994</i> (NSW)
Heritage Act	<i>Heritage Act 1977</i> (NSW)
T&ISEPP	State Environmental Planning Policy (Transport & Infrastructure) 2021
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 Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
NPW Act	<i>National Parks and Wildlife Act 1974</i> (NSW)
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
QA Specifications	Specifications developed by Roads and Maritime Services for use with road work and bridge work contracts let by Roads and Maritime Services.

Appendix 1

Statutory consultation checklists

Transport & Infrastructure SEPP

Council related infrastructure or services

Issue	Potential impact	Yes / No	If 'yes' consult with	T&ISEPP clause
Stormwater	Are the works likely to have a <i>substantial</i> impact on the stormwater management services which are provided by council?	No	-	T&ISEPP cl.13(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will <i>strain</i> the capacity of the existing road system in a local government area?	No	-	T&ISEPP cl.13(1)(b)
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a <i>substantial</i> impact on the capacity of any part of the system?	No	-	T&ISEPP cl.13(1)(c)
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a <i>substantial</i> volume of water?	No	-	T&ISEPP cl.13(1)(d)
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a <i>minor</i> or <i>inconsequential</i> disruption to pedestrian or vehicular flow?	No	-	T&ISEPP cl.13(1)(e)
Road & footpath excavation	Will the works involve more than <i>minor</i> or <i>inconsequential</i> excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No	-	T&ISEPP cl.13(1)(f)

Local heritage items

Issue	Potential impact	Yes / No	If 'yes' consult with	ISEPP clause
Local heritage	Is there is a local heritage item (that is not also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than <i>minor</i> or <i>inconsequential</i> ?	No	-	T&ISEPP cl.14

Flood liable land

Issue	Potential impact	Yes / No	If 'yes' consult with	T&ISEPP clause
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a <i>minor</i> extent?	No	-	T&ISEPP cl.15

Public authorities other than councils

Issue	Potential impact	Yes / No	If 'yes' consult with	T&ISEPP clause
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the <i>National Parks and Wildlife Act 1974</i> , or on land acquired under that Act?	Yes	BCD of DPIE	T&ISEPP cl.16(2)(a)
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No	BCD of DPIE	T&ISEPP cl. 16(2)(b)
Aquatic reserves	Are the works adjacent to an aquatic reserve or a marine park declared under the <i>Marine Estate Management Act 2014</i> ?	No	Fisheries within DPIE	T&ISEPP cl.16(2)(c)
Sydney Harbour foreshore	Are the works in the Sydney Harbour Foreshore Area as defined by the <i>Sydney Harbour Foreshore Authority Act 1998</i> ?	No	Sydney Harbour Foreshore Authority	T&ISEPP cl.16(2)(d)
Bush fire prone land	Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land?	No	Rural Fire Service	T&ISEPP cl.16(2)(f)
Artificial light	Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	No	Director of the Siding Spring Observatory	T&ISEPP cl.16(2)(g)
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhart LEP 2012, Narrandera LEP 2013 and Urana LEP 2011.	No	Secretary of the Commonwealth Department of Defence	T&ISEPP cl. 16(2)(h)

Issue	Potential impact	Yes / No	If 'yes' consult with	T&ISEPP clause
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the <i>Mine Subsidence Compensation Act 1961</i> ?	No	Mine Subsidence Board	T&ISEPP cl. 16(2)(i)

Appendix 2

Construction and acquisition plans

Appendix 3

Biodiversity assessment

Appendix 4

Non-aboriginal heritage database searches

Search Results

20 results found.

CBC Bank (former) Fitzmaurice St	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Church and Cathedral Group Church St	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Civic Group Fitzmaurice St	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Estella Homestead, Outbuildings and Barn Old Narrandera Rd	Wagga Wagga, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Hambledon Homestead Hume Highway	Tarcutta, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Hampden Bridge Hampden Ave	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
House Cobden La	Malebo via Wagga Wagga, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Murrumbidgee River Rail Bridge	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Police Station Sturt St	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Railway Station Station Pl	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)

St Andrews Manse Church St	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
St Andrews Presbyterian Church Church St	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
St Johns Anglican Church Church St	Wagga Wagga, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
St Michaels Cathedral Church St	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
St Michaels Cathedral Johnston St	Wagga Wagga, NSW, Australia	(Nomination now ineligible for PPAL) National Heritage List
St Michaels Presbytery (The Bishops House) Church St	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Tarcutta Hills Woodland Remnant	Tarcutta, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Wagga South Public School Edward St	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Wagga Wagga Courthouse Fitzmaurice St	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Wagga Wagga Post Office (former) Fitzmaurice St	Wagga Wagga, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)

Report Produced: Mon May 3 12:41:55 2021

Arajoel Homestead complex

Item details

Name of item:

Arajoel Homestead complex

Type of item:

Built

Group/Collection:

Farming and Grazing

Category:

Pastoralism

Primary address:

3915 Sturt Highway, Galore, NSW 2650

Local govt. area:

Wagga Wagga

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
3915 Sturt Highway	Galore	Wagga Wagga			Primary Address

Statement of significance:

Historical significance as a fine example of a large-scale pastoral complex.

Date significance updated: 17 Apr 12

Note: The State Heritage Inventory provides information about heritage items listed by local and State government agencies. The State Heritage Inventory is continually being updated by local and State agencies as new information becomes available. Read the Department of Premier and Cabinet [copyright](#) and [disclaimer](#).

Description

Physical description:

A well presented homestead complex comprising a rendered brick residence, woolshed, bunkhouse, cookhouse, meathouse and washhouse and various ancillary buildings.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Wagga Wagga Local Environmental Plan 2010	167	16 Jul 10		
Heritage study					

References, internet links & images

None

Note: internet links may be to web pages, documents or images.

Data source

The information for this entry comes from the following source:

Name:

Local Government

Database number:

2560120

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Search Results

13 results found.

Balranald Courthouse River St	Balranald, NSW, Australia	(Removed from Register or IL) Register of the National Estate (Non-statutory archive)
Balranald Courthouse and Post Office Group Market St	Balranald, NSW, Australia	(Removed from Register or IL) Register of the National Estate (Non-statutory archive)
Balranald Post Office Market St	Balranald, NSW, Australia	(Removed from Register or IL) Register of the National Estate (Non-statutory archive)
Euston Courthouse 22-24 Murray St	Euston, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Great Cumbungj Swamp Area Oxley Rd	Balranald, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Indigenous Place	Balranald, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Indigenous Place	Balranald, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Lock and Weir No 15	Robinvale, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Mungo National Park	Balranald, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Murray Mallee - Mallee Cliffs National Park	Gol Gol, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)

Willandra Lakes Region Mildura Ivanhoe Rd	Balranald, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Willandra Lakes Region Arumpo Mungo National Park Rd	Robinvale, NSW, Australia	(Declared property) World Heritage List
Willandra Lakes Region Arumpo Mungo National Park Rd	Robinvale, NSW, Australia	(Listed place) National Heritage List

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Place Details

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Dry Lagoon Area, Sturt Hwy, Narrandera, NSW, Australia

Photographs	None
List	Register of the National Estate (Non-statutory archive)
Class	Natural
Legal Status	Indicative Place
Place ID	731
Place File No	1/06/320/0006

Nominator's Statement of Significance

A shallow lake filled by floods from the Murrumbidgee River in two out of four years. A worthwhile example of an ephemeral lake within the billabong systems of the riverine plain when inundated it supports a particularly rich avifauna particularly waterfowl which breed profusely throughout the area. Feather tailed gliders (ACROBATS PYGMAEOS) are in the area in the river red gums.

Official Values Not Available

Description

Shallow lake surrounded by patches of lignum and lined by river red gums, as are many of the channels throughout the area.

History Not Available

Condition and Integrity

The area in general is arable sheep country, but the regions surrounding the waterways are generally undisturbed.

Location

About 5000ha, located 20km west of Narrandera.

Bibliography Not Available

Report Produced Mon May 3 12:43:27 2021

Search Results

17 results found.

Bishops Lodge and Outbuildings Moama St	Hay, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Goonawarra Nature Reserve	Booligal, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Great Cumbungi Swamp Area Oxley Rd	Balranald, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Hay Courthouse 418 Moppett St	Hay, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Hay Gaol (former) 355 Church St	Hay, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Hay Hospital Complex Murray St	Hay, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Hay Post Office 120 Lachlan St	Hay, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Hay Post Office 120 Lachlan St	Hay, NSW, Australia	(Listed place) Commonwealth Heritage List
Hay Railway Station Murray St	Hay, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Indigenous Place	Hay, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Indigenous Place	Maude, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)

Indigenous Place	Tchelery Station via Hay, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Land Board Office 126 Lachlan St	Hay, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Merrimajeel and Muggabah Creeks Area	Booligal, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Old Hay Sewage Treatment Works Bruncker St	Hay, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
One Tree Hotel (former) Cobb Hwy	via Hay, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Witcombe Memorial Drinking Fountain Lachlan St	Hay, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)

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Search Results

1 result found.

Indigenous Place	Leeton, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
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Report Produced: Mon May 3 13:27:09 2021



Search Results

7 results found.

Carrathool Bridge Wright Lane	Carrathool, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Courthouse Group (former) Darlington St	Darlington Point, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Indigenous Place	Darlington Point, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Old Warrangesda Mission	Darlington Point, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Tubbo Station Group , Sturt Hwy	Darlington Point, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Tubbo Station Homestead and Outbuildings Sturt Hwy	Darlington Point, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Tubbo Station Woolshed Complex Sturt Hwy	Darlington Point, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)

Report Produced: Mon May 3 12:42:19 2021

Search Results

11 results found.

Butherwah Homestead Butherwah Rd	Urana, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
CBC Bank (former) 142 East St	Narrandera, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
CWA Rest House Yapunyah St	Barellan, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Dry Lagoon Area Sturt Hwy	Narrandera, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Narrandera Courthouse and Police Station Group Larmer St	Narrandera, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Narrandera Nature Reserve	Narrandera, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Narrandera Post Office 140 East St	Narrandera, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Narrandera Rail Bridge	Narrandera, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Narrandera Showground Victoria Ave	Narrandera, NSW, Australia	(Indicative Place) Register of the National Estate (Non-statutory archive)
Railway Station and Station Masters Residence Whitton St	Narrandera, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)

[St Johns Uniting Church and Hall](#) Cadell St

Narrandera, NSW,
Australia

[\(Indicative Place\)](#)
Register of the
National Estate
(Non-statutory
archive)

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Place Details

[Send Feedback](#)

Narrandera Rail Bridge, Narrandera, NSW, Australia

Photographs



List	Register of the National Estate (Non-statutory archive)
Class	Historic
Legal Status	Registered (15/05/1990)
Place ID	16076
Place File No	1/06/320/0008

Statement of Significance

The bridge is a significant technical accomplishment. Placed in service in 1885, it has two lattice truss spans, each of 48.5m. It is ninth in a series of twelve related bridges, all with 48.5m lattice trusses, built between 1871 and 1887. The bridge at Narrandera is one of the later bridges of the group. It is also one of the smallest of the twelve, with two spans and a single track. As the group is highly significant there are reasons for recording all members of the group including the bridge at Narrandera. The series was designed by Sir John Fowler (codesigner of the Firth of Forth Bridge) for John Whitton, engineer in chief of the New South Wales railways. It is of considerable age for an Australian metal bridge and would be in the forty oldest existing metal truss bridges.

Official Values Not Available

Description

The bridge carries a single 1.44m gauge railway with transomes on metal stringers with metal crossgirders resting on the lower chords. The main trusses are through type lattice trusses, continuous over two 48.5m spans. They are connected together above the track by characteristic arched latticed braces. They are supported on twin cast iron cylinder piers. The superstructure was fabricated by Westwood, Baillie; Halliday and Owen were the principal contractors. It was placed in service in May 1885.

History Not Available

Condition and Integrity

The bridge is in use and is believed to be in good condition and in its original state.

Location

Narrandera-Jerilderie Railway over Murrumbidgee River at Narrandera.

Bibliography

C O'CONNOR, "REGISTER OF AUSTRALIAN HISTORIC BRIDGES" 1983.
 C O'CONNOR, "SPANNING TWO CENTURIES" UQP 1985.
 R E BEST AND D J FRASER, "RAILWAY LATTICE GIRDER BRIDGES IN NEW SOUTH WALES" IE AUST CONF ON THE PROTECTION OF THE ENGINEERING HERITAGE, BRISBANE MAY 1982.

Report Produced Mon May 3 12:43:08 2021

Search Results

2 results found.

Maize Island Lagoon Conservation Park Holder Settlement Rd	Waikerie, SA, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Margaret Dowling Park	Renmark, SA, Australia	(Registered) Register of the National Estate (Non-statutory archive)

Report Produced: Mon May 3 12:03:21 2021

Place Details

[Send Feedback](#)

Tubbo Station Group, Sturt Hwy, Darlington Point, NSW, Australia

Photographs



List	Register of the National Estate (Non-statutory archive)
Class	Historic
Legal Status	Registered (14/05/1991)
Place ID	14328
Place File No	1/06/333/0003

Statement of Significance

A rare survival of nearly all the buildings associated with one of the largest nineteenth century holdings in New South Wales. As such the group of homestead, outbuildings, woolshed and shearers' quarters is important for the way it demonstrates life on a large working turn of the century sheep station. (Criterion 2.2)

The homestead and woolshed buildings are valued for their fine proportions and design. (Criterion 5.1)

The buildings of the group are important for the way they demonstrate technical achievements of the time. (Criterion 5.2)

Official Values Not Available

Description

John Peter emigrated from Glasgow in 1832 with 50 pounds in his pocket and no immediate prospects. In 1837 he married Mrs Mary Bourke of Gumby Gumby near Wagga and by the 1860s the Peters' income was estimated at 40,000 pounds a year and their holdings 740,000 acres. Peters acquired Banandra run originally taken up in 1838 added Uroly and the back blocks of Yanco to comprise the Tubbo pastoral holding in 1865 230,000 acres. Today the station group consists of a homestead and associated outbuildings, a woolshed and shearers quarters. Graveyard.

History Not Available

Condition and Integrity

Condition fair, integrity altered and extended sympathetically.

Location

Off Sturt Highway, 10km south-east of Darlington Point, comprising homestead and jackeroos quarters, office, store, meat house, laundry, generator house, smithy, wagon house and stables, all located near the homestead, and woolshed and associated buildings 1km south-east of the homestead.

Bibliography

FREEMAN PETER "THE WOOLSHED" A RIVERINA AUTHOLOGY.
TOWN AND COUNTRY JOURNAL NOVEMBER. 2 1872.
JUNIOR GROUP BOOK NO. 336 APRIL 1977.

Report Produced Mon May 3 12:44:15 2021

Place Details

[Send Feedback](#)

Tubbo Station Homestead and Outbuildings, Sturt Hwy, Darlington Point, NSW, Australia

Photographs



List	Register of the National Estate (Non-statutory archive)
Class	Historic
Legal Status	Registered (14/05/1991)
Place ID	14330
Place File No	1/06/333/0003

Statement of Significance

Generously proportioned homesteads of 1896 and 1906, which are valued for their architectural and spatial qualities, especially the refined joinery externally and internally and the fine pressed metal dado and ceiling of the entrance hall. (Criterion 5.1)

They are important for the way they, together with the outbuildings, demonstrate technical achievements of the time. (Criterion 5.2)

Official Values Not Available

Description

The complex stands on the Murrumbidgee, centred around a large verandahed homestead built in two stages. The first stage built in 1896 is now the jackeroos' quarters and is joined by a covered walk way to the main homestead which was built in 1905-06. The building is of weatherboard of very generous proportions surrounded by a wide verandah on all sides with decorative iron brackets and roof finials, and pressed metal frieze panels. Inside the rooms are large with high ceilings, The entrance hall is notable for fine pressed metal and dado and ceiling. The homestead is set in a well maintained garden and associated buildings include the station store, meat house, cool room, stables, smithy, tanks, windmill and generator house, and wagon house, etc.

History Not Available

Condition and Integrity

The homestead buildings are generally in good condition. Some of the outbuildings are in a run down condition.

Location

Off Sturt Highway, 10km south-east of Darlington Point, comprising homestead, jackeroos quarters, office, store, meat house, laundry, generator house, wagon house, stables and smithy.

Bibliography Not Available

Report Produced Mon May 3 12:44:32 2021

Place Details

[Send Feedback](#)

Tubbo Station Woolshed Complex, Sturt Hwy, Darlington Point, NSW, Australia

Photographs



List	Register of the National Estate (Non-statutory archive)
Class	Historic
Legal Status	Registered (14/05/1991)
Place ID	14329
Place File No	1/06/333/0003

Statement of Significance

A woolshed which is important for its associations with the wool industry in the Riverina. (Criterion 1.4)

The woolshed is also important for the way it demonstrates shearing processes from the 1870s to the early twentieth century. (Criterion 2.2)

It is a well designed and constructed example of a mid Victorian Riverina woolshed, which demonstrates a high degree of technical achievement for the time. (Criterion 5.2)

It is valued for its fine proportions and as a key element of the landscape. (Criterion 5.1)

Official Values Not Available

Description

The woolshed was commenced in mid 1870s reputedly designed and supervised by a Melbourne architect to a T-type plan arrangement with king post timber trusses supporting the roof. William McFadzean the Riverina master woolshed builder who added to the original building in 1906, pronounced Tubbo the best constructed woolshed in the land. In 1891, the shed was converted to power with fifty one stands. The shed is surrounded by iron shearers quarters, shower blocks, cooking and dining room. The woolshed, marshal steam engine provided hot water. A large tank and windmill stand over the old well.

History Not Available

Condition and Integrity

Condition good, integrity intact.

Location

Off Sturt Highway, 11km south-east of Darlington Point, comprising woolshed, shearers quarters, shower blocks, cooking and dining room, windmill, tank and well.

Bibliography

FREEMAN P. "THE WOOLSHED" A RIVERINA ANTHOLOGY.

Report Produced Mon May 3 12:44:45 2021

Bullenbong Creek Bridge

Item details

Name of item:

Bullenbong Creek Bridge

Other name/s:

RTA Bridge No. 5508, Bullenbung Creek Bridge

Type of item:

Built

Group/Collection:

Transport - Land

Category:

Road Bridge

Location:

Lat: -35.019999999999996 Long: 146.92749999999998

Primary address:

Sturt Highway, 43.7 km west of Wagga, NSW 2650

Local govt. area:

Wagga Wagga

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Sturt Highway	43.7 km west of Wagga	Wagga Wagga			Primary Address

Owner/s

Organisation Name	Owner Category	Date Ownership Updated
Roads Maritime and Bus Services - Transport for NSW	State Government	

Statement of significance:

The Bullenbong Creek Bridge has historic, aesthetic, research and representative significance in the Wagga Wagga - Narrandera area. The present Sturt Highway developed as a track along the bank of the Murrumbidgee River linking cattle runs in the 1840s. The form of the Bullenbong Creek Bridge demonstrates changes to the character of the route following its proclamation as the Sturt Highway in 1933. The bridge is constructed on a high level, with long slender piers and with raised approaches, and built on a skew, providing flood resistance and a smooth road alignment. In both these features it is likely to have constituted a significant improvement on the former crossing. The bridge has landmark qualities as a high level structure close to the junction of two important local tributaries of the Murrumbidgee River. The bridge has the potential to provide information to engineers in studying the behaviour of concrete beam bridges over time, it is constructed on a sharp skew, and reflects the difficulties of large skew spans over time. Bullenbong Creek Bridge is capable of demonstrating the major structural and aesthetic characteristics of concrete beam bridges constructed in the period 1925-1948, particularly those constructed on a skew. The bridge is also capable of representing the subset of bridges from this era widened in the latter decades of the twentieth century using the older system of form work and on site pouring.

Date significance updated: 18 Aug 05

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Description

Designer/Maker:

DMR - individuals unknown

Physical description:

Crossing what appears to be a permanent and reasonably substantial watercourse, this bridge is in almost flat country, with its approaches raised slightly for flood clearance. The structure has three simply supported spans, with the deck formed from three reinforced concrete beams integral with the deck, all having a 40 degree skew. The bridge has been widened on the southern side by the addition of another beam. Piers are quite tall, being rectangular and rising from ground beam which are presumably pile caps. The columns have a headstock. Widening has required a fourth column, and also a size increase to the adjacent original column. Whilst the formwork of the original bridge was in timber, with its patterns visible, the widening used formply which by the 1970s had replaced the timber system. At deck level, both sides are the same, with a wide kerb supporting a three rail steel railing.

Physical condition and/or

Archaeological potential:

Original condition assessment: 'Generally good, although the skew movements have produced local spalling at the abutments' (Last updated: 28/10/2004.)

2007-08 condition update: 'Fair.' (Last updated: 17/4/09.)

Date condition updated: 17 Apr 09

Modifications and dates:

The widening noted above was completed in 1973, including changes to kerbs and railings.

Current use:

Road bridge

Former use:

Road bridge

History

Historical notes:

Bullenbong Creek Bridge crosses Bullenbong Creek near the junction of Old Man Creek, both tributaries of the Murrumbidgee River, on the Sturt Highway near Collingullie, approximately 44 kilometres west of Wagga Wagga. Originally the area was the territory of the Wiradjuri Aboriginal people, in whose language Wagga Wagga means 'place of crows'. Explorer, Charles Sturt travelled the whole course of the Murrumbidgee from its junction with the Tumut in 1829-1830. He noted that just west of Wagga Wagga's present site the flats bordering the river were extensive and rich, and being mixed with sand were well suited to agriculture. Pastoralism, horse and cattle breeding, wheat and fruit growing and viticulture have been the major activities of the region. The buoyant economic conditions and the desire for better grazing lands in the 1820s and 1830s stimulated settlement of the area and by 1849 several villages, including Wagga Wagga had been established. Collingullie was originally

known as Mundowry and was proclaimed a village in 1899. (Swan, 1970, pp. xxi-xxiii, 3, 18-19, 23; Morris, 1999. p. 17)

When Surveyor-General Major Thomas Mitchell passed through the area in 1836 he found that 'a tolerable cart road' existed from one station to the other, so great was the migration of settlers along the river. Alexander Davidson and his family, Scottish immigrants, settled on the Bullenbong Creek in 1843 where they ran horses and cattle. It is reported that the Sturt Highway west of Wagga Wagga was first marked out when prospective settlers who were directed towards Bullenbong Creek by a stockman on the 'Wagga Wagga' run dragged a log behind the bullock dray to mark a track by which they could return. Early roads were merely bullock tracks and cattle routes and initially, steamers provided the main form of transport for stock and goods along the Murrumbidgee. It is likely that tracks developed along both the north and south banks of the Murrumbidgee. The track along the northern bank departed from the Great South Road at Gundagai and followed the north bank of the Murrumbidgee through Wagga Wagga, Narrandera, Hay and Balranald and the north bank of the Murray River on its way to the South Australian border. An 1858 Post Office Department map shows the postal route departing from the Great South Road on the southern side of the Murrumbidgee, at Tarcutta, and following the south bank of the Murrumbidgee River from Tarcutta to Wagga Wagga, where it crossed the river and proceeded along its northern bank to Balranald. A map of main roads proclaimed under the Local Government Act of 1923 appears to show the main route following the south bank of the river from Wagga Wagga to Narranderra and possibly to Hay where it crosses to the north bank. (Swan, 1970, p. 23; Morris, 1999, pp. 17, 32; Sherry Morris, *Then and Now: 75 Years 1928-2003*, RTA, Wagga Wagga, 2003, p. 2, DMR, 1976, pp. 37, 112)

Following the appointment of the Main Roads Board (MRB) in 1925, a new system of road classification was introduced whereby Main Roads were classified as State Highways, Trunk Roads or Ordinary Main Roads. The Board assumed full responsibility for all State Highways in the County of Cumberland and in the country and for all Ordinary Main Roads in the County of Cumberland. In 1929 the road from Wagga Wagga to Hay was proclaimed as a Trunk Road and in 1930 this length was named the Sturt Trunk Road in commemoration of Sturt's expedition down the Murrumbidgee River. In 1933 the road from Sydney to Adelaide through Wagga Wagga was proclaimed the Sturt Highway. The new highway comprised what had previously been a section of the Monaro Highway (now the Snowy Mountains Highway) from Lower Tarcutta to Wagga Wagga; the road along the south bank of the Murrumbidgee River from Wagga Wagga to Hay and that portion of the Mid Western Highway from Hay to the South Australian border. (Morris, 2003, pp. 6-7, 12)

Bullenbong Creek Bridge, a three-span skewed reinforced concrete beam structure, was built in 1942. During World War Two, bridge construction and road maintenance slowed due to shortages of materials and the priority given to defence works, so that only essential maintenance and construction work was carried out. The construction of Bullenbong Creek Bridge in 1942 probably indicates that it had been planned for some time and that its construction was urgent, most likely it replaced a very dilapidated timber bridge which was not considered able to last through the war (DMR, 1976, pp. 174, 187, 220; RTA File: 14/468.1117).

Based on RTA bridge database records, reinforced concrete beam or girder bridges were the most common form of concrete bridge construction to 1948, with more than 160 extant.

Within the general group of beam bridges, the main longitudinal members have had various configurations ranging from a simple set of rectangular beams cast integrally with the deck, through beams with curved soffits, to flat soffit decks where the edge beams also form the bridge parapet or sidewall. These bridges on the State's main roads and highways, constructed to replace high-maintenance and aged timber bridges or open crossings, embodied new standards of width, load capacity and alignment which were intended to adapt the State's road network to the increasing volume and speed of motor traffic.

Bullenbong Creek Bridge is likely to have constituted a substantial improvement in amenity when constructed. It provides a fairly high level crossing which would be reasonably flood resistant. The construction of the bridge on a skew reflects the changing relationship of roads and bridges in this period, where more advanced and flexible bridge technologies could cross streams on a curve, skew or incline, or combination of all three, allowing roads to follow a smooth alignment where previously lines of road were forced to bend to meet the straightest opportunity for a waterway crossing. (DMR, 1976, pp. 169-70)

Following World War Two, factors such as the increasing use of the Sturt Highway by semi-trailers and other heavy vehicles for long distance haulage; the establishment of the Snowy Mountains Hydro Electric Authority, Closer Settlement, particularly Soldier Settlement and the growth of the Murrumbidgee Irrigation Area led to the need for greater development of roads. As Wagga Wagga grew after the 1970s, towns such as nearby Collingullie, which had declined in the 1950s and 1960s, became important commuter centres. Major upgrading of the Sturt Highway was carried out during the 1970s, including new bridges and deviations. The Bullenbong Creek Bridge was widened in 1973. An inspection report in March 1974 noted problems with cracking in new construction joints in the decking and abutments, allowing water to run through. Bad scouring was also evident at the abutments following flooding. Apart from this, the bridge has remained in good condition, requiring only routine maintenance. (Morris, 2003, pp. 25, 37; Morris, 1999, p. 218; RTA File: 14/468.1117)

Historic themes

Australian theme (abbrev)	New South Wales theme	Local theme
3. Economy-Developing local, regional and national economies	Agriculture-Activities relating to the cultivation and rearing of plant and animal species, usually for commercial purposes, can include aquaculture	(none)-
3. Economy-Developing local, regional and national economies	Environment - cultural landscape-Activities associated with the interactions between humans, human societies and the shaping of their physical surroundings	(none)-
3. Economy-Developing local, regional and national economies	Pastoralism-Activities associated with the breeding, raising, processing and distribution of livestock for human use	(none)-
3. Economy-Developing local, regional and national economies	Technology-Activities and processes associated with the knowledge or use of mechanical arts and applied sciences	(none)-
3. Economy-Developing local, regional and national economies	Transport-Activities associated with the moving of people and goods from one place to another, and systems for the provision of such movements	(none)-

Assessment of significance

SHR Criteria a)

[Historical significance]

The Bullenbong Creek Bridge is likely to have some local historic significance as an infrastructural improvement to the Wagga Wagga to Narranderra road. The bridge is constructed on a high level, with long slender piers and with raised approaches, both features presumably for flood clearance of the lower reaches of this tributary to the

Murrumbidgee River. The bridge is also built on a skew, reflecting the developments in bridge building technologies of the 1920s and 1930s. Both these features are likely to have constituted a significant improvement on the former crossing, giving increased flood resistance and a smoother alignment. The construction of the bridge early in Australia's involvement in WWII when labour and resources were concentrated on defence works or essential improvements suggests that the construction of this bridge was considered important enough within the local area to be prioritised.

SHR Criteria c)

[Aesthetic significance]

The bridge has landmark qualities as a high level structure with long slender piers close to the junction of two important local tributaries of the Murrumbidgee River. The widening of the bridge was carried out in kind - using the older system of form work and on site pouring, but is readily distinguishable where it abuts the original upstream pier and through the different patina left by ply formwork on the widening as distinct from timber formwork on the original structure. The widening is thus sympathetic and does not compromise interpretation of the structure.

SHR Criteria e)

[Research potential]

The bridge has the potential to provide information to engineers in studying the behaviour of concrete beam bridges over time. The bridge is constructed on a sharp skew, and reflects the difficulties of large skew spans over time as evidenced by ongoing localised damage. Nevertheless it remains in reasonably good condition.

SHR Criteria g)

[Representativeness]

Bullenbong Creek Bridge is capable of demonstrating the major structural and aesthetic characteristics of concrete beam bridges constructed in the period 1925-1948, particularly those constructed on a skew, its design embodying the new standards set by the MRB and DMR to bring the State's roads into the motor age. The bridge is also capable of representing the subset of bridges from this era widened in the latter decades of the twentieth century using the older system of form work and on site pouring (rather than the addition of abutting precast, prestressed component, which is more common). Locally, this group includes the Yarragundry Bridge over Sandy Creek, a concrete slab bridge widened in 1972.

Integrity/Intactness:

Moderate

Assessment criteria:

Items are assessed against the  [State Heritage Register \(SHR\) Criteria](#) to determine the level of significance. Refer to the Listings below for the level of statutory protection.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Heritage Act - s.170 NSW State agency heritage register			18 Aug 05		

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
Heritage Study of Pre-1948 Concrete Beam	2005		Burns and Roe Worley and Heritage		

Bridges (Sthn, Sth West, Sydney)		Assessment And History (HAAH)	Y e s
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References, internet links & images

Type	Author	Year	Title	Internet Links
Written	Department of Main Roads	1976	The Roadmakers. A History of Main Roads in New South Wales	
Written	Morris, Sherry	2003	Then and Now: 75 Years, 1928 - 2003	
Written	Morris, Sherry	1999	Wagga Wagga. A History	
Written	Roads and Traffic Authority		RTA File 14/468.1117	
Written	Swan, Keith	1970	History of Wagga Wagga	

Note: internet links may be to web pages, documents or images.



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Data source

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Burial Ground

Item details

Name of item:

Burial Ground

Type of item:

Archaeological-Terrestrial

Group/Collection:

Aboriginal

Category:

Burial

Primary address:

Sturt Highway, East Of, Lake Benanee, NSW 2737

Local govt. area:

Balranald

Property description

Lot/Volume Code	Lot/Volume Number	Section Number	Plan/Folio Code	Plan/Folio Number
LOT	1		DP	92444

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Sturt Highway, East Of	Lake Benanee	Balranald			Primary Address

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Balranald Local Environmental Plan 2010	17	09 Jul 10		
Heritage study					

References, internet links & images

None

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Cottage and Pise Building

Item details

Name of item:

Cottage and Pise Building

Type of item:

Built

Group/Collection:

Farming and Grazing

Category:

Homestead Complex

Primary address:

1810 Sturt Highway, Yarragundry, NSW 2650

Local govt. area:

Wagga Wagga

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
1810 Sturt Highway	Yarragundry	Wagga Wagga			Primary Address

Statement of significance:

Historical and aesthetic significance as an intact example of early cottage and outbuilding complex. Local significance.

Date significance updated: 18 Sep 12

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Description

Physical description:

A rendered brick or rendered pise cottage with a steeply pitched corrugated iron roof and an encircling bullnose verandah. To the rear there is a pise and timber outbuilding with a corrugated iron gable roof.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Wagga Wagga Local Environmental Plan 2010	1301	16 Jul 10		
Heritage study					

Study details

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Title	Year	Number	Author	Inspected by	Guidelines used
Wagga Wagga City Council Rural Heritage Study	2000		Peter Freeman Conservation Architects and Planners		No

References, internet links & images

None

Note: internet links may be to web pages, documents or images.

Data source

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Local Government

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2560212

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Poisoned Waterholes Creek Bridge

Item details

Name of item:

Poisoned Waterholes Creek Bridge

Other name/s:

RTA Bridge No. 5514; Poison Water Holes Creek Bridge

Type of item:

Built

Group/Collection:

Transport - Land

Category:

Road Bridge

Location:

Lat: -34.81027777777778 Long: 146.58055555555555

Primary address:

Sturt Highway, 8.4 km east of Narrandera, NSW 2700

Local govt. area:

Narrandera

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Sturt Highway	8.4 km east of Narrandera	Narrandera			Primary Address

Owner/s

Organisation Name	Owner Category	Date Ownership Updated
Roads Maritime and Bus Services - Transport for NSW	State Government	

Statement of significance:

Poisoned Waterholes Creek Bridge has historical and representative significance, having the capacity to demonstrate the State historical themes of Transport and Pastoralism within the Narranderra area. The present Sturt Highway developed from a track along the bank of the Murrumbidgee River linking cattle runs in the 1840s, and a historically important stock route. The form of the Poisoned Waterholes Creek Bridge, along with the remnants of the older timber bridge on the site, demonstrates continuity in the route of the road but changes in its character, following its proclamation as the Sturt Highway in 1933. Located on an historically important stock route, the bridge continues to be used for sheep and cattle crossing the creek during flood times and the design of its current handrailings and approaches reflect this use. Poisoned Waterholes Creek Bridge is capable of demonstrating the major structural and aesthetic characteristics of concrete beam bridges constructed in the period 1925-1948, as well as being unusual in south western NSW in being constructed in two halves joined with shear keys.

Date significance updated: 18 Aug 05

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by local and State agencies as new information becomes available. Read the Department of Premier and Cabinet [copyright](#) and [disclaimer](#).

Description

Designer/Maker:

DMR - individuals unknown

Physical description:

This five span reinforced concrete beam bridge is on slightly elevated approaches to give flood clearance. (Situated in flat country close to the Murrumbidgee, the creek is dry most of the time but does flood). The original bridge had four driven reinforced concrete piles per pier, connected by a headstock. This has been widened by addition of an extra pile on each side and extension of the headstock. The original deck has simply supported spans and has a longitudinal joint on the centreline, presumably to allow staged construction. Each side has two longitudinal beams with an intermediate cross beam. The widening has been formed by the addition of two prestressed concrete planks on each side. Topping this is a wide kerb with three rail steel railing (referred to on the design file as being "cattle safe"). Abutments are of the wall type with 90 degree returns, which have also been widened to cater for increased deck width.

Evidence of the previous bridge is visible in the form of cut-off timber piles at a number of the original pier locations.

Physical condition and/or

Archaeological potential:

Original condition assessment: 'The piers display localised spalling damage in a number of locations, typically in the central third of the bridge width.' (Last updated: 9/06/2004.)

2007-08 condition update: 'Fair.' (Last updated: 17/4/09.)

Date condition updated: 17 Apr 09

Modifications and dates:

Widening was installed in 1973 as described above. Demolished old kerbing may be seen in the creekbed.

Current use:

Road bridge

Former use:

Road bridge

History

Historical notes:

Poisoned Waterholes Creek flows into Sandy Creek, a tributary of the Murrumbidgee River. The Poisoned Waterholes Creek Bridge crosses the creek on the Sturt Highway, approximately 8 kilometres east of Narrandera. The area was the territory of the Wiradjuri Aboriginal peoples, with the Narrungdera clan occupying the area around Narrandera. Explorer, Charles Sturt travelled the whole course of the Murrumbidgee from its junction with the Tumut in 1829-1830, and on 10 December 1929 he camped at a spot on the river just south-east of present day Narrandera. He recorded that the country was well suited for agriculture or grazing. The buoyant economic conditions and the desire for better grazing

lands in the 1820s and 1830s stimulated settlement of the area and by 1833 the entire Narrandera frontage of the Murrumbidgee had been occupied. Pastoralism, horse and cattle breeding, wheat and fruit growing and viticulture have been the major activities of the region. (Gammage, 1986, pp. 17, 25, 30; Swan, 1970, p. 2)

The encroachment of Europeans onto Wiradjuri land brought conflict and between 1839 and 1841 a series of incidents along 100 kilometres of the Murrumbidgee centring on Narrandera became known as the "Wiradjuri wars". Aborigines took cattle and speared stockmen in retaliation for atrocities committed by settlers and loss of traditional fishing grounds and significant sites. Many of the Wiradjuri peoples were killed at Hulong in 1840 and at Murdering Island in 1841. Whilst it has been speculated that Poisoned Waterholes Creek's name stems from the poisoning of Aborigines by settlers, it seems that the majority of the Narrungdera were broken by the Murdering Island massacre. According to Gammage, a more likely explanation for the name is that it was associated with the poisoning of dingos, which became troublesome around the creek in the 1880s, forced into the area by closer settlement. (Regional Histories, 1996, p. 132; Gammage, 1986, p. 238)

The town of Narrandera began as a river crossing, as did most towns on the Murrumbidgee. A rare breach in the steep hills, floodplains and lagoons elsewhere along the river made Narrandera the only feasible crossing place for miles in either direction. When gold was discovered in Victoria, a crossing was essential as stock traffic, which had previously followed the rivers west-east to Sydney, suddenly turned to the south. A natural stock route ran south via Mirrool Creek to the river at Narrandera, then down the Yanko and lower creeks into Victoria. When the record floods of 1852 filled these creeks for the first time in years, Narrandera's future as a crossing place was assured. (Gammage, 1986, p. 122)

It is reported that the Sturt Highway west of Wagga Wagga was first marked out when prospective settlers, who were directed towards Bullenbong Creek by a stockman on the "Wagga Wagga" run, dragged a log behind the bullock dray to mark a track by which they could return. Early roads were merely bullock tracks and cattle routes and initially, steamers provided the main form of transport for stock and goods along the Murrumbidgee. Tracks developed along both the north and south banks of the Murrumbidgee. The track along the northern bank departed from the Great South Road at Gundagai and followed the north bank of the Murrumbidgee through Wagga Wagga, Narrandera, Hay and Balranald and the north bank of the Murray River on its way to the South Australian border. An 1858 Post Office Department map shows the postal route departing from the Great South Road on the southern side of the Murrumbidgee, at Tarcutta, following the south bank of the Murrumbidgee River from Tarcutta to Wagga Wagga, and then crossing the river and proceeding along its northern bank and the northern bank of the Murray for the rest of the way. A map of main roads proclaimed under the Local Government Act of 1923 appears to show the main route following the south bank of the river from Wagga Wagga to Narranderra and possibly to Hay where it crosses to the north bank. Today the Sturt Highway follows the southern bank of the river from Tarcutta through Wagga and Narranderra to Balranald. (Swan, 1970, p. 23; Morris, 1999, pp. 17, 32; Morris, 2003, p. 2, DMR, 1976, pp. 37, 112)

Following the appointment of the Main Roads Board in 1925, a new system of road classification was introduced whereby Main Roads were classified as State Highways, Trunk Roads or Ordinary Main Roads. The Board assumed full responsibility for all State Highways in

the County of Cumberland and in the country and for all Ordinary Main Roads in the County of Cumberland. The remaining classified roads continued to be the responsibility of the appropriate local government authority, which received financial assistance from the Board. In 1929 the road from Wagga Wagga to Hay was proclaimed as a Trunk Road and in 1930 this length was named the Sturt Trunk Road in commemoration of Sturt's expedition down the Murrumbidgee River. In 1933 the road from Sydney to Adelaide through Wagga Wagga was proclaimed the Sturt Highway. The new highway comprised what had previously been a section of the Monaro Highway from Lower Tarcutta to Wagga Wagga; the road along the south bank of the Murrumbidgee River from Wagga Wagga to Hay; and that portion of the Mid Western Highway from Hay to the South Australian border. (Morris, 2003, pp. 6-7, 12)

The bridge over Poisoned Waterholes Creek was built in 1941 and replaced a timber bridge built in 1908. Some time after its construction, it became evident that the 1908 bridge was too low and of insufficient waterway as water was coming down in increased volume due to excessive scouring of a shallow channel cut from the Old Man Creek to Sandy Creek. The bridge was raised twelve inches and lengthened by the addition of two spans of 25 feet in 1920. By 1937 the timber bridge required extensive repairs and, as it was almost at the end of its useful life, it was recommended that it be replaced by a reinforced concrete structure. (RTA File: 14/321.147)

Between 1925 and 1940 the Main Roads Board, later the DMR, constructed more than 1,000 bridges across the State by. During this period the Department adapted existing standards of bridge design to meet the requirements of improved motor vehicle performance: they were generally wider than previously with an improved load capacity. The principal types of bridges constructed during the period were: reinforced concrete beam; concrete slab; steel truss on concrete piers; and timber beam bridges. Concrete was favoured in many instances because it was perceived to be a low maintenance material (DMR, 1976, pp. 55, 88-89, 169, 170).

Based on RTA bridge database records, reinforced concrete beam or girder bridges were the most common form of concrete bridge construction to 1948, with more than 160 extant. They have been very popular in NSW, and elsewhere, providing an efficient and often aesthetically pleasing solution to a wide range of crossing types. Within the general group of beam bridges, the main longitudinal members have had various configurations ranging from a simple set of rectangular beams cast integrally with the deck, through beams with curved soffits, to flat soffit decks where the edge beams also form the bridge parapet or sidewall. These bridges on the State's main roads and highways, constructed to replace high-maintenance and aged timber bridges or open crossings, along with other road improvements, ushered in the age of comfortable motor transport and efficient road transport of goods and produce to which we are accustomed today.

Following World War II, factors such as the increasing use of the road by semi-trailers and other heavy vehicles for long distance haulage, closer settlement, particularly Soldier Settlement and the growth of the Murrumbidgee Irrigation Area led to the need for greater development of roads. Major upgrading of the Sturt Highway was carried out during the 1970s, including new bridges and deviations. In 1973 the bridge was widened by four feet on each side by the addition of a girder consisting of two standard size precast-prestressed concrete plank units on either side of the existing structure. The concrete hand railing was replaced on both sides by a new steel railing. Before the bridge was widened it was

recommended that cattle protection fencing be erected on the approaches and that the hand railing be designed for stock since an average of 300 mobs of cattle and sheep passed the bridge each year, although about 50 percent of the time the waterway was dry and the mobs did not cross the bridge. (RTA File: 14/321.147)

Historic themes

Australian theme (abbrev)	New South Wales theme	Local theme
3. Economy-Developing local, regional and national economies	Environment - cultural landscape-Activities associated with the interactions between humans, human societies and the shaping of their physical surroundings	(none)-
3. Economy-Developing local, regional and national economies	Pastoralism-Activities associated with the breeding, raising, processing and distribution of livestock for human use	(none)-
3. Economy-Developing local, regional and national economies	Transport-Activities associated with the moving of people and goods from one place to another, and systems for the provision of such movements	(none)-

Assessment of significance

SHR Criteria a)

[Historical significance]

Poisoned Waterholes Creek Bridge has the capacity to demonstrate aspects of the transport history of the locality providing evidence of the overlay of crossings at this site, with evidence of the earlier timber bridge (built 1908) directly below the existing structure. The replacement of the timber bridge with the reinforced concrete structure was part of statewide road improvement programme carried out by the Department of Main Roads, which developed new standards of bridge design throughout the 1930s and 1940s to meet the requirements of the new motoring era. The bridge's width and simple but durable concrete beam form demonstrates aspects of the changes in character to the Sturt Highway following its proclamation in 1933. Subsequent widening of the bridge was related to upgrading of the Sturt Highway in response to the greater volume of freight and other traffic associated with growth of the surrounding region. Located on an historically important stock route, later modifications to the bridge reflect its continued role as such, with fencing and hand railings designed to protect the hundreds of mobs of cattle and sheep that use the bridge during floods.

SHR Criteria b)

[Associative significance]

The bridge has no associative significance. The name of the creek, 'Poisoned Waterholes,' is possibly associated with the history of conflict between the Wiradjuri Aboriginal people and the European settlers who encroached on their lands or with nineteenth century European settlement patterns and with settlers' efforts to survive and establish a living from pastoralism in a challenging natural environment; in this case, the threat of dingoes that were forced into the area by closer settlement. However, the bridge itself does not demonstrate these historical processes.

SHR Criteria g)

[Representativeness]

The substructure of the bridge has the capacity to demonstrate the key characteristics of concrete beam bridges constructed in the period 1925-1948. The bridge is unusual in the western half of NSW in having been built in two longitudinal sections, and joined using small shear keys.

Integrity/Intactness:

Moderate

Assessment criteria:

Items are assessed against the  [State Heritage Register \(SHR\) Criteria](#) to determine the level of significance. Refer to the Listings below for the level of statutory protection.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Heritage Act - s.170 NSW State agency heritage register			18 Aug 05		

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
Heritage Study of Pre-1948 Concrete Beam Bridges (Sthn, Sth West, Sydney)	2005		Burns and Roe Worley and Heritage Assessment And History (HAAH)		Y e s

References, internet links & images

Type	Author	Year	Title	Internet Links
Written			RTA File: 14/321.147, General, 1934-1987	
Written			RTA File: 14/321.147, General, 1970-1989	
Written			RTA File: 14/321.147 Part 2, General, 1999	
Written	Department of Main Roads	1976	The Roadmakers - A History of Main Roads in New South Wales	
Written	Gammage, B	1986	Narrandera Shire	
Written	Heritage Office, New South Wales	1996	Regional Histories of New South Wales	
Written	Morris, S	2003	Then and Now: 75 Years 1928-2003	
Written	Morris, S	1999	Wagga Wagga A History	
Written	Swan, K A	1970	History of Wagga Wagga	

Note: internet links may be to web pages, documents or images.



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Data source

The information for this entry comes from the following source:

Name:

State Government

Database number:

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Pomingalarna

Item details

Name of item:

Pomingalarna

Type of item:

Built

Group/Collection:

Residential buildings (private)

Category:

Homestead building

Primary address:

932 Sturt Highway, Yarragundry, NSW 2650

Local govt. area:

Wagga Wagga

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
932 Sturt Highway	Yarragundry	Wagga Wagga			Primary Address

Statement of significance:

Historical and aesthetic significance as a fine example of a substantial Federation era station residence.

Date significance updated: 18 Sep 12

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Description

Physical description:

A substantial Federation era white painted brick residence with a corrugated iron gable roof. The main entrance faces north and features a gabled entrance portico with paired tapered columns resting on a face brick dwarf wall which extends around the encircling verandah. The verandah features decorative timber fretwork brackets. Chimneys are well detailed. Detailed brick pillars support entrance gates and there are mature plantings throughout the untended garden and a stone outbuilding similar to those at nearby Moorong.

History

Historical notes:

The first wheat crop in the district was grown on clear sandhill near Pomingalarna in 1846. It was sown by A. Marshall and B. Bennett with an old wooden plough, single furrow, drawn by four bullocks. The property was owned by the Wagga retail merchant David Copland from

c1870s until the mid 20th century. Copland is believed to have built the existing house. Fire destroyed the earlier homestead in 1979.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Wagga Wagga Local Environmental Plan 2010	1299	16 Jul 10		
Heritage study					

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
Wagga Wagga City Council Rural Heritage Study	2000		Peter Freeman Conservation Architects and Planners		No

References, internet links & images

None

Note: internet links may be to web pages, documents or images.

Data source

The information for this entry comes from the following source:

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Local Government

Database number:

2560210

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Sandigo Hall

Item details

Name of item:

Sandigo Hall

Type of item:

Built

Group/Collection:

Community Facilities

Category:

Hall Concert

Primary address:

7499 Sturt Highway, Sandigo, NSW 2700

Local govt. area:

Narrandera

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
7499 Sturt Highway	Sandigo	Narrandera			Primary Address

Statement of significance:

The Sandigo Hall was constructed in 1921 and has served as the meeting place for the local farming community. This single storey building is clad in weatherboard has gabled ends with corrugated iron roof and a skillion extension to the west side. The site and the building has social significance for the residents of Sandigo and district.

Date significance updated: 17 Apr 20

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Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Narrandera Local Environmental Plan 2013	1095	28 Jun 13		

References, internet links & images

None

Note: internet links may be to web pages, documents or images.



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The Homestead

Item details

Name of item:

The Homestead

Other name/s:

Kerarbury Station

Type of item:

Built

Group/Collection:

Residential buildings (private)

Category:

Homestead building

Primary address:

Sturt Highway, Darlington Point, NSW 2706

Local govt. area:

Murrumbidgee

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Sturt Highway	Darlington Point	Murrumbidgee			Primary Address

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Schedule 1		30 Dec 94	177	1041
Local Environmental Plan	Murrumbidgee Local Environmental Plan 2013	13	23 Aug 13		

References, internet links & images

None

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Name:

Local Government

Database number:

2100003

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Timber Bridge

Item details

Name of item:

Timber Bridge

Type of item:

Built

Group/Collection:

Transport - Land

Category:

Road Bridge

Primary address:

Via 2356 Sturt Highway (Beavers Island Creek), Collingullie, NSW 2650

Local govt. area:

Wagga Wagga

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Via 2356 Sturt Highway (Beavers Island Creek)	Collingullie	Wagga Wagga			Primary Address

Statement of significance:

This bridge illustrates a once typical solution to the problems of settling river flat and floodplain areas, using mainly bush and sawn timbers. Local significance.

Date significance updated: 29 Mar 12

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Description

Physical description:

A single lane timber bridge across an arm of the Murrumbidgee River [currently dry], constructed of sawn and round limbers with concrete piers. Still in private use.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Wagga Wagga Local Environmental Plan 2010	1307	16 Jul 10		
Heritage study					

References, internet links & images

None

Note: internet links may be to web pages, documents or images.

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Toganmain Woolshed Precinct (including woolshed and associated buildings)

Item details

Name of item:

Toganmain Woolshed Precinct (including woolshed and associated buildings)

Primary address:

Sturt Highway, Darlington Point, NSW 2706

Local govt. area:

Murrumbidgee

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Sturt Highway	Darlington Point	Murrumbidgee			Primary Address

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan		14	23 Aug 13		

References, internet links & images

None

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Data source

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Name:

Local Government

Database number:

5067704

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Tubbo Station

Item details

Name of item:

Tubbo Station

Type of item:

Built

Group/Collection:

Transport - Rail

Category:

Railway Platform/ Station

Primary address:

Sturt Highway, Darlington Point, NSW 2706

Local govt. area:

Murrumbidgee

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Sturt Highway	Darlington Point	Murrumbidgee			Primary Address

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Schedule 1		30 Dec 94	177	1041
Local Environmental Plan	Murrumbidgee Local Environmental Plan 2013	12	23 Aug 13		

References, internet links & images

None

Note: internet links may be to web pages, documents or images.

Data source

The information for this entry comes from the following source:

Name:

Local Government

Database number:

2100002

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Yanco Creek Bridge

Item details

Name of item:

Yanco Creek Bridge

Other name/s:

RTA Bridge No. 5522, Yanco Creek

Type of item:

Built

Group/Collection:

Transport - Land

Category:

Road Bridge

Location:

Lat: -34.70333333333333 Long: 146.40083333333334

Primary address:

Sturt Highway (SH 14), Narrandera, NSW 2700

Parish:

Narrandera

County:

Cooper

Local govt. area:

Leeton

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
Sturt Highway (SH 14)	Narrandera	Leeton	Narrandera	Cooper	Primary Address

Owner/s

Organisation Name	Owner Category	Date Ownership Updated
Roads Maritime and Bus Services - Transport for NSW	State Government	

Statement of significance:

This bridge is a simple functional structure and a component of the Sturt Highway infrastructure developed from the 1930s by the Department of Main Roads (DMR) as part of the State Highways improvement programme aimed at bringing the State's roads up to a standard suited to motor vehicle traffic, a programme which as a whole was a significant activity in the State's cultural history. The bridge also has historic significance in the context of the history of transport in the area, associated with the agricultural development of the area and the road transport of produce. Aesthetically, the bridge stands well in the landscape and crosses a significant waterway. The structure has an interesting physical history which has not been able to be fully researched here.

This bridge has been assessed as being of Local significance.

Date significance updated: 28 Aug 07

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Description

Designer/Maker:

Original structure: DMR; Widening: Harry Cheung, RTA Bridge Branch

Builder/Maker:

Unknown

Construction years:

1940-1940

Physical description:

The bridge crosses Yanco Creek in an area predominately flat with some undulations and scattered timber. The bridge is slightly raised above the general road level to keep it above flood level, and it is on a curve. It is also skewed 30 degrees to suit the creek. The structure consists of seven spans, of 8.13 m, with a total length of 66.2 m including approach slabs.

Physical condition and/or**Archaeological potential:**

Original condition assessment: 'The bridge is in generally good condition, although there is staining from water seepage through the deck joints. The pilecap of the old western abutment pier, which sits partly in the river, appears to have been underscoured. The 1940 and 1954 decks appear identical, both in geometry and in the use of timber formwork.' (Last updated: 1/08/2003.)

2007-08 condition update: 'Fair.' (Last updated: 17/4/09.)

Date condition updated: 17 Apr 09

Modifications and dates:

Lengthened in 1954. Widened in 1993.

Current use:

Road bridge

Former use:

Road bridge

History

Historical notes:

The Murrumbidgee area is Wiradjuri country. This was the dominant language of an area of 60,000 square kilometres, extending south of the Murrumbidgee River and westwards to the west bank of the Lachlan River on the Western plains. The river was a source of shellfish and fish, the area provided seasonal food and there were possums, kangaroos and emus all providing a varied and nutritious diet. (Regional Histories, 1996, p. 132) Conflict between the Wiradjuri and settlers was a strong factor in pastoral development of the area in the first half of the nineteenth century; several stations were abandoned in 1839/40 as a direct result of escalations in conflict. (Regional Histories, 1996, p.134) After a brief goldrush and associated boom in the importance of meat production in the 1840s and 1850s the area around Narrandera and Leeton has focussed on wool, fruit and wheat production. (Regional

Histories, 1996, pp.134-8) Yanco Creek - not to be confused with Yanco or North Yanco Runs, has been a significant presence for settlers in the vicinity of Narrandera in the eastern Riverina. The creek is one of a number of distributory streams from the Murrumbidgee River which have been altered by canals, dams and other water flow projects to supply the irrigation so important in the area's primary production. The waterways in the area were originally shallow and on permeable soils and frequently ran dry. Between 1832 and 1852 the Yanco Creek ran only once, briefly, during an 1844 flood. The first attempt to improve the Yanco Creek was made in 1855 when one hundred men were employed to cut a canal through the sand choking its intake and let in water from the Murrumbidgee. By October the following year they had cut through to the river. There was celebration and it was renamed the Yanco River. However, when the water ran down the creek most of it vanished into the porous streambed. In 1864 and 1865 attempts were again made to open the creek with a deeper cutting, but were also unsuccessful. It was not until 1879, under a Government scheme, that a reasonable flow was achieved. The ultimately successful cutting increased the creek's flow tenfold, but unfortunately the swift water cut deep into the old bed, destroying the valuable swamps which had lined the waterway. The Yanco Creek also served as part of a natural stock route via lower creeks into Victoria. (Gammage, 1986, pp. 55, 87, 122, 222-3)

Through the 1930s the Main Roads System within the Western Division of New South Wales was designed to link main centres of population, to pass through smaller centres, and to provide access to the railways. (DMR, 1976, pp 60-1) Improved roads and bridges facilitated motor transport in general and the road transport of produce. The bridge over Yanco Creek, built in 1940, was one of more than 1,000 bridges built, or under construction, by the DMR between 1925 and 1940, a period in which their engineers were adapting existing standards of bridge design to meet the requirements of improved motor vehicle performance - they were generally wider than previously with an improved load capacity. In many cases bridges began to be constructed on a skew, as the bridge over Yanco Creek is, to fit with improved road alignments. The principal types of bridges constructed in this period were: concrete slab; reinforced concrete beam; steel truss on concrete piers; and timber beam bridges. (DMR, 1976, pp.169, 170, 171) Concrete was favoured in many instances because it was perceived to be a low maintenance material. Based on records available, the extant section of the original bridge built in 1940 covers spans 2, 3 and 4 only. These reinforced concrete spans consist of three beam slabs. The piers at the ends of this section were apparently the original abutments which would have been of the spill-through type. The two piers between are of lighter design, with square columns. In 1954 the bridge was lengthened by the addition of one span to the eastern end and two to the western end, using a similar deck design. The new piers are similar to the original river piers, and the abutments are wall type, all founded on piles. The records indicate that additional piles were added beneath the old western abutment. In 1990 discussions were had as to whether a replacement bridge should be built. The preference was for a new bridge on an improved alignment capable of handling the increased traffic. The likelihood of funding was low and the alternative was to widen the existing structure. The bridge was widened from 6.7 m between kerbs to 9 m between rails on the upstream or northern side in 1993 by the addition of a new column for each pier and using prestressed concrete planks for the deck. At this time the road alignment was slightly modified and the New Jersey kerb with aluminium railing tapers from one end to be inside the bridge width by some 800 mm at the eastern end. (RTA File 14/321.1107)

Historic themes

Australian theme (abbrev)	New South Wales theme	Local theme
3. Economy-Developing local, regional and national economies	Agriculture-Activities relating to the cultivation and rearing of plant and animal species, usually for commercial purposes, can include aquaculture	(none)-
3. Economy-Developing local, regional and national economies	Transport-Activities associated with the moving of people and goods from one place to another, and systems for the provision of such movements	(none)-

Assessment of significance

SHR Criteria a)

[Historical significance]

The bridge has significance in the context of the history of transport in the area, as infrastructure connected with the agricultural development of the area and the road transport of produce, and the programmes for the improvement of rural highways and main roads in this period. The physical history of the structure reflects changes of demands on road infrastructure since its construction, and possibly changes in the status of this waterway.

SHR Criteria c)

[Aesthetic significance]

The bridge has been modified both in length and width. The widening is relatively unsympathetic to the previous design, with headstock details not matching or well aligned. Despite the above, the bridge stands well in the landscape and crosses a significant waterway. From downstream it appears reasonably intact.

SHR Criteria f)


[Rarity]

The bridge possibly has rarity value at a local level. As only a handful of beam bridges are included in this study its rarity value cannot be assessed at this stage.

Integrity/Intactness:

Major modifications - but enough integrity to be expressive.

Assessment criteria:

Items are assessed against the  [State Heritage Register \(SHR\) Criteria](#) to determine the level of significance. Refer to the Listings below for the level of statutory protection.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Heritage Act - s.170 NSW State agency heritage register					

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
Pre-1948 RTA Controlled Concrete Slab and Concrete Arch Bridges in NSW	2004		Burns and Roe Worley and Heritage Assessment And History (HAAH)		Yes

References, internet links & images

Type	Author	Year	Title	Internet Links
Written	Department of Main Roads (DMR)	1976	The Roadmakers	

Written	Gammage, Bill	1986	Narrandera Shire	
Written	Heritage Office and Department of Urban Affairs and Planning	1996	Regional Histories of New South Wales	
Written	Roads and Traffic Authority (RTA)		Reconstructed bridge west of Narrandera 14/321.1104	

Note: internet links may be to web pages, documents or images.



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Yarragundry School (former)

Item details

Name of item:

Yarragundry School (former)

Type of item:

Built

Group/Collection:

Education

Category:

School - State (public)

Primary address:

1431 Sturt Highway, Yarragundry, NSW 2650

Local govt. area:

Wagga Wagga

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
1431 Sturt Highway	Yarragundry	Wagga Wagga			Primary Address

Statement of significance:

Historical and social significance to the local community. Local significance.

Date significance updated: 18 Sep 12

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Description

Physical description:

A brick former school, now in private ownership. A number of modifications have been undertaken.

History

Historical notes:

This was formerly the Yarragundry School.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Wagga Wagga Local Environmental Plan 2010	1300	16 Jul 10		
Heritage study					

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
Wagga Wagga City Council Rural Heritage Study	2000		Peter Freeman Conservation Architects and Planners		N o

References, internet links & images

None

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Yarragundry Woolshed

Item details

Name of item:

Yarragundry Woolshed

Type of item:

Built

Group/Collection:

Farming and Grazing

Category:

Woolshed/Shearing Shed

Primary address:

1988 Sturt Highway, Collingullie, NSW 2650

Local govt. area:

Wagga Wagga

All addresses

Street Address	Suburb/town	LGA	Parish	County	Type
1988 Sturt Highway	Collingullie	Wagga Wagga			Primary Address

Statement of significance:

Yarragundry Woolshed is a functional yet aesthetically pleasing woolshed. The Yarragundry property is of historical significance to the local community.

Date significance updated: 29 Mar 12

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Description

Physical description:

A timber and iron woolshed comprising a number of gable roofed sections, with open skillion additions to the north elevation.

History

Historical notes:

Ronald McCrae purchased Yarragundry from the Scott family in 1906. The property was overrun with rabbits and unsuitable for cropping so a Shorthorn herd was established. Ronald McCrae was a pioneer of Corriedale sheep in Australia and established a Corriedale flock at Yarragundry in 1909, mating Lincoln and merino first x ewes. This practice continued until a family partnership was dissolved in 1950.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan	Wagga Wagga Local Environmental Plan 2010	139	16 Jul 10		
Heritage study					

Study details

Title	Year	Number	Author	Inspected by	Guidelines used
Wagga Wagga City Council Rural Heritage Study	2000		Peter Freeman Conservation Architects and Planners		N o

References, internet links & images

None

Note: internet links may be to web pages, documents or images.

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Statutory listed items

Information and items listed in the State Heritage Inventory come from a number of sources. This means that there may be several entries for the same heritage item in the database. For clarity, the search results have been divided into three sections.

- **Section 1** - contains Aboriginal Places declared by the **Minister for the Environment** under the National Parks and Wildlife Act. This information is provided by Heritage NSW.
- **Section 2** - contains heritage items listed by the **Heritage Council of NSW** under the Heritage Act. This includes listing on the State Heritage Register, an Interim Heritage Order or protected under section 136 of the Heritage Act. This information is provided by Heritage NSW.
- **Section 3** - contains items listed by **local councils** on Local Environmental Plans under the Environmental Planning and Assessment Act and **State government agencies** under s.170 of the Heritage Act. This information is provided by local councils and State government agencies.

Section 1. Aboriginal Places listed under the National Parks and Wildlife Act.

Your search did not return any matching results.

Section 2. Items listed under the Heritage Act.

Your search did not return any matching results.

Section 3. Items listed by Local Government and State Agencies.

Your search returned 22 records.

Item name	Address	Suburb	LGA	Information source
Arajoel Homestead complex	3915 Sturt Highway	Galore	Wagga Wagga	LGOV
Borambola Park Outbuildings	950 Sturt Highway	Borambola	Wagga Wagga	LGOV
Borambola Woolshed	1708 Sturt Highway	Borambola	Wagga Wagga	LGOV
Borambola, dwelling	Sturt Highway	Borambola	Wagga Wagga	LGOV
Bullenbong Creek Bridge	Sturt Highway	43.7 km west of Wagga	Wagga Wagga	SGOV

Burial Ground	Sturt Highway, East Of	Lake Benanee	Balranald	LGOV
Cottage and Pise Building	1810 Sturt Highway	Yarragundry	Wagga Wagga	LGOV
George Chaffey Bridge over Murray River, Mildura	Sturt Highway	Mildura	Wentworth	SGOV
Old Glandore Homestead and Outbuildings	3186 Sturt Highway	Alfredtown	Wagga Wagga	LGOV
Old Mildura Bridge	Sturt Highway	Buronga	Wentworth	LGOV
Poisoned Waterholes Creek Bridge	Sturt Highway	8.4 km east of Narrandera	Narrandera	SGOV
Pomingalarna	932 Sturt Highway	Yarragundry	Wagga Wagga	LGOV
Sandigo Hall	7499 Sturt Highway	Sandigo	Narrandera	LGOV
Tennis Courts and Clubhouse	1446 Sturt Highway	Borambola	Wagga Wagga	LGOV
The Homestead	Sturt Highway	Darlington Point	Murrumbidgee	LGOV
The Shanty	3018 Sturt Highway	Alfredtown	Wagga Wagga	LGOV
Timber Bridge	Via 2356 Sturt Highway (Beavers Island Creek)	Collingullie	Wagga Wagga	LGOV
Toganmain Woolshed Precinct (including woolshed and associated buildings)	Sturt Highway	Darlington Point	Murrumbidgee	LGOV
Tubbo Station	Sturt Highway	Darlington Point	Murrumbidgee	LGOV
Yanco Creek Bridge	Sturt Highway (SH 14)	Narrandera	Leeton	SGOV
Yarragundry School (former)	1431 Sturt Highway	Yarragundry	Wagga Wagga	LGOV
Yarragundry Woolshed	1988 Sturt Highway	Collingullie	Wagga Wagga	LGOV

There was a total of 22 records matching your search criteria.

Key:

LGA = Local Government Area

GAZ= NSW Government Gazette (statutory listings prior to 1997), HGA = Heritage Grant Application, HS = Heritage Study, LGOV = Local Government, SGOV = State Government Agency.

Note: While Heritage NSW seeks to keep the Inventory up to date, it is reliant on State agencies and local councils to provide their data. Always check with the relevant State agency or local council for the most up-to-date information.

Appendix 5

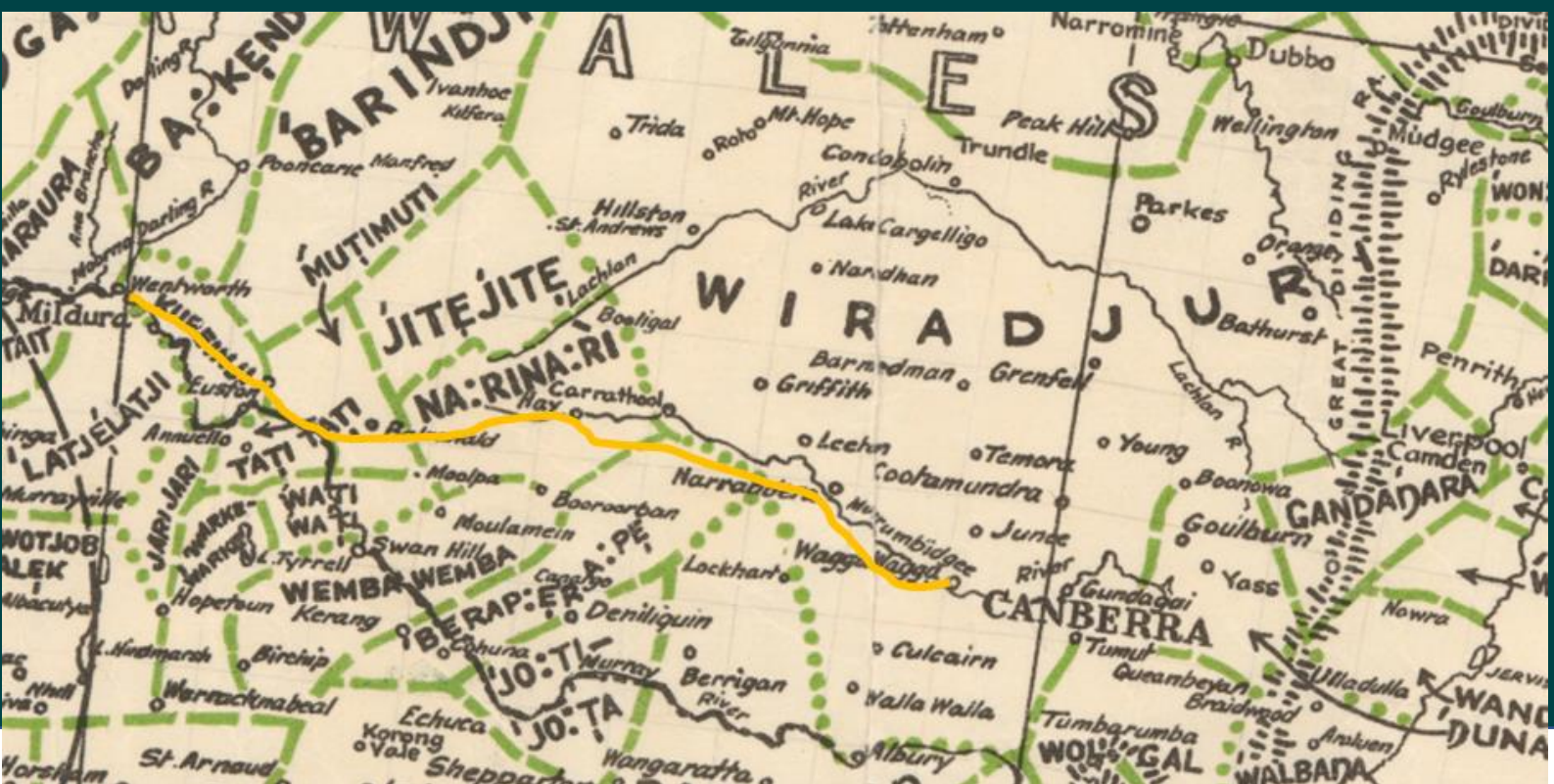
Aboriginal Cultural Heritage Constraints Mapping Report

Sturt Highway (HW14) Route safety review project

Aboriginal cultural heritage constraints mapping report

Report to Transport for New South Wales

Version 3.0 – December 2021



 **Lantern Heritage**
shining a light on people and place



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Project Client

Transport for New South Wales
195 Morgan St,
Wagga Wagga NSW 2650

Project Name

Sturt Highway (HW14) Route Safety Review Project
Aboriginal cultural heritage constraints mapping report

Project Reference Number

128-097

Local Government Areas

Wagga Wagga, Narrandera, Leeton, Murrumbidgee, Hay, Murray River, Balranald and Wentworth

Report Author

Christine Gant-Thompson and Bec Parkes

Version	Date	Reviewer(s)	Notes
1.0	23/6/2021	Bec Parkes	Internal review 1
1.1	3/5/2021	Steve Sass - Envirokey	Internal review 2
1.1	24/6/2021	Transport for NSW	Preliminary draft
2.0	30/7/2021	Transport for NSW	Final draft
3.0	22/12/21	Lantern Heritage	Final revisions incorporated

Cover image: extract from N. B. Tindale's Aboriginal Tribes of Australia map 1974

EXECUTIVE SUMMARY

Transport for NSW (Transport) has completed a route safety review (RSR) of a 550km section of the Sturt Highway (HW14) between Wagga Wagga and Buronga. The Sturt Highway is a two lane flexible pavement, predominantly single carriageway that forms a state highway link starting around Wagga Wagga to Buronga and through to Adelaide in South Australia. The RSR identified key roadside infrastructure and line making safety improvements at various locations along the Sturt Highway.

This desktop assessment reviewed archaeological investigations, ethnographic sources, regional histories and both the New South Wales and Victorian heritage databases. There are 52 sites recorded on the AHIMS database that are located within the Sturt Highway road corridor. With an additional 35 located within 100m of the road corridor.

Aboriginal communities within the study area have strong, ongoing connections to this country. This project is in the preliminary stages of investigation and further archaeological investigation and community consultation is required. A level of goodwill and willingness to engage with Transport for NSW and Lantern Heritage has been expressed by the majority of Aboriginal communities within the study area. There is an opportunity to further this rapport through consistent and honest engagement with the community.

This desktop analysis of Aboriginal cultural heritage constraints has identified four zones of sensitivity (low-moderate; moderate; high and very high) that have been developed on the basis of a combination of quantitative and qualitative approaches to the data and mapping reviewed in this report. The approach was to implement buffers around known sites and major water courses, with reference to geology and Aboriginal Site Decision Support Tool (ASDST) mapping.

The resultant mapping of cultural heritage constraints is presented below in Figure 48 to Figure 53 (Section 11). This mapping provides guidelines for the currently proposed works as well as an assessment of Aboriginal cultural heritage constraints for future upgrades to the Sturt Highway.

Desktop analysis has shown that a field assessment for the Sturt Highway project area is warranted prior to finalising design route options of the Sturt Highway Route Safety improvement works. As illustrated in Table 12 further investigation is recommended prior to any impacts for all sites recorded within 100m of the Sturt Highway Road corridor to confirm the status, location, condition, extent and cultural heritage significance. In addition, further investigation is recommended for all sections of road identified as have very high to high sensitivity in Figure 48 to Figure 53 prior to any impacts.

On the basis of the desktop analysis and preliminary community consultation documented in this report, it is recommended that:

1. In order to continue the goodwill fostered during community consultation meetings this report should be circulated to RAPs for their comment.
2. Further investigation in the form of field survey is required to ground truth the 13 sites listed below. These sites are recorded within the Sturt Highway road corridor and are within the currently proposed scope of works for the Sturt Highway route safety review project.

AHIMS sites requiring ground truthing prior to impacts				
Section 1	Section 2	Section 3	Section 4	Section 5
49-6-0037	48-5-0431	47-6-0028	No sites	47-4-0009
49-6-0038	49-4-0217	48-4-0469		
49-6-0039	49-5-0213			
56-1-0083				
56-1-0092				
56-1-0094				
56-1-0132				

3. If sites listed above cannot be avoided, Transport must apply for an Aboriginal Heritage Impact Permit (AHIP) from Heritage NSW to impact these sites.
4. Further investigation in the form of field survey is required for all sections of the Sturt Highway assessed to have very high to high sensitivity prior to any future impacts.
5. Further investigation in the form of targeted sample survey is required across the sections of the Sturt Highway assessed to have low-moderate to moderate-high sensitivity prior to any future impacts.
6. Areas of low-moderate significance should be subject to due diligence assessment and visual inspection, prior to impacts from any proposed works.
7. Field survey should be conducted in partnership with the local Aboriginal community to determine the cultural significance of the study area.
8. That prior to working in the study area, all Transport employees and contractors associated with the Sturt Highway route safety review project receive cultural heritage inductions delivered by either Transport staff trained in site identification of a member of the relevant Local Aboriginal Land Council.
9. Long term management plans be developed for future works and activities that may occur beyond current study corridor.

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1 PROJECT OVERVIEW

1.1 Introduction

Transport for NSW (Transport) has completed a Route Safety Review (RSR) of a 550km section of the Sturt Highway (HW14) between Wagga Wagga and Buronga. The Sturt Highway is a two lane flexible pavement, predominantly single carriageway that forms a state highway link starting around Wagga Wagga to Buronga and through to Adelaide in South Australia (Figure 1). The RSR identified key roadside infrastructure and line making safety improvements at various locations along the Sturt Highway including:

- Road edge repair and road widening at various locations (including required ancillary works such as culvert and drainage structure widening)
- Reinstatement of a hazard free roadside where possible by; removing trees, maintenance of vegetation regrowth, batter flattening, and table drain reshaping
- Installation of roadside safety barriers at various locations where a hazard free roadside cannot be achieved (nominally 10m from the existing carriageway edge line)
- Intersection upgrades at various locations
- Road signage upgrades
- Installation of new audio tactile line-marking in line with Transport policy
- Reinstatement of line marking and raised pavement markers on completion
- Beneficial re-use of surplus material from other road projects located nearby

Lantern Heritage is engaged by Transport to prepare Aboriginal cultural heritage constraints reporting and mapping along the Sturt Highway study area.

This report documents the Aboriginal cultural heritage constraints assessment undertaken of the Sturt Highway between Wagga Wagga and Buronga. The assessment includes background research, overall assessments of cultural significance, potential impacts to Aboriginal cultural values and mapping of cultural constraints. It has been prepared in accordance with the NSW Office of Environment and Heritage's *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) and the *Roads and Maritime Services procedure for Aboriginal cultural heritage consultation and investigation (RMS 2011)*. This report has been compiled in accordance with the *Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Australia ICOMOS, 2013).

1.2 Study area and scope of activity

The study area comprises the length of the Sturt Highway from Wagga Wagga to Buronga excluding the towns of Gillenbah, Hay, Balranald and Euston (see Figure 1). The study area crosses through the Local Government areas of Wagga Wagga, Narrandera, Leeton, Murrumbidgee, Hay, Murray River, Balranald and Wentworth.

The Sturt Highway is located to the south of the Murrumbidgee River from Wagga Wagga in the east to Balranald in the west, where the highway crosses the river. This section of the study area crosses several tributaries of the Murrumbidgee River including Yanco Creek, Gum Creek, Abercrombie Creek and Yanga Creek. From Balranald to Buronga the Sturt Highway continues on the north side of the Murrumbidgee where it joins the Murray River near Waldaira Creek.

This Aboriginal cultural heritage constraints mapping report assesses the Sturt Highway road corridor up to 10m from each side of the existing carriageway edge line. This study area will allow creation of a 5m clear zone from the carriageway edge line where possible.

This desktop analysis of Aboriginal cultural heritage constraints has identified four zones of sensitivity (low-moderate; moderate; high and very high) that have been developed on the basis of a combination of quantitative and qualitative approaches to the data and mapping reviewed in this report. The approach was to implement buffers around known sites and major water courses, and to interpolate the geology and Aboriginal Site Decision Support Tool (ASDST) mapping in order to map the predicted Aboriginal cultural heritage constraints along the length of the study area.

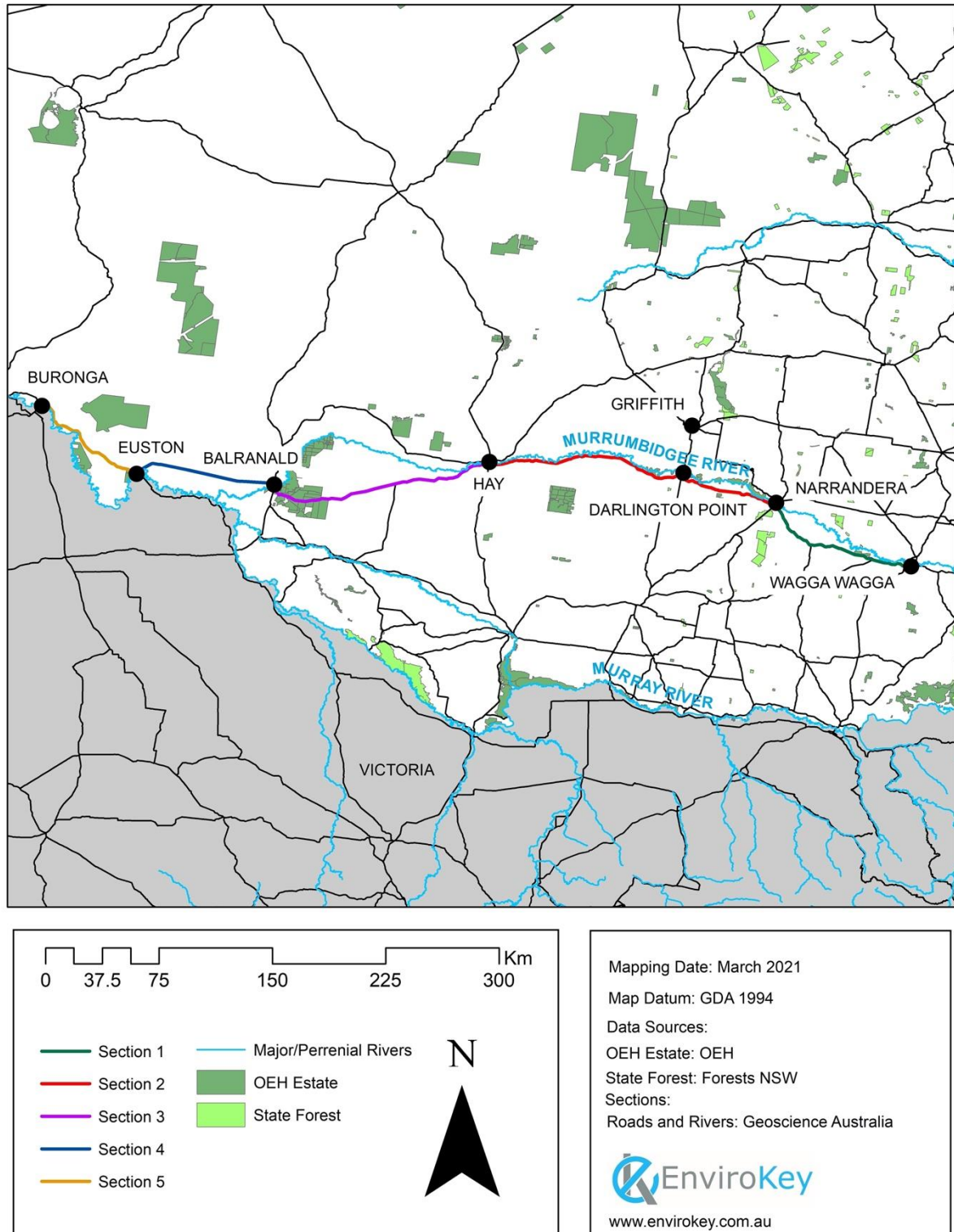


Figure 1: Sturt Highway route safety review project study area (EnviroKey 2021).

1.3 Legislative Framework

1.3.1 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (as amended), jointly administered Heritage NSW (HNSW) and Department of Planning Industry and Environment (DPIE), is the primary legislation for the protection of Aboriginal cultural heritage in New South Wales. Part 6 of the NPW Act provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm.

Error! Reference source not found. summarises those offences and their associated penalties. However, if due diligence is exercised, this is a defence against prosecution for the strict liability offence, in the event that an Aboriginal object is later unknowingly harmed without an Aboriginal Heritage Impact Permit (AHIP).

Table 1: Offences and penalties for harming or desecrating Aboriginal objects and declared Aboriginal Places (DECCW 2010c)

Offence	Maximum Penalty: Individual	Maximum Penalty: Corporation
A person must not harm or desecrate an Aboriginal object that the person knows is an Aboriginal object.	2,500 penalty units (\$275,000) or imprisonment for 1 year 5,000 penalty units (\$550,000) or imprisonment for 2 years or both (in circumstances of aggravation)	10,000 penalty units (\$1,100,000)
A person must not harm or desecrate an Aboriginal object (strict liability offence).	500 penalty units (\$55,000) 1,000 penalty units (\$110,000) (in circumstances of aggravation)	2,000 penalty units (\$220,000)
A person must not harm or desecrate an Aboriginal Place (strict liability offence).	5,000 penalty units (\$550,000) or imprisonment for 2 years or both	10,000 penalty units (\$1,100,000)
Failure to notify DECCW of the location of an Aboriginal object (existing offence and penalty)	100 penalty units (\$11,000). For continuing offences a further maximum penalty of 10 penalty units (\$1,100) applies for each day the offence continues.	200 penalty units (\$22,000). For continuing offences a further maximum penalty of 20 penalty units (\$2,200) applies for each day the offence continues
Contravention of any condition of an Aboriginal Heritage Impact Permit	1,000 penalty units (\$110,000) or imprisonment for 6 months, or both, and in the case of a continuing offence a further penalty of 100 penalty units (\$11,000) for each day the offence continues	2,000 penalty units (\$220,000) and in the case of a continuing offence a further penalty of 200 penalty units (\$22,000) for each day the offence continues

1.3.2 Environmental Planning and Assessment Act 1979 (NSW)

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) provide the overarching structure for planning in NSW. The two most commonly used policies that support the EP&A Act and the EP&A Regulation are State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs).

SEPPs deal with matters of State or regional environmental planning significance. These policies are made by the Governor on the recommendation of the Minister for Planning. SEPPs may be

exhibited for public comment in draft form before being published as a legal document to allow the public the opportunity to provide feedback.

LEPs are administered by Local government. An LEP is a planning instrument that councils prepare under the EP&A Act, in consultation with their community and approved by the Minister for Planning (or their delegate). Each local government area has a LEP that guides development and planning decisions as well as providing protection for natural resources. All local councils are required to identify items of local heritage significance in a heritage schedule to their LEP. Items listed on the heritage schedule of an LEP are also listed on the State Heritage Inventory (SHI).

LEPs are normally supported by a Development Control Plan (DCP), which provides detailed planning and design guidelines. The DCP identifies additional development controls and standards for addressing local development issues. It can normally be applied more flexibly than a LEP.

1.3.3 Project framework

The works proposed as part of the Sturt Highway route safety review project are being assessed under Part 5 of the EP&A Act 1979. A Review of Environmental Factors (REF) has been prepared by Envirokey in relation to the proposed works. A REF is an environmental assessment undertaken to assist in meeting the requirements of Part 5 of the EP&A Act. Transport is the determining authority for the proposal and fulfills Transport'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.

1.3.4 Aims and Objectives

This *Aboriginal cultural heritage constraints mapping report* has been prepared to inform the review of environmental factors for this project. The assessment detailed in this report was undertaken in order to document the potential harm of the proposed activities on Aboriginal objects and places and to clearly set out which impacts are avoidable and which are not.

This report identifies four zones of sensitivity (low-moderate; moderate; high and very high) that have been developed on the basis of a combination of quantitative and qualitative approaches to the data and mapping reviewed in this report. The approach was to implement buffers around known sites and major water courses, to map the predicted Aboriginal cultural heritage constraints along the length of the study area.

Where harm to Aboriginal objects cannot be avoided, recommendations are provided regarding ways of reducing the extent and severity of harm to significant Aboriginal objects. It includes actions to be taken before, during and after an activity to manage and protect Aboriginal objects where harm cannot be avoided.

1.3.5 Report restrictions and copyright

None of the information contained in this report has been identified as confidential or restricted.

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2 INVESTIGATORS AND CONTRIBUTORS

2.1 Investigators

The background research, analysis of results and report writing for this project were managed and undertaken by Christine Gant-Thompson (Senior Archaeologist) with assistance from Conor McAdams (Geoarchaeologist) and Majella Hammersley (Junior Archaeologist). The mapping for the project was completed by Rebecca Parkes (Director, Lantern Heritage). Aboriginal community consultation meetings were facilitated by Tom Knight (Archaeologist).

Christine has a MA (Hons) in archaeology and over 10 years' experience in Aboriginal cultural heritage assessments and Majella is completing her studies at ANU in 2021. Rebecca has a BA (Hons) and a PhD in archaeology; she has over 20 years' experience in investigating Aboriginal archaeology. Tom has a MA (Hons) in archaeology and over 25 years experience in Aboriginal archaeology. Conor McAdams (geoarchaeologist, B.Sc, M.Phil) has experience using Earth science techniques to detect and interpret prehistoric sites in Italy, Malta, Vietnam and Australia.

2.2 Contributors

Bec Parkes undertook the internal review and editing of this report.

3 LANDSCAPE CONTEXT

The Sturt Highway crosses three bioregions in southern New South Wales, at the eastern end of the study area the South Western Slopes bioregion extends from Wagga Wagga to Narrandera. The middle and largest section of the study area is located in the Riverina bioregion from Narrandera in the east to Balranald in the west. While the western end of the study area from Balranald to Buronga in the west is located in the Murray Darling Depression bioregion.

3.1 Landforms and hydrology

The eastern end of the Sturt Highway study area is located in the South Western Slopes bioregion within the foothills comprising the western fall of the Great Dividing (NSW NPWS 2003:120). To the west of the South Western Slopes bioregion, the Riverina bioregion includes the alluvial fans of the Murrumbidgee and Murray Rivers west of the Great Dividing Range and is characterised by floodplains with overflow lakes and undulating plains (NSW NPWS 2003: 92). The landscape of the Murray Darling Depression bioregion is characterised by undulating plains of brown calcareous soils, dunefields and sandplains (NSW NPWS 2003: 79) and comprises the western end of the study area.

There are a variety of landforms within the Sturt Highway study area, however the landscape is dominated by the very gently sloping alluvial fans and floodplains of the Murrumbidgee and Murray River rivers at the eastern and western ends of the study area respectively. Between these rivers, the landscape is dominated by the very low relief Hay Plain. As shown in Figure 2 to Figure 7, the following 11 landscapes described by Dr Peter Mitchell (DECC 2002) occur in the study area:

Starting at the eastern end of the Sturt Highway study area outside Wagga Wagga:

- **Wonga Hills and Ranges** landscape is located on the western outskirts of Wagga Wagga comprised of rolling hills and low rises with general elevation of 250 to 370m (DECC 2002: 99).
- **Coffin Rock Granite Hills** landscape is comprised of rolling to steep rocky hills with broad crests on granite foundation to south of the Sturt highway. The general elevation is 300 to 440m (DECC 2002: 100).
- **Brokong Plains** landscape comprise quaternary alluvial plains with an elevation of 170m. Small areas of this landscape are found in the study area, to the west of Wagga Wagga (DECC 2002: 91).
- **Lockhart Hills and Foothills** landscape appears in small areas to west of Wagga Wagga. This landscape comprises isolated steep rocky ridges that stand as prominent peaks and ridges above the surrounding Brokong Plains. The general elevation is 250m to 550m (DECC 2002: 92).
- **Murrumbidgee – Tarcutta Channels and Floodplains** landscape extends on either side of the Murrumbidgee River for about 110km along the highway from west of Wagga Wagga to west of Narranderra. This landscape comprises the channels, floodplains and terraces of the Murrumbidgee and tributaries (DECC 2002: 93).
- **Murrumbidgee Channels and Floodplains** landscape is the dominant landscape within the section of the study area from west of Narranderra to Hay. This landscape comprises quaternary alluvium on seasonally inundated floodplains, with active and inactive channels, billabongs, levees and swamps of the Murrumbidgee River and tributaries (DECC 2002: 105).
- **The Murrumbidgee Scalded Plains** landscape borders the Murrumbidgee Channels and Floodplains landscape from Narranderra to west of Balranald near Yanga State Conservation Area. This flat landscape dominates the study area for about 300km and is comprised of quaternary alluvial plains with extensive bare areas (scalds) produced by removal of the surface soil by wind. The loss of soil varies from small patches to vast areas of several square

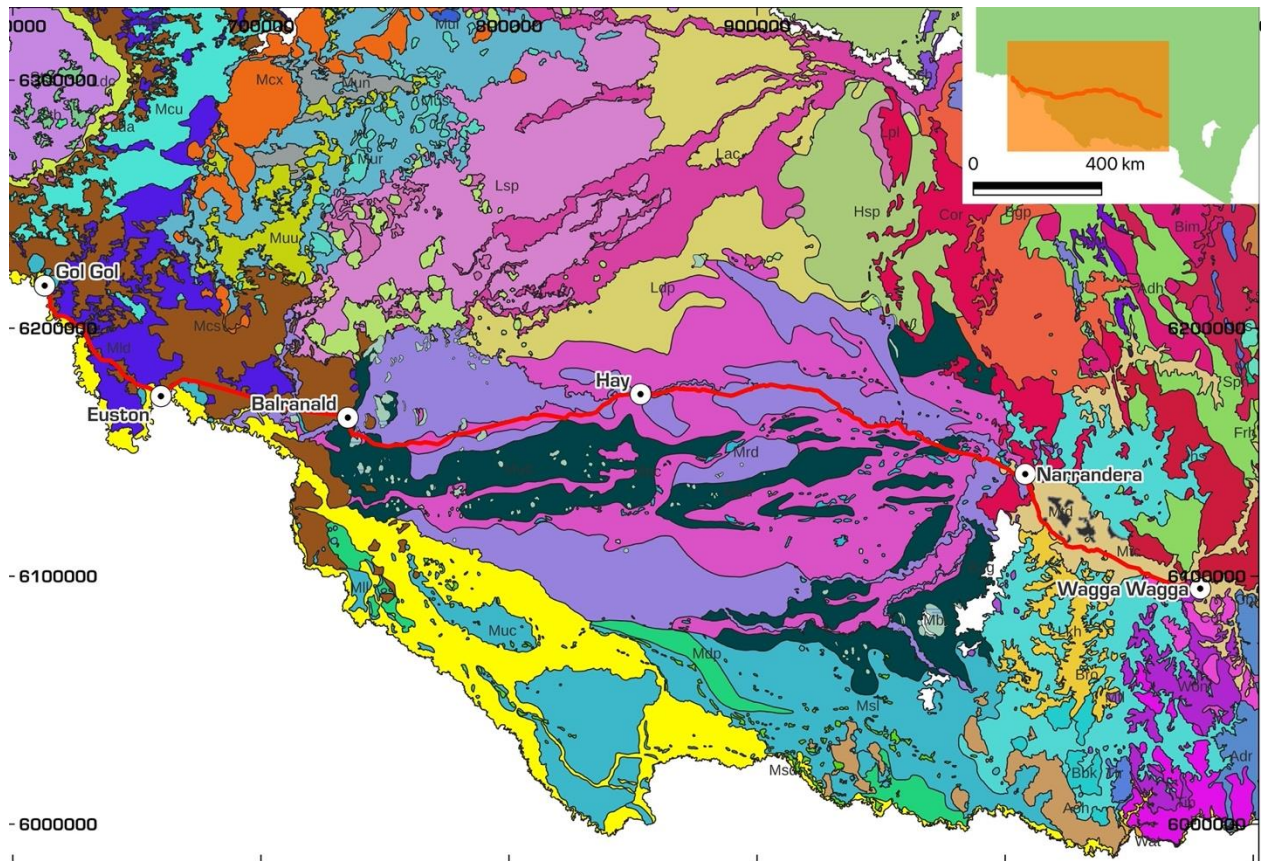
kilometres (Butler et al 1973). The scalded area is interpreted as relic floodplains or terraces (DECC 2002: 105).

- From Yanga State Conservation Area the highway crosses the **Murrumbidgee Depression Plains** landscape for about 22 km and ends near Balranald. This landscape is characterised by quaternary alluvial plains with numerous circular depressions interpreted as high floodplains or low terraces beyond the reach of average floodwaters (DECC 2002: 105).
- West of Balranald to the dominant landscape is **Mallee Cliffs Sandplains** for about 70km to the outskirts Euston. The Sturt Highway crosses further sections of this landscape between Euston and Buronga where it is interspersed with sections of the **Mallee Cliffs linear dunes** landscape. The Mallee Cliffs Sandplains are characterised by extensive, slightly undulating sandplains of Quaternary aeolian sands with east-west trending dunes. Blowouts, partly scalded brown swales and small depressions are frequently found in this landscape (DECC 2002: 64).
- The **Mallee Cliffs linear dunes** landscape features extensive Quaternary dunefields and sandplains with occasional narrow swales. This landscape dominates the study area west of Balranald to Buronga. These parallel dunes vary in height from 6 to 10m and have an open spacing between adjacent ridge crests of about 500m (DECC 2002: 63).
- The **Murray Channels and floodplains** landscape is characterised by active channels and seasonally inundated floodplains of the Murray streams in Quaternary alluvium with associated billabongs, swamps, channels, levees and source bordering dunes. It also includes sections of scalded alluvial flats, broad elevated floodplains and associated relic channels with isolated sandy rises (DECC 2002: 103). This landscape dominates the Sturt Highway for about 16km on the east and west sides of Euston where it transitions to the Mallee Cliffs linear dunes landscape.

The hydrology of Sturt Highway study area is dominated by the Murrumbidgee and Murray rivers and associated features such as extensive riverine floodplains, major streams, anabranches, abandoned channels, billabongs, swamps, wetlands and lakes. Within the study area, the Sturt Highway crosses several tributaries and distributaries of the Murrumbidgee River including Yanco Creek, Gum Creek, Abercrombie Creek and Yanga Creek until it joins the Murray River near Waldaira Creek. The Murray River is the longest river in Australia while the Murrumbidgee River is the third longest. The Murrumbidgee River joins the Murray near Balranald (MDBA 2021).

Both rivers are heavily regulated water courses that provide water for hydro-electric power generation, environmental flows and irrigated agriculture (MDBA 2021). Prior to construction of multiple reservoirs upstream from the study area, the Murrumbidgee and Murray Rivers flooded annually from a combination of rainfall and snow melt. The variation in stream flow, both from season to season and year to year, was considerable prior to damming. The flooding of these rivers extended beyond the immediate river terraces and out onto the surrounding plains leaving grey and silty clays than are low in salts. Smaller streams that are tributaries of these rivers frequently dry up after periods of low rainfall. In general, the rivers form meandering courses of 1.5 to 5km wide and are located between 1.5 to 5m below the level of the surrounding plains (Butler et al 1973).

The flow of both rivers is now managed by multiple reservoirs, irrigation channels and weirs. The Murrumbidgee River provides water to the Murrumbidgee Irrigation Area through a network of irrigation channels and water holding structures managed by WaterNSW. Water from the Murrumbidgee is also used for ecological objectives, such as supporting waterbird breeding (CEWO 2019).



Sturt Highway Landscape Mapping - Overview

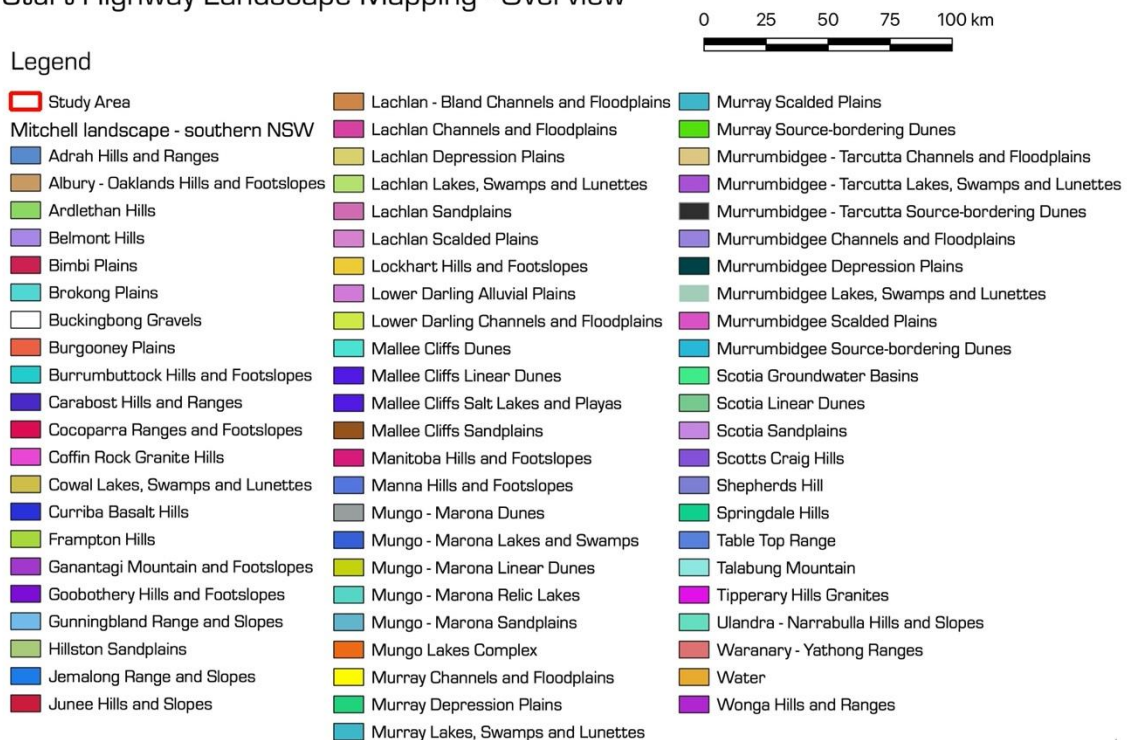
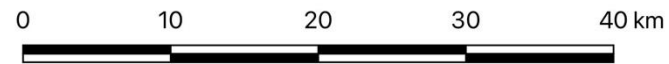


Figure 2: Overview of Mitchell landscapes within Sturt Highway study area



Sturt Highway Landscape Mapping - Section 1

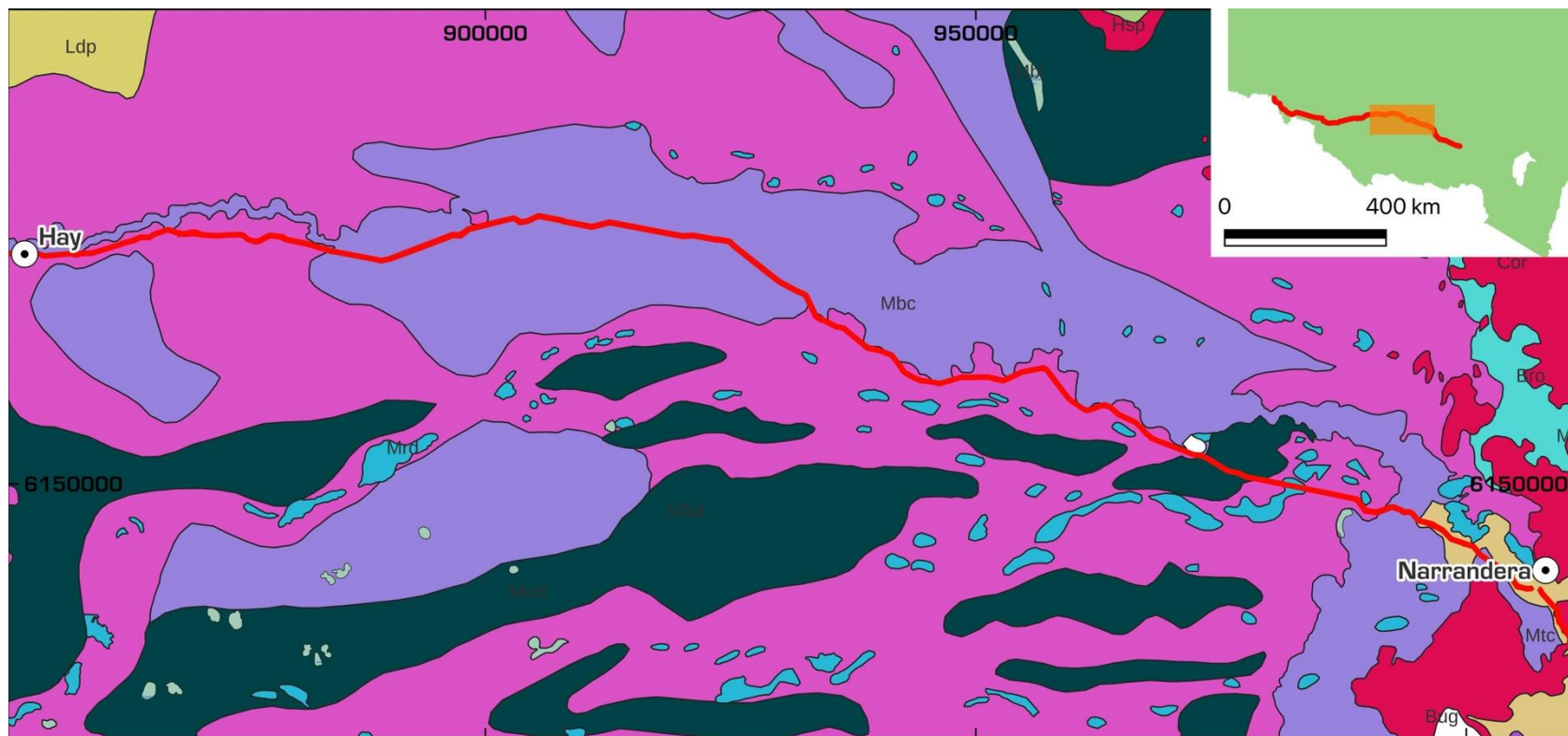


Legend

- | | | |
|---------------------------------|--|---|
| Study Area | Coffin Rock Granite Hills | Murrumbidgee Channels and Floodplains |
| Mitchell Landscape v3.1 | Junee Hills and Slopes | Murrumbidgee Depression Plains |
| Ardlethan Hills | Lockhart Hills and Footslopes | Murrumbidgee Lakes, Swamps and Lunettes |
| Brokong Plains | Manitoba Hills and Footslopes | Murrumbidgee Scalded Plains |
| Buckingbong Gravels | Murrumbidgee - Tarcutta Channels and Floodplains | Murrumbidgee Source-bordering Dunes |
| Cocoparra Ranges and Footslopes | Murrumbidgee - Tarcutta Lakes, Swamps and Lunettes | Wonga Hills and Ranges |
| | Murrumbidgee - Tarcutta Source-bordering Dunes | |



Figure 3: Location of Mitchell landscapes within Section 1 of the Sturt Highway study area

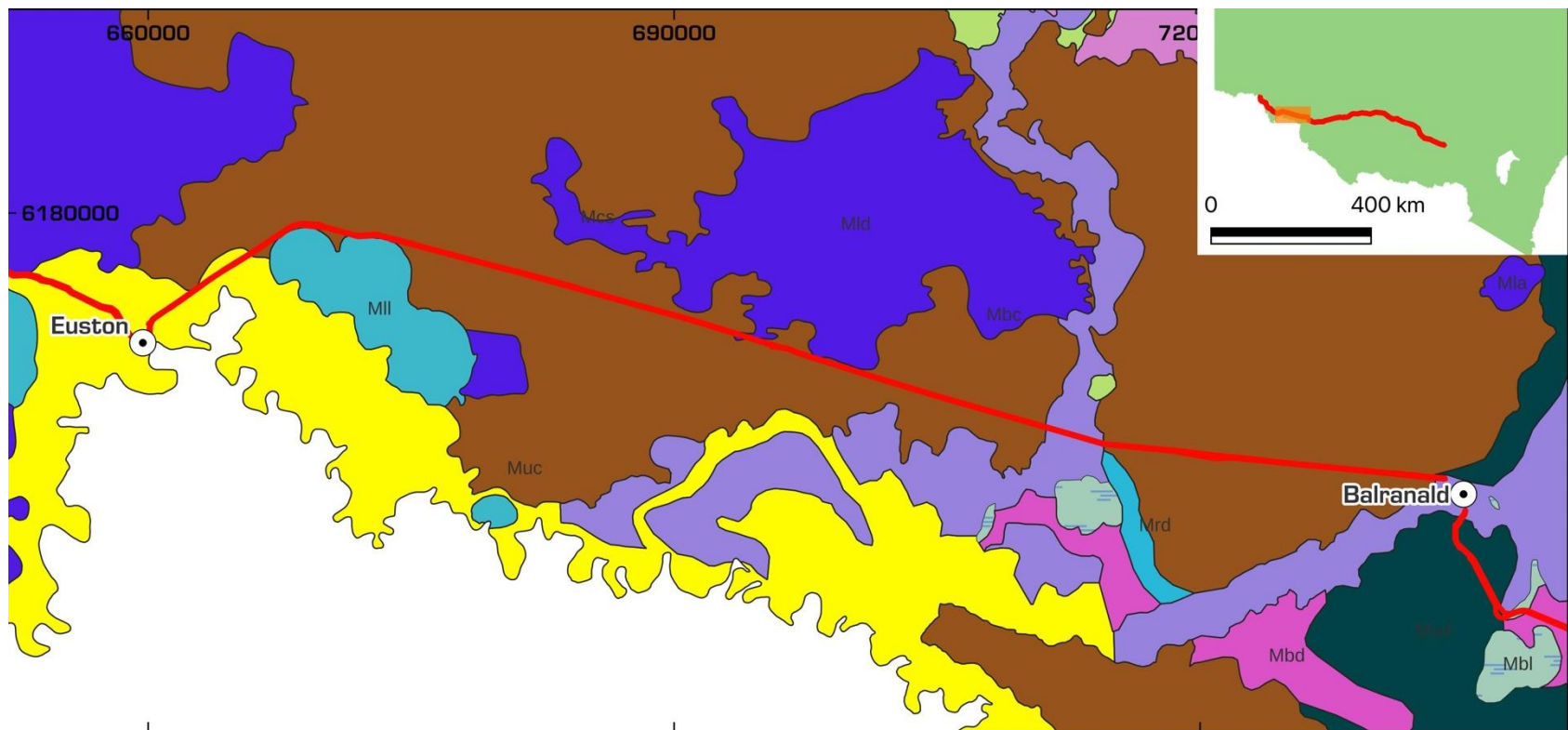


Sturt Highway Landscape Mapping - Section 2

Legend

- | | | |
|---------------------------------|--|---|
| Study Area | Hillston Sandplains | Murrumbidgee Channels and Floodplains |
| Mitchell Landscapes v3.1 | Lachlan Depression Plains | Murrumbidgee Depression Plains |
| Brokong Plains | Lachlan Lakes, Swamps and Lunettes | Murrumbidgee Lakes, Swamps and Lunettes |
| Buckingham Gravels | Lockhart Hills and Foothlopes | Murrumbidgee Scalded Plains |
| Burgooney Plains | Murrumbidgee - Tarcutta Channels and Floodplains | Murrumbidgee Source-bordering Dunes |
| Cocoparra Ranges and Foothlopes | Murrumbidgee - Tarcutta Lakes, Swamps and Lunettes | |

Figure 4: Location of Mitchell landscapes within Section 2 of the Sturt Highway study area



Sturt Highway Landscape Mapping - Section 4

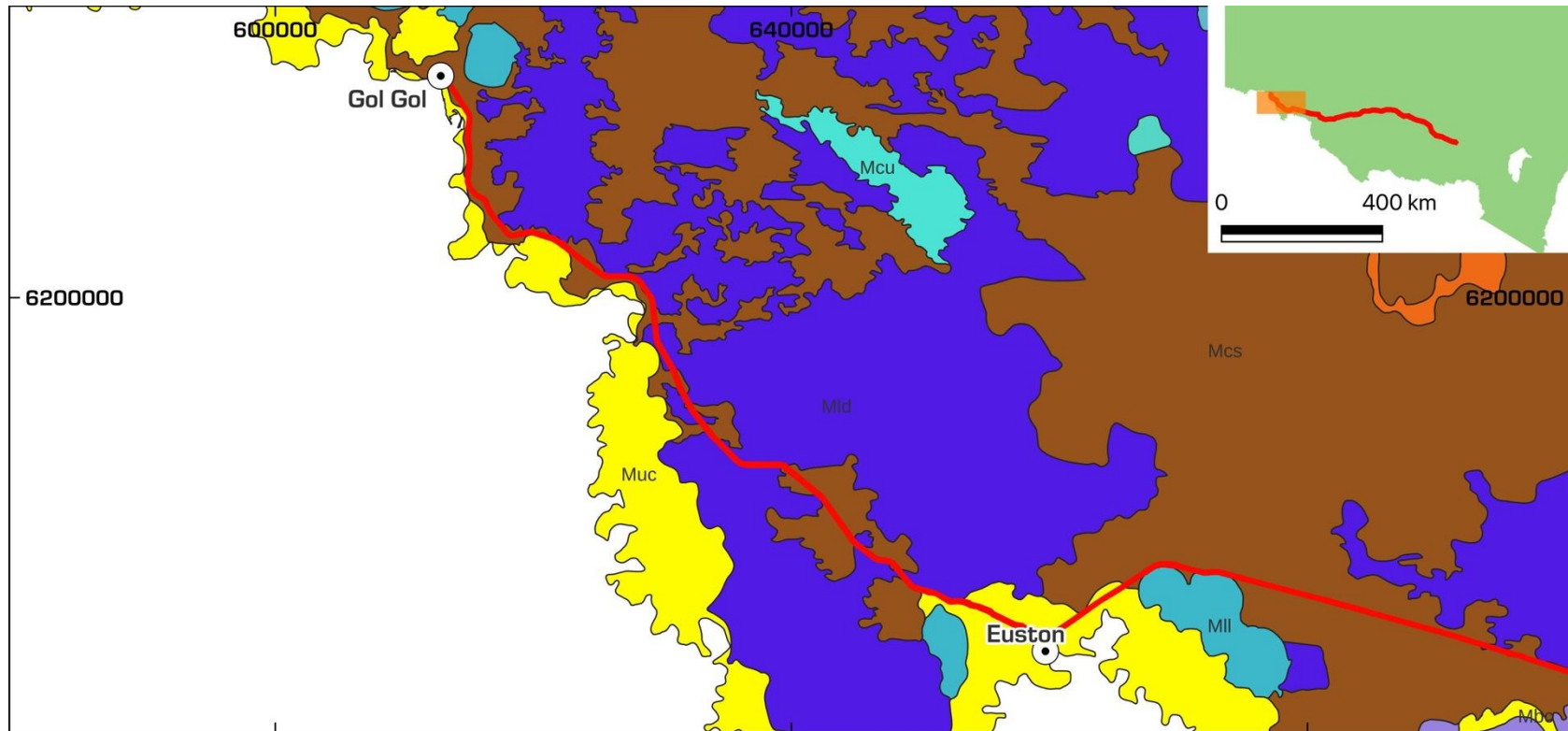
0 10 20 30 40 km

Legend

- Study Area
- Mallee Cliffs Salt Lakes and Playas
- Mallee Cliffs Sandplains
- Murrumbidgee Depression Plains
- Murrumbidgee Lakes, Swamps and Lunettes
- Lachlan Lakes, Swamps and Lunettes
- Murray Channels and Floodplains
- Murrumbidgee Scalded Plains
- Lachlan Scalded Plains
- Murray Lakes, Swamps and Lunettes
- Murrumbidgee Source-bordering Dunes
- Mallee Cliffs Linear Dunes
- Murrumbidgee Channels and Floodplains



Figure 6: Location of Mitchell landscapes within Section 4 of the Sturt Highway study area



Sturt Highway Landscape Mapping - Section 5

0 10 20 30 40 km



Legend

- | | | |
|----------------------------|-----------------------------|---------------------------------------|
| Study Area | Mallee Cliffs Sandplains | Mungo Lakes Complex |
| Mitchell Landscape v3.1 | Mungo - Marona Linear Dunes | Murray Channels and Floodplains |
| Mallee Cliffs Dunes | Mungo - Marona Relic Lakes | Murray Lakes, Swamps and Lunettes |
| Mallee Cliffs Linear Dunes | Mungo - Marona Sandplains | Murrumbidgee Channels and Floodplains |



Figure 7: Location of Mitchell landscapes within Section 5 of the Sturt Highway study area

3.2 Geology and soils

The eastern end of the study area is located within the South Western Slopes bioregion which is based on the Lachlan Fold belt which is comprised of a series of north to northwesterly folded bodies of Cambrian to Early Carboniferous sedimentary and volcanic rocks. There are limited areas of Tertiary basalt with underlying river gravels and sands, where wide valleys are filled with Quaternary alluvium in the lower slopes surrounding Wagga Wagga. The alluvial fans of the Riverine Plain have largely buried bedrock forms, remnants of earlier gravel deposition are found as terrace features in the valleys and as gravel outwash plains (see Figure 8) (NSW NPWS 2003:120).

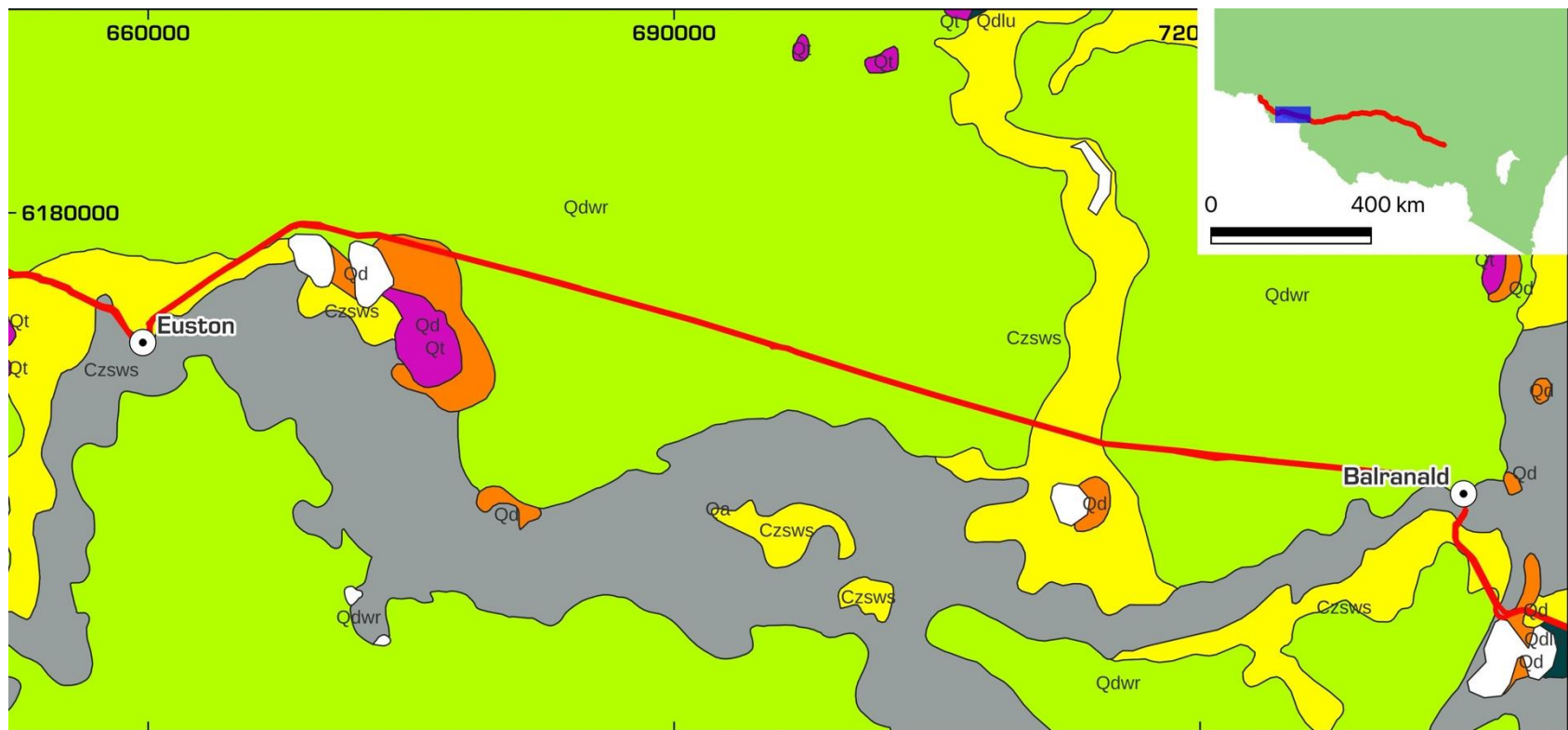
The central section of the Sturt Highway study area is located within the Riverina bioregion where the basement rocks are the early Palaeozoic sediments and granites of the Lachlan Fold belt (see Figures 9 and 10). However, almost no outcrops exist in the Riverina due to the dominance of Quaternary age floodplains, backplains, swamps, lakes and lunettes which cover the basement rocks with sand and clay deposits reaching a maximum thickness of about 500m (NSW NPWS 2003:92).

The western end of the study area is located within the Murray Basin which is a shallow depression filled with marine and terrestrial sediments reaching a maximum thickness of about 600m (see Figures 11 and 12). These marine sediments were deposited when seas flooded this basin in prehistory. At one stage the coast reached as far inland as Balranald. Sandy sediments have been reworked into dunes and sandplains which have been cut through by the Murray and Murrumbidgee Rivers creating overflow lakes and channels such as the Willandra Lakes complex (NSW NPWS 2003:80).

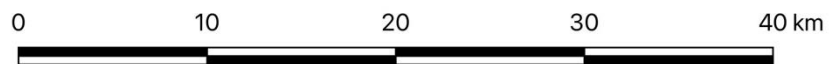
Table 2 summarises the geological units found within the study area.

A description of the soils within the study area at a bioregion level is discussed here with details of each soil landscape provided in Table 3 below. Soils on valley floors within the South Western Slopes bioregion have poor drainage and may accumulate soluble salts. Dryland salinity is widespread. Over the Quaternary alluvium found within landscapes of this bioregion, there is a considerable quantity of wind-blown silt and clay from western NSW (NSW NPWS 2003:120). In comparison, the river channels within the Riverina bioregion consist mostly of sandy soils and more saline heavy grey and brown clays on the outer edge of the rarely flooded river terraces. Sandy soils form levees, old channels, dunes and lunettes with saline clays become evident on lake floors in the Murrumbidgee river corridor where soil and water salinity increases (NSW NPWS 2003: 92). In the Murray Darling Depression bioregion soils vary depending on the landform, for example on sandplains the soils tend to be heavier with brown gradational or texture contrast profiles. Lakes and depressions within this bioregion have clay floors while lunettes comprise varying soils from clean sands to brown clayey sands, and from mixed sand to clay (NSW NPWS 2003: 80). Across the study area soils are generally have neutral pH with the exception of Hay Plain within the central section of the study area (from Balranald to Hay) where the soils are alkaline. In alkaline soils bones, teeth and shells are better preserved than in acidic soils. In addition, the dry conditions of soils within the central and western sections of the study area will also aid the preservation of bones, teeth and shells (Kibblewhite et al 2015).

The soil landscapes of the study area are subject to major wind and water erosion hazards. Stone artefacts and subsurface archaeological deposits may be present across these soil landscapes but their context and stratigraphic integrity will be variably impacted by erosion.



Sturt Highway Geology Mapping - Section 4



Legend

- Study Area
- Ga
- Qdwr
- Qd
- CzsWS
- Qt
- Qdlu



Figure 11: Location of geological formations within section 4 of the Sturt Highway study area



Sturt Highway Geology Mapping - Section 5



Legend

Study Area	CzsWS	Qdwr
Sturt Highway Geology	Qd	Qt
Czs	Qdlu	Qtbb
Czsps	Qdmx	Qty



Figure 12: Location of geological formations within section 5 of the Sturt Highway study area

Table 2: Summary of Geology units bisected by Sturt Highway

Osw – Ordovician volcano-sedimentary rocks (low grade metamorphic)
Qa – Quaternary alluvium
Sgcn – Silurian Intrusive igneous rocks (felsic), chemical sediments and high grade metamorphic
Sg – Silurian Intrusive igneous (felsic) rocks
Qtc – Quaternary lake and swamp deposits
Qrc – Quaternary colluvium and residual deposits, boulders/gravel/sands
Cza – Cenozoic alluvium (often cut by later river channels)
Czb – Cenozoic alluvium (often cut by later river channels)
Dso – Devonian coal measures
Qt – Quaternary lake and swamp sediments
Qd – Quaternary dunes
Qdlu – Quaternary dunes with limestone
Qdwr – Quaternary dunes with reworked mixed volcano-sedimentary rocks
Qtbb – Lake and swamp deposits with weathered mafic rock
Czsws – Sand plains with reworked low grade metamorphic rock
Other Units
Czc – Cenozoic consolidated siliclastic rocks
Czs – Cenozoic sand plain
Ds – Devonian sedimentary and low-grade metamorphic rocks
Sfwl – Silurian chemical sediments and limestone
Sggr – Silurian igneous rock (felsic) mixed intrusives, metamorphosed
Sgkb – Silurian igneous rock (ultrabasic)
Sgkf – Silurian igneous rock (ultrabasic and felsic)
Sgtn – Silurian igneous rock (metamorphosed volcanics with high grade metamorphics)
Sgtw – Silurian igneous rock (metamorphosed volcanics with mixed sediments and volcanics)
Qty – Quaternary lake and swamp deposits (siliclastic)
Qdmx – quaternary dunes with metacarbonate and complex metamorphics

3.3 Vegetation

A brief summary of the vegetation found across the study area is provided below with details relating to each Mitchell landscape area following.

The study area starts within the western edge of the South Western Slopes bioregion where vegetation communities along the lower slopes are characterised by tree species including white cypress pine, yellow box and belah. Along the eastern edge of the Riverine Plain, river red gums grow along all streams with occasional black box, lignum and river cooba. Alluvial loams are occupied by poplar box, belah and yellow box (NSW NPWS 2003: 120-121)

The sandy soils of modern river channels within the study area support river red gum and river cooba communities. Within the Riverina bioregion, the soil is more saline with heavy clays towards the outer edge of the river floodplains. In these locations, black box woodlands dominate with an understorey of salt-tolerant grasses, saltbushes and daisies. On the rarely flooded river terraces are yellow box communities with cypress pine and grey box. Further from the rivers are many treeless plains such as the Hay Plain that are vegetated with saltbush shrubland. On the western boundary of the bioregion are mallee communities growing on the calcareous sandy soils of the Murray Darling depression bioregion (NSW NPWS 2003: 92)

The sandplains of the Murray Darling depression bioregion typically contain the following plant species: white cypress pine, rosewood, narrow-leaf hopbush, copperburrs, belah and variable spear grass. The dunes in this bioregion support diverse mallee communities with mixed shrubs and porcupine grass. Within lunettes, the vegetation varies with clean sands often supporting White Cypress Pines, while brown clayey sands support mallee with porcupine grass (NSW NPWS 2003:80).

3.3.1 Vegetation by Mitchell landscape:

Wonga Hills and Ranges feature woodlands of tumbledown red gum, red stringybark and grey box on slopes. On the flats Kangaroo grass and plains grass can be found with yellow box and white box with the occasional Blakely's red gum (DECC 2002: 99).

Similar to Wonga Hills and Ranges landscape, the **Coffin Rock Granite Hills** feature woodlands of tumbledown red gum, red ironbark, red stringybark, white gum, Blakely's red gum and white cypress pine with Kangaroo grass and plains grass (DECC 2002: 100).

The **Brokong Plains** have been extensively cleared and cropped and were formerly woodland to open forest comprising grey box, yellow box, Blakely's red gum and white cypress pine (DECC 2002: 91).

Within the **Lockhart Hills and Footslopes** landscape are tumbledown red gum, red ironbark, red stringybark, hill oak, daphne heath, golden wattle and grasses. White cypress pine is found around the base of the hills with black cypress on the crests (DECC 2002: 92).

Murrumbidgee – Tarcutta Channels and Floodplains contain river red gum gallery woodland on the banks with yellow box and grey box open woodland on the floodplain and terraces (DECC 2002: 93).

Murrumbidgee Channels and Floodplains contain open forest of river red gum, river cooba, lignum, and nitrate goosefoot with numerous grasses along the channels and floodplains. On the outlying floodplains and back plains is black box woodland with lignum, nitre goosefoot, thorny saltbush, old man saltbush and annual saltbushes. Within flooded depressions are cumbungi, common reed and nardoo (DECC 2002: 105).

The **Murrumbidgee Scalded Plains** landscape contains low shrublands and grasslands of bladder saltbush, other annual saltbushes, numerous burrs, cottonbush, bush minuria, white-top grass, windmill grass and hill wallaby grass (DECC 2002: 105).

Vegetation within the **Murrumbidgee Depression Plains** is reported to have changed substantially since European settlement from myall, old man saltbush and bladder saltbush to heavily grazed

grasslands of wind-mill grass, spear grass and sand broom with invasive exotic species. Along sandy ridges adjacent to prior streams are patches of white cypress pine, needlewood, western pittosporum and spear grasses (DECC 2002: 105).

Within the plains of the **Mallee Cliffs Sandplains** landscape vegetation includes rosewood, white cypress pine, sugarwood, belah, black bluebush and pearl bluebush with speargrass, bottlewashers and copperburr. On the dunes, vegetation includes scattered rosewood, belah and mallee with isolated porcupine grass, white cypress pine, narrow-leaf hopbush, punty bush and grasses. Depressions are usually fringed by black box and contain annual saltbush, canegrass, lignum and nitre goosefoot (DECC 2002: 64).

Vegetation within the **Mallee Cliffs Linear Dunes** landscape is characterised by dense mallee, belah and rosewood with porcupine grass. Within the narrow swales are belah, rosewood, scattered shrubs, variable speargrass, copperburr and forbs (DECC 2002: 63).

The **Murray Channels and Floodplains** landscape contains river red gum, black box and river cooba along the river banks with billabongs surrounded by river red gum, dense lignum, common reed and cumbungi. River flats are rimmed with black box, lignum and canegrass while the highest flood terraces contain yellow box. Dunes and sandplains within this landscape feature belah, white cypress pine, malle, rosewood, needlewood and marginal clumps of black box, belah, prickly wattle over bluebush and grasses (DECC 2002: 103).

Table 3: summary of landforms, soils, vegetation and archaeological implications by landscape type.

Landscapes in Research Area	Landforms	Soil description	Vegetation	Archaeological Implications
Wonga Hills and Ranges	Rolling hills and low rises	Stony, thin red and brown texture contrast soils. High salinity in the subsoil.	Tumbledown red gum, red stringybark yellow box, white box and grey box	Artefact scatter Culturally modified tree
Coffin Rock Granite Hills	Rolling to steep rocky hills on granite foundation	Coarse gritty red and brown texture-contrast soils on slopes. Yellow harsh texture-contrast soils on flats.	Tumbledown red, red ironbark, red stringybark, white gum, white cypress	Artefact scatter Culturally modified tree (occasional)
Brokong Plains	Quaternary alluvial plains	Red-brown texture contrast soils.	Formerly grey box, yellow box, Blakely's red gum and white cypress	Artefact scatter Hearths Culturally modified tree (occasional) Burial Midden
Lockhart Hills and Footslopes	Isolated steep rocky ridges forming prominent peaks and ridges	Layered colluvium, sandstone boulders and stony brown harsh texture-contrast soils on foot slopes.	Tumbledown red, red ironbark, red stringybark, hill oak, white cypress and black cypress	Artefact scatter Culturally modified tree (occasional) Ceremonial Stone arrangement

Landscapes in Research Area	Landforms	Soil description	Vegetation	Archaeological Implications
Murrumbidgee – Tarcutta Channels and Floodplains	Channels, floodplain and terraces including active and inactive tributaries of the Murrumbidgee.	Quaternary alluvium: organic sand and loam on floodplain with yellow texture-contrast soils on higher terraces.	River red gum, river cooba, lignum Cumbungi, reed and nardoo in flooded depressions. Black box and saltbush varieties on back plains	Artefact scatter Hearths Culturally modified tree Burial Midden Earth mound
Murrumbidgee Channels and Floodplains	Channels and floodplains inc scaled alluvial flats, elevated floodplains and isolated sandy rises	Quaternary alluvium: grey and brown clay with occasional sand.	River red gum, river cooba, lignum. Back plains have Black box and saltbushes with Cumbungi, reeds and nardoo in flooded depressions.	Artefact scatter Hearths Culturally modified tree Burial Midden Earth mound
Murrumbidgee Scalded Plains	Quaternary alluvial plains, with extensive scalds. Interpreted as relic floodplains or terraces.	Grey, brown and red cracking clays. Red brown texture-contrast soils within scalds.	Saltbush varieties and grasslands	Artefact scatter Hearths
Murrumbidgee Depression Plains	Quaternary alluvial plains, circular depressions and low terraces. Interpreted as high floodplains or low terraces.	Grey to brown clays and clay loams. Sandy linear patterns from prior streams.	Formally saltbush species with myall. White cypress, needlewood and spear grasses	Artefact scatter Culturally modified tree (occasional) Burial Stone arrangements Hearths Earth mound Midden
Mallee Cliffs Sandplains	Slightly undulating Quaternary aeolian sands with east-west trending dunes. Blowouts, swales and small depressions	Solonized brown soils, calcareous loamy sand and texture-contrast soils on the plain. Red and brown sands on dunes. Non-cracking grey or brown clays in depressions.	Rosewood, white cypress, sugarwood, belah and bluebush species. Mallee, penty bush and grasses. Black box, saltbush and lignum around depressions	Artefact scatter Hearth Culturally modified tree Burial

Landscapes in Research Area	Landforms	Soil description	Vegetation	Archaeological Implications
Mallee Cliffs linear dunes	Quaternary dunefields and sandplains narrow swales	Deep brownish sands and calcareous soils.	Mallee, belah, rosewood with porcupine grass	Artefact scatter Hearth Culturally modified tree (occasional) Burial Earth mound
Murray Channels and Floodplains	Active channels and floodplains of Murray River and associated features. Scalded alluvial flats	Quaternary alluvium. Isolated sandy rises.	River red gum, black box and river cooba. Belah, white cypress, mallee, prickly wattle and grasses in sandplains	Artefact scatter Hearth Culturally modified tree Burial Midden Fish trap Earth mound Resource procurement

3.4 Aboriginal use of the land

3.4.1 Flora and Fauna Resources

3.4.1.1 Clothing resources

Ethnohistorical sources record many descriptions of clothing, and their origins, of Indigenous peoples in the study area. Such descriptions include using kangaroo and possum skins for cloaks, processed through the use of mussel shell scrapers (Bennet, 1834; Hobler, 1825-1871). Cunningham (1817) also describes kangaroo ‘mantles’ which extended from the shoulder to the mid-back as being worn by women.

Bennet (1834) also describes the use of kangaroo sinew (primarily from the tail) as a form of thread used with bone needles. He also describes cloaks as being “decorated with markings representing kangaroos, emus, turtles and other ornamental designs”. Bennet (1834) also describes such sinew as being coloured through the use of ochre or clays, and used for string based items such as hair nets.

Cunningham (1817) also describes belts and head coverings of “a grass network”, kangaroo teeth earring, cockatoo feather hair decoration, and also observes ‘young men’ has having “their beards divided into three divisions and formed into plaited tails”.

3.4.1.2 Food resources

Food resources are recorded as being used by Indigenous peoples in ethnohistoric sources. These include freshwater aquatic resources, mammal and reptile species, both land and water bird species, plant species, and various insects and grubs.

Freshwater resources are commonly used in areas close to rivers and water sources and recorded as a primary food source in such areas. Ethnohistoric sources frequently describe various fish species as being caught with nets and traps (Mitchell, 1839; Morey, nd; Margaret Tucker 1977). McDonald (1850) reports fish to become a significantly less common food source during times of increasing floodwater. Freshwater turtles are noted by both Mitchell (1839), and Tucker (1977). Various reptiles are also described by Fraser (1892) and Cunningham (1817) which may also include freshwater turtle. Yabbies are described as a food source by Mitchell

(1839), and other shellfish such as mussel (Sturt, 1833), are also noted as a food source. Mitchell (1839) also refers to various mussel type species being harvestable from empty lakes in the dry season through digging in the sand. Robinson (Clark 2014) also describes women as “fishing for shells” in the lakes.

Kangaroo and possum are described as common terrestrial food sources (Fraser 1892; Gribble 1933; Margaret Tucker 1977), however McDonald (1850) describes them as being of limited priority in some of his observations.

Various types of birds are commonly described as food sources in ethnohistorical sources. These include ‘turkey’ (Gribble, 1933) and emu (Gribble 1933; Tucker 1977), Sturt (1833) describes emu as a food for “old men” only. General ‘freshwater birds’ are also commonly referred to, and occasionally specified as including pelican, swan, duck, and others (Sturt, 1833; Mitchell, 1839; McDonald, 1850; Beveridge, 1883; Gribble, 1933; Tucker, 1977). Sturt (1833), also notes that in some areas ‘duck’ is limited to married people only. Beveridge (1883) and Gribble (1933) also note eggs as a food source.

Various plant types are referred to as food sources by ethnohistories. These include: Pigface (*Carpobrotus glaucescens*) (Morey, nd); Balyan (likely a form of *Typha*), which was processed to form a flour-like substance (Mitchell 1839); “wild lettuce and carrots” (Gribble 1933); “roots, herbs grass seeds, fungi &c” in placement of fish species during flood periods (McDonald, 1850); and various tuber types (Eyre, 1845; Gribble, 1933; Sweeney, 1947). Sturt (1835) describes them as a food source used predominantly in the dry season.

Other traditional food sources are recorded as including various types of berries, seeds and greens (Montero Lopez, 2016) along with the Yam Daisy, Kurrajong (seeds and roots) and Acacia (seeds and shoots) (Barber, Ruhl and Bradley, 2016).

Insects are described as food sources in many non-waterfront areas, including various ant species, and ant eggs (Eyre, 1845; Fraser 1892), and ‘grubs’, including witchety grubs (Eyre, 1845; Fraser 1892, Tucker 1977).

3.4.2 Plant tool and weapon resources

Bark, primarily from Eucalypt species, was a common resource utilised for creating a number of tools, as well as for various other uses. Bark harvesting for such uses leaves identifiable scars on existing trees, which add to the archaeological record.

Gribble (1933) also describes “dinner plates” and coolamon as being made from singular pieces of bark removed from Eucalypt trees. Likewise, he also describes large pieces of bark as being stripped from Eucalypts for use in shelter and house construction. He also describes one shield type made in the Warrangesda area. He notes this shield to be broad in shape, “made out of very thick sun-dried bark”, and used especially against spears (Gribble, 1933).

Though Gribble (1933) does reference canoe construction, he primarily discusses using them as a child, rather than the process and materials. Tucker (1977) does however describe the process and materials. She identifies the need for a “suitable gum tree” from which the correct shape of harp would be removed using an axe. Gribble (1933) also describes the use of “the pith of a certain plant” which was lit and used to create small circular burn scars which “were worked into a design by way or ornamentation”. This is a process which Gribble describes as being associated with women – although he is not clear if the ornamentation type is only used by women, or if it is women who are responsible for conducting the practice.

Thin strips of bark are also recorded as being sewn together to create bags (Gribble, 1933). Gribble (1933) describes these bags as being especially useful for honey gathering. Similarly, Gribble (1933) also notes that vessels for carrying water could be made from the bark “stripped from the round lumps on gum trees”. Thin strips of bark from cypress pines, are also recorded as being used for creating torches (Thompson, 1982).

Wood and other plant materials were also utilised in a number of ways for manufacture of tools and weapons, as well as other more general uses. Beveridge (1883) describes the creation of cord from plant fibres, similarly Gribble (1933) notes the creation of bags and baskets from fibres, rather than bark strips.

Gribble (1932) also describes bark squares as being used during processing of skins. He also notes “carefully made” pegs used to pin out the skins for drying and processing (Gribble, 1932). He describes these pegs as being hardened with fire, and also being made of “a certain shrub which grew in the sand-hills” (Gribble, 1932).

Other wooden artefacts described in ethnohistorical sources include digging sticks (Sturt 1833; Mitchell, 1839) and shovels (Oxley, 1820; Bennet, 1834). Weapons also included spear throwers, clubs/nulla nullas, throwing sticks, and axe handles (Oxley, 1820; Bennet, 1834). Gribble (1933) also describes wooden shields for use against nulla nullas, and broad tipped boomerangs with “decorative carving”.

3.4.3 Inorganic resources

Ethnographic sources make little mention of inorganic material sources; however they do note the use of a number of materials. Various clays and ochres are mentioned in passing, with clays being used for decorations primarily, and ochres primarily in reference to dying and colouring (Bennet, 1834). Ethnographic sources do not seem to mention the origin of these resources, however.

Stone material is referenced as being in use for creating a number of tools and weapons, however the specifications of this material, or its origin is not noted. Cunningham (1817) does refer to a “green jade hatchet” which he trades for in the Murrumbidgee area. Beveridge (1883) does, interestingly, reference several materials outside stone which are used to create tools. These materials include shell, bone, and reed materials. He references these tools specifically regarding cooking, however, as Hobler (1825-1871) and Bennet (1834) both reference mussel shell scrapers used in processing skins, it is feasible that such tools existed in non-food related contexts.

3.4.4 Land Management

A number of ethnohistorical sources note the use and construction of fish trap and weir structures by Indigenous peoples. A number of sites have been recorded in the archaeological record in the area surrounding the study area, for example at Balranald on the Murrumbidgee River (see Appendix 2).

Ethnohistoric recordings of such sites include Townsend (in Klaver 1998) who described a ‘fish dam’ near Narranderra, Beveridge (1883) who described weir structures built from wooden stakes which functioned as both traps, and pools in which fish could be stored for later capture. Gilmore (1934) also describes ‘log traps’ in use in billabong sites during large gatherings. Beveridge (1883) describes the creation of weir structures and the collection of fish as a practice conducted by women. Norton (1907) also described weir structures on the Murray and Murrumbidgee rivers as being sapling based, and used during the flood season to trap fish for ease of catch, or for storing fish in the post-flood season. He notes that these structures were primarily created in the spring season.

3.4.5 Sites

Of various site types present in the study area, burial sites are those most predominantly recorded in ethnohistorical sources. Burial sites are not, however, necessarily limited to one specific landform. Mitchell (1839) records observing burial sites in a number of landforms and environments, including “reedy hollows” and “risen ground”. He also records, in the Murrumbidgee/Riverine area, burials on raised mounds on floodplains, and on the Lachlan River, burials existed on flat country. Robinson (Clark 2014) records graves as slight mounds with “raised ridges” at Lake Tala. Cunningham (1817), records similar burial areas as being located on “mound[s] of earth about 3 feet above the level of the ground” with associated ridges and scarred trees. Sturt (1838) records burials on sandhills, and theorises that “sandy soils are utilized as being easier to excavate”. Morey (nd) described burials near Euston as being “on a high bank

overlooking the river”, while in other instances (Morey nd) describes the burial of an important man as being in a selected cemetery “on a sandy rise sloping to the river”. Morey (nd) does however, note that this was abnormal due to the status of the man, and that remains were usually interred in the nearest location that consisted a of a sandhill “above the floodmark”. Stone (1911) also references the practice of burials in association with hearth sites.

Cunningham (1817) also describes locations of campsites he observes as being near creeks, or on margins of “extensive low swamps”. While hearth and oven sites are observed, these are rarely recorded with any connection to landform or environmental descriptions. Stone (1911) and Mitchell (1839) do, however, suggest these could be prominent sites in the landscape, and Mitchell (1839) observes many of these hearth and oven sites as being located in proximity to water, to the extent that “very ancient” sites might be within the current path of the river, or far from it, depending on the movements of the water course over time.

3.5 Land-use History

The environment of the Sturt Highway study area has been significantly impacted by European settlement. Land clearance for agriculture and the impact of rabbits has changed the vegetation of the study area. Flows within the rivers of the study area are now highly regulated by dams and weirs for irrigation. Wind erosion has increased since settlement, which has a direct influence on the aeolian features in the study area, with the extent and location of scalds being particularly transient (Butler et al 1973: 29).

Early European explorers can provide some insight into the environment of the study area prior to intensive European settlement and alienation of Aboriginal groups from Country. In 1833 Sturt travelled along the Murrumbidgee River and commented on the great extent of treeless plains at Maude located west of Hay. In this area Sturt recorded that the grasses further east were replaced by saltbush. Graziers with cattle and sheep arrived in this area not long after the explorers and impacts to vegetation were observed as early as the 1840s. It was noted that the more palatable species of saltbushes were eaten out and native grasses spread in their place. Reed beds in the seasonally flooded sections of the river plains were rapidly depleted as they were found to be a great resource to fatten cattle (Butler et al 1973: 26).

From about 1880 to 1930 major environmental impacts resulted from three key factors: the spread of rabbits, introduction of widespread farming and start of irrigation. Rabbits were introduced in Geelong in 1862 and by 1879 had crossed the Murray River creating extensive damage to native vegetation and further increasing soil erosion and pasture depletion. Farming across the study area became a common practice from about 1880 resulting in removal of trees, and replacement of native grasses by crops, pasture species and weeds. The lack of reliable rain limited the physical expansion of farming westward in the early 20th century (Butler et al 1973: 27). However after World War I several subdivisions were proposed including the 1920 a Commonwealth government program to settle discharged Australian soldiers on land within the Murrumbidgee Irrigation Area (Water Conservation & Irrigation Commission 1920). About 30 years earlier, large scale irrigation farming along the Murrumbidgee River had started for growth of crops, cereals and fruit. A by-product of irrigation was salinity and waterlogging which was first noted in the 1920s (Butler et al 1973: 27).

The major development in the region from the 1930s was further expansion of irrigation. This expansion involved significant changes to the landscape of the study area through construction of water channels, weirs and water storage dams along rivers and streams to control the flow of water and suit irrigators needs. Irrigation supports production of rice, animal fodder, cotton, table grapes, wine grapes, almonds, citrus and olives (MDBA 2021). The construction of dams and weirs has had a significant impact on the flow regimes of the rivers. Continued irrigation has created further areas of waterlogged and saline conditions resulting from rising water tables (Butler et al 1973: 28).

4 ETHNOHISTORIC CONTEXT

Aboriginal people living within the Sturt Highway study area were distinguished by various language groups at the time of first European contact. Language groups recorded across the study area include the Wiradjuri, Nari Nari, Muthimuthi, Tatitati and Kureninji. These language groups and their approximate geographic boundaries were recorded by Tindale as shown in Figure 13 below.

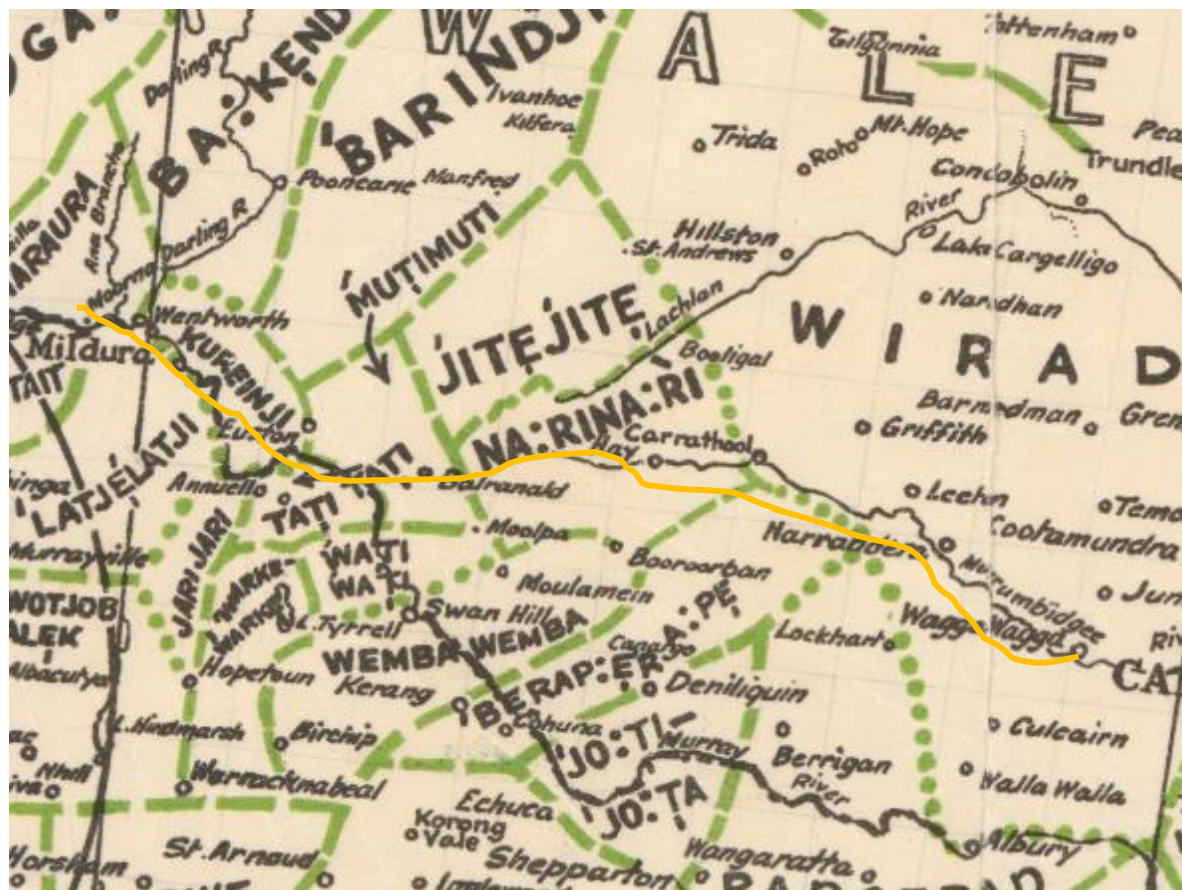


Figure 13: Approximate location of study area overlaid on Tindale's (1940) map showing Aboriginal Tribes of Australia.

Tindale's map attempts to represent the language and tribal groups of Aboriginal Australia in the first half of the 20th century. As shown in Table 4 there are many variations in the way that language group names are spelt. For example, in the Australian Institute of Aboriginal and Torres Strait Islander Studies map of Indigenous Australia, Tindale's Mutmuti are referred to as the Madi Madi and the Tati Tati are referred to as the Dadi Dadi.

There is still some debate over the geographic boundaries of people living within region surrounding the study area. However, ethnohistoric sources suggest that these groups of people would have interacted for trade, ceremonies, dispute resolution, marriage and access to resources, despite any differences in language, material culture or customs.

Table 4: Distribution of Aboriginal tribal groups within the Sturt Highway study area based on Tindale's *Aboriginal Tribes of Australia* (1974).

Tribal name	Location within study area	Alternative names
Wiradjuri	On the Lachlan River and south from Condoblin to Booligal. South of the Murrumbidgee from east side of Hay. Includes country around Wagga Wagga and east to Gundagai. South as far as Albury and north east as far as Gulgong.	Wiradyuri, Wiradhuri, Wiraduri, Wiradjeri, Wirra' jerre', Wiradhari, Wirra-dhari, Wirradhurri, Wirradthoor-ree, Wirraidyuri, Wirraddury, Wirraijuri, Wirraijuri, Wiiratheri, Wirrathuri, Wiradthuri, Wiradthery, Wirathere, Wiratheri, Wiragere, Wuradjeri, Wiradurei, Wirashurri, Wirradgerry, Weradgerie, Woradgery, Waradgeri, Wiraturai, Wiradurei, Wirrajerry, Weongery, Woradjera, Wooradgery, Woorajuri, Woradjerg, Weerarthery (said to be Kamilaroi name), Wirotheree, Wiratheri, Wooratheri, Wooratherie, Wiiradurei, Wirradthooree, Warradjerrie, Waradgery, Wayradgee, Wirrajeree, Wirradjery, Wir-ra' jerree, Wirrai-yarrai, Wirrach-arree, Wiradjwri (typographical error), Warrai Durhai, Wirraidyuri, Kunamildan (of the Thaua, means 'come by night,' i.e., night raiders), Wagga tribe (a horde).
Nari Nari	Southern bank of the Lachlan River from Booligal to near Balranald. Up the Murrumbidgee River to Hay and south to about Booroorban.	According to Cameron, the Narinari were also called Wathi wathi.
Muthimuthi	On Murrumbidgee River at Balranald; southwest to Murray River; west to near Lake Benanee; at Reedy Lake; north to west of Carrawathal.	Muti muti, Mutte Mutte, Matimati, Madi-madi, Mataua, Moorta Moorta, Matthee-matthee, Bakiin (of tribes to the south, means 'stealthy marauders by night').
Tatitati	From 13 km below Euston to 25 km above Murrumbidgee junction with Murray River. Located chiefly on southern bank of the Murray River but extending north to Lake Benanee.	Tunggut (valid alternative), Tataty (['ta:ti = no), Tatatha, Tat(h)i, Ta-tathi, Tar-tarthee, Ta-tathi, Taa-tatty, Darty-Darty, Nimp-mam-wern (lit. Light lip).
Kureninji	From near Euston on the northern bank of the Murray River downstream to Wentworth.	Kareingi (valid alternative), Karin, Kerinma, Karinma, Karingma, Grangema, Garnghes, Orangema (misprint), Kinenekinene, Kianigane, Keramin, Kemendok, Pintwa, Jungeegatchere.

The following table provides a summary of ethnohistoric records relating to Aboriginal people living within the region of the broader study area. Many of these sources come from the journals of early European explorers such as Sturt and Mitchell. The information presented here is collated where possible around the language groups identified by Tindale and others starting in the east and moving to the western end of the study area.

Table 5: summary of ethnohistoric records within the study area and surrounding regions.

Author/source	Year	Location	Key findings
Wiradjuri Country			
Cunningham 1817	1817	Lachlan River	Wiraduiiri men described as having very long beards, and regularly being tattooed, particularly around the shoulders and upper chest, These were usually in a systematically diagonal pattern. Septum piercing was common, but Cunningham notes seeing no “stick or reed worn through it”
Cunningham 1817	1817	Lachlan River	Cunningham recorded grass belts used for carrying tools, wooden and reed spears with varying uses, and wooden digging sticks
Cunningham (1817, 30th July)	1817	Lachlan River	<p>“Near our encampment a native grave of modern construction, from the regular manner and systematical mode in which everything connected with it is disposed, led us to conclude that this mausoleum contained the remains of some person of eminence, either a chief or one who had acquired from his skill in hunting, the respect and awe of his countrymen. It is a mound of earth about 3 feet above the level of the ground and is bounded on one side by three rows of seats forming the segment of a circle and of the following dimensions. The inside tier 40ft long, the centre 45 feet and the outer one 50 feet. Each tier is 4 ½ feet apart and about one foot high. On the opposite side of the grave is a single tree less than any of the others, and on the north and south side of the grave are openings to it. About 6 feet to the west of this mausoleum stood a cypress on which was cut out with very considerable labour remarkable characters, the stem having been previously barked and about 30 feet north west was another having some singular Figures deeply cut on its stem - perhaps a description of the man, his age, and cause of death.</p> <p>The banks of the river vary in height, from 5 to 16 feet, clothed as usual with Acacia stenophylla and a few Casuarinae As Mr. Oxley is instructed to collect all the information possible respecting the government, customs and habits of the aborigines of the country over which we might pass - points on account of the sparse thin population of Western Australia, which we had no opportunity to furnish ourselves - he intends to</p>

Author/source	Year	Location	Key findings
			<p>open the grave in order to ascertain its internal appearance. Removing the whole of the mound, we found it vaulted with pieces of wood and layers of bark and came to the body about 3 ½ feet below the surface of the ground, compressed in a grave 2 feet by 4, formed in long ovate figure sufficient to contain that part of a person from head to hip - the legs and feet having been forced over the shoulders. The body was placed on its right side, and the face looking towards the East or rising sun. His head was ornamented with the usual netting, and his opossum hatchet-girdle was placed beside him. From the size of his bones he appears to have been a man of about 6 feet, and might have been 40 years of age, and apparently had not six months. The Cypress and Blue Gum are more abundant than they were. Our people took up his skull, which had the hair very fresh upon it. Its upper jaw wanted one of the front teeth, which loss may be accustomed by the same custom prevailing here as is adopted on the eastern coast. The skull Mr. Oxley intends to take with us, as a subject for study by craniologists.”</p>
Cunningham 1817	1817	Lachlan River	<p>“Our huntsmen came up with a native, his two gins or wives and three small children. They were extremely shy and by no means friendly, showing symptoms of suspicion and mistrust towards our people, who tried to persuade them to follow them to our encampment but to no purpose. The man was represented as of a strong robust athletic habit, perfectly naked, and armed with a stone hatchet and a long spear of acacia wood, with which he continually kept our people at a distance when they attempted to approach the females. The women were of delicate low stature, wore short mantles of skin round their shoulders, but were otherwise naked and were from 25 to 30 years of age. They carried some wooden spoon-shaped instruments in their hands, with which they dig for grubs, or roots.”</p>
Cunningham 1817, 14th August	1817	Lachlan River	<p>“They were young men of 5 feet 4-6 inches, of well-proportioned features, and with large bushy heads of hair, which gave them a wild ferocious appearance.”</p>
Cunningham 1817, 14th August	1817	Lachlan River	<p>“The cartilage of the nose of one of them was perforated and a stick or reed passed through it. They did not want for their front teeth. The pain occasioned by the deep tattooing process on their backs and breasts must be almost intolerable. Large cartilaginous pieces of flesh projected from their backs - almost an inch - forming various figures”.</p>

Author/source	Year	Location	Key findings
Cunningham 1817	1817	Lachlan River	“By way of ornament they wore kangaroo teeth in their ears and cockatoo feathers in their hair. Those of them who were young men had their beards divided into three divisions and formed into plaited tails.”
Cunningham 1817, 10th August	1817	Lachlan River	<p>Along an 8ft wide creek “quantities of the horse-mussel shells” and “some stones on which they had been sharpening some weapons or instruments” are noted.</p> <p>Cunningham also notes the surrounding land has having evidence of kangaroos and emus and describes the land as “fine grassy grounds”.</p> <p>Later in this entry interaction with a local hunting party is described, in which a number of non-identified Indigenous men are described being found as a result of the noise of possum hunting. The men were described as being “loaded with kangaroo, rats and snakes”.</p> <p>The men are invited to join Cunningham and Oxley’s camp, and the men are described as having “roasted the fruits of their labours entire, gutting the opossum, and when sufficiently baked, devouring the entrails first, as a great delicacy, which they appeared to enjoy the more when powdered and peppered with fine wood-ashes!”</p> <p>Oxley also trades an “old” iron hatchet for a “green jade hatchet” and shows the men the benefits of using an iron hatchet.</p>
Cunningham (1817)	1817	Near Booligal	Describes huts on margins of “extensive low swamps”. These huts are “built rather stronger than usual, evidently in the wet season, and having a loose thatch of red grass”.
Cunningham 1817	1817	Riverine Plain	“They carried some wooden spoon-shaped instruments in their hands, with which they dig for grubs, or roots.”
Oxley 1820	1820	Lachlan River	Oxley (1820) and Bennet (1834) describe septum naris piercings with a bone, straw or stick in both men and women. And singular upper incisor removal during initiation.
Bennet 1834	1834	?	

Author/source	Year	Location	Key findings
Oxley 1820	1820	Lachlan River	Journals describe spear throwers, parrying shields, broad shields, clubs, shovels, axes and varieties of throwing sticks
Bennet 1834	1834		
Bennet (1834)	1834	Lachlan River	Describes possum and kangaroo skin coats made through the use of mussel shell scrapers. Also kangaroo tail sinew being used to form thread, and bone awl needles to sew cloaks from skins. Ornamental patterns occur – but report is a little vague about if these are on the cloaks or the awls. Kangaroo sinew thread also used for hair nets coloured by ochre or pipeclay for both men and women
Mitchell 1839:65-66]	1839	Lake Waljeers	“The bed of this lake had been full of the fresh-water muscle [sic]; and under a canoe... were several large cray-fish dead in their holes. Dry and parched as the bed of the lake was, the natives found nevertheless live freshwater muscles [sic], by digging to a substratum of sand”.
Mitchell 1839:53, 80-81	1839	Murrumbidgee River	“One artificial feature, not observed by me in other places, distinguishes localities principally frequented by the natives, and consists in the lofty mounds of burnt clay, or ashes used by them in cooking. The common process of natives in dressing their provisions, is to lay the foot between layers of heated stones; but here, where there are no stones, the calcined clay seems to answer the same purpose, and becomes better or harder, the more it is used. Hence the accumulation of heaps resembling small hills. Some of them were so very ancient, as to be surrounded by circles of lofty trees; others, long abandoned, were half worn away by the river, which, in the course of ages, had so far changed its bed, that the burnt ashes reached out to mid-channel; others, now very remote from the river, had large trees growing out of them. I saw the first of these heaps, where near the end of the last day’s journey along the Lachlan, where this river partook of the reedy character of the Murrumbidgee. I understood that the Balyan, or bulrush-root, which is the chief food of the natives there, is prepared in those kilns, when a family or tribe are together.”
Mitchell 1839	1839	Murrumbidgee River	Tree stage burials have been recorded along the Murrumbidgee, and reports exist of women carrying bone bundles.

Author/source	Year	Location	Key findings
Mitchell 1839:65-66	1839	Murrumbidgee River	“The bed of this lake had been full of the fresh-water muscle; and under a canoe ... were several large cray-fish dead in their holes. Dry and parched as the bed of the lake then was, the natives found nevertheless live fresh-water muscles, by digging to a substratum of sand. I understood that they also find this shell alive, in the same manner in the dry bed of the Lachlan:
Mitchell 1839 Vol II:53	1839	Lachlan River	“I found about the fires of the natives, a number of small balls of dry fibre, resembling hemp, and I, at first, supposed it to be a preparation for making nets, having seen such on the Darling. Barney, the native, however, soon set me right, by taking up the root of a large reed or bulrush, which grew in a dry lagoon hard by, and by shewing me how the natives extracted from the rhizoma a quantity of gluten; and this was what they eat, obtaining it by chewing the fibre. They take up the root of the bulrush in lengths of about eight or ten inches, peel off the outer rind, and lay it a little before the fire; then they twist and loosen the fibres, when a quantity of gluten, exactly resembling wheaten flour, may be shaken out, affording at all times a ready and wholesome food. It struck me that this gluten which they call Balyan, must be the ‘staff of life’ to the tribes inhabiting these morasses, where tumuli and other traces of human beings were more abundant than at any part of the Lachlan that I had visited”
Mitchell 1839:2:88	1839	Murrumbidgee and Lachlan Rivers	“On rising ground near our camp, were several graves, all enclosed in separate parterres of exactly the same remarkable double and triple ridges, as those first seen on the lower part of the Lachlan. There were three of these parterres all lying due east west. On one, evidently the most recent, the ashes of a hut appeared over the grave. On another, which contained two graves (one of a small child) logs of wood, mixed with long grass, were neatly piled transversely; and in the third, which was so ancient that the enclosing ridges were barely visible, the grave had sunk into a grassy hollow. I understood from the widow that such tombs were made for men and boys only, and that the ashes over the most recent one were the remains of a hut, which had been burnt and abandoned, after the murder of the person whose body was buried beneath, had been avenged by the tribe”
‘Mitchell 1839 Vol II: 60-61	1839	Lachlan River	“The principal food of these inhabitants of the Kalare or Lachlan appeared to be ‘balyan’, the rhizoma, as already stated, of a monocotyledonous plant or bulrush, growing amongst the reeds. It contains so much gluten, that one of our party, Charles Webb, made, in a short time, some excellent cakes of it; and they seemed to me lighter and

Author/source	Year	Location	Key findings
			sweeter than those prepared from common flour. The natives gather the roots and carry them on their heads in great bundles, within a piece of net. The old man came thus loaded to the fire, where the blind child was seated; and indeed this was obviously their chief food among the marshes.”
Townsend 1848 (in Klaver 1998).	1848	Narrandera	Describes a “fish dam” crossing a creek tributary in swampland
Gribble, Rev. John B	1880	Warrangesda	Warrangesda mission was established in 1880 near Darlington Point by Rev. John Gribble (father of Ernest Gribble)
Curr, Edward M 1883: 311-313	1883	Lachlan River?	“After a time, when these paroxysms of grief had subsided, a sheet of bark, rather larger than the grave, was stripped from a neighbouring tree and placed over the remains in a somewhat arched form.”
Woolrych 1890	1890	Wiradjuri Country	Writings from settlers on the Wiradjuri people did differentiate between subgroups, describing them as the Lachlan, Murrumbidgee, or Levels tribes
Mathews 1897	1897	Murrumbidgee River	The area of the Murrumbidgee between Jugiong and Hay was Wiradjuri country. However, he identifies this Wiradjuri group as being the southern variation and differing from those in the north.
ALP Cameron* 1899	1899	Wiradjuri and Nari Nari country	<p>Makogo, a Wathi Wathi man, informed Cameron's boundary descriptions in the Murrumbidgee Lachlan area, which identified the Wathi Wathi country as being from Balranald to the Murrumbidgee/Lachlan junction. This was the border with the Yita Yita (also Ithi Ithi).</p> <p>He also notes that Wiradjuri county was bordered by the Yita Yita, Wathi Wathi, Mathi Mathi, Ta-Tathi and Keramin groups. It was explained that in general, as these groups spoke varying languages, a Wiradjuri man could speak 2-3 languages, and understand additional ones.</p> <p>* note that Cameron describes the Wathi Wathi and Nari Nari groups as the same.</p>
Howitt 1904	1904	Narrandera	Near Narrandera the Wiradjuri were bordered by the Baraba Baraba people to the southwest

Author/source	Year	Location	Key findings
Ernest Gribble nd	ca 1932	Warrangesda	“In those days, kangaroos and emus as well as turkeys were very numerous on the plains. If the skins were not needed, the animals would be thrown on the fire and the hair singed off. They would then be disembowelled and cooked. If on the other hand the skins were needed for any purpose, they were carefully removed, pegged out on squares of bark, and then dried in the sun. The pegs used for pegging out skins were carefully made, and the points hardened in the fire. These pegs were made from a certain shrub which grew in the sand-hills. On the Murrumbidgee River the natives in the spring of the year gathered wild lettuce and carrots, and in the sand-hills a small sweet yam”
Ernest Gribble 1932 and 1933	ca 1932/ 1933	Murrumbidgee River	“In some tribes the knocking out of the teeth was a tribal mark, men and women alike having to undergo it. Other tribes have a special tribal mark on the body, in addition to the ceremonial markings. Among the aborigines on the Murrumbidgee, the women worked designs upon the legs and arms with fire, by way of decoration. The pith of a certain plant was lighted and placed in small pieces upon the flesh and allowed to burn itself out. This left a spot, and these spots were worked into a design by way of ornamentation”
Ernest Gribble nd	ca 1932	Warrangesda	Thought the Wiradjuri to be “without doubt the best huntsmen in the continent”. He goes on to describe that the open aspect of the country required “a great deal of strategy” when hunting game. As such “the natives were adept in making all sorts of snares”. He also describes a practice where “the hunter would use a screen of green bushes, and would succeed, after much patience, in getting close enough to launch his weapon”.
Ernest Gribble. Account of the foundation of Warrangesda Mission Station	ca 1932	Warrangesda	Gribble describes the process of possum hunting and its relationship to scarred trees, saying that: “A native would examine a gum-tree for recent scratches on the bark made by ascending possums; then with his tomahawk, he would ascend, cutting small steps in the bark just sufficient to put his toes into. Reaching the hollow he would examine the entrance for traces of the animal ... He would then probe the hollow with a long switch. If he could reach the bottom of the hollow he would be able to feel if the animal was “at home”. Then tapping the outside of the tree to find the end of the hollow by the sound, he would soon cut through, and inserting his hand draw out by the legs and tail the little

Author/source	Year	Location	Key findings
			<p>animal, and killing it by banging its head against the tree, drop it to the ground. I have seen as many as twenty or thirty caught in this way during a morning's hunt."</p> <p>The implication is that small repetitive ascending scars on trees are potentially resulting from possum hunting practices</p>
Ernest Gribble. Account of the foundation of Warrangesda Mission Station	ca 1932	Warrangesda	<p>Describes two types of shields:</p> <ol style="list-style-type: none"> 1. Broad, for protection against spears: very hard, made out of very thick sun-dried bark 2. Narrow, wooden, and used for close contact combat with clubs/nulla nullas. <p>He also notes "A remarkable boomerang was made by the natives on the Murrumbidgee River. It had a broadened out tip, fashioned somewhat like an axe, with a keen edge. This was a terrible weapon. Their boomerang was larger than elsewhere, and was used in battle as well as in the chase, whereas in the north it was smaller and mostly used for amusement."</p>
Ernest Gribble. Account of the foundation of Warrangesda Mission Station	ca 1932	Warrangesda	<p>Water carrying vessels were made from bark from "round lumps" on trees. Bags were made from sewn thin bark and used for gathering honey.</p>
Ernest Gribble. Account of the foundation of Warrangesda Mission Station	ca 1932	Warrangesda	<p>Notes that scarred trees in the area were as a result of harvesting bark for the following: housing construction, canoes, shields, coolamons and 'dinner plates'.</p> <p>He noted that "bark was taken from trees to make 'gunyahs' or canoes, and they were very clever hunters. On the larger rivers in the south, canoes were made from the bark of gum-trees, stripped off in one piece. As a boy on the Murrumbidgee River, I frequently helped in the making of these canoes, and spent many a day with the natives in their large bark canoes or went hunting with them."</p>
Ernest Gribble. Account of the foundation of Warrangesda Mission Station	ca 1932	Warrangesda	<p>"The tribes in the Riverina made large nets for catching ducks. A net would be stretched across a sheet of water, fairly high above the water. The flying birds would at once pass down the stream, when the native in hiding would throw his boomerang among them as they passed. The ducks taking this to be a hawk, at once swoop down into the net. Another method was for the native to swim out into the stream with head covered with</p>

Author/source	Year	Location	Key findings
Ernest Gribble 1932 and 1933 in Taylor and Undy 1994		Murrumbidgee	<p>green bushes and, getting among the ducks as they swam about, to seize them by the legs and pull them under.”</p> <p>“On the Murrumbidgee River the corpse was laid, amid much wailing, in a huge grave, with all that belonged to the deceased during life, weapons rugs, etc. The body faced the east and was sometimes placed in a sitting posture. After the grave had been filled in, a smoke fire was made, and all present passed through the smoke. A bough shed was then erected over the grave, and the whole often enclosed by stakes. The gunyah formerly occupied by the deceased was then burnt. Then, too, any person with the same name as the deceased would have his name changed, and the name of the departed would no longer be mentioned by any of the tribe”</p>
Ernest Gribble		Murrumbidgee River	<p>“Among these tribes vessels for carrying water were made from bark, stripped from the round lumps on gum trees ... Small bags were made for gathering honey. These bags were made from very thin bark, sewn up at the sides with either bark twine, or the fine sinews of the tails of kangaroo. Bags and baskets of twisted grass were made in New South Wales, Victoria, and other parts in the south. Owing to the coldness of the winter, these natives made beautiful rugs of opossum, wallaby, and kangaroo skins. These skins were beautifully and strongly made and were well sewn together with the fine sinew taken from the tail of the kangaroo, the needle used being of bone. Each skin was decorated with markings representing kangaroos, emus, turtles and other ornamental designs. A few other observations will suffice to give a small flavour of the material culture, as seen and recorded by the early Europeans.”</p>

Author/source	Year	Location	Key findings
Margaret Tucker (1977: 41	c. 1910	Warragesda	<p>She recalled “being carried on my old aunt’s back in a possum rug”, and also described canoe making, saying “as we came to a river to be crossed. Uncle would get his tomahawk, look for a suitable gum tree, shape a canoe with his tomahawk in the bark, loosen it by tapping the outline of the canoe and ease it out with a wedge made of hard wood. Aunt would make a fire, very hot, but constantly stirred so as to keep an even temperature to dry the sap and moisture out of the bark. While this was gently steaming, some good food would come to light: damper freshly made, tea, and maybe some fish or a river turtle. We loved witchety grubs, cooked in ashes not too hot for not more than a minute or two. You can have all your oysters from the sea or mussels, the French their frogs, but some of the wild food eaten by Aborigines was second to none. I saw wild pigs, swans, emus and animals such as kangaroos cooked in a large hole in the ground, all specially prepared and wrapped in leaves, with hot rocks or mussel shells around it, to make it cook quickly. Before the canoe was dried out on the fire, it would be moulded and small wedges cut for each end and stuck through to keep the ends together. Then gum from the trees was melted down and used to glue the ends. Mud was caked into the cracks. Amazing as it may seem, I remember hard-baked earth being kept in the canoe, on top of which a fire was lit to boil the billy for tea, while they were fishing. After the billy had boiled there would be enough coals to grill a couple of nice-sized fish. Of course the fire would be watched so that it didn’t burn the canoe. They knew what they were doing.”</p>
Bonhomme, 1990			<p>High ground was the preferable burial location in the Darling and Murray areas, however this was not necessary in the Hay Plain area.</p> <p>Scarred or carved trees were common markers of grave areas, particularly in the east. Visible monuments such as huts, fishing nets, or lots, were also commonly associated with a site. In some cases destruction of this monument is related to the concept of avenging the death of the individual.</p> <p>Most commonly ethnographic descriptions of burials had some form of boundary, were visibly mounded, and clustered in groups of three.</p>
Gilmore 1986		Murrumbidgee River	Described numerous fish traps in the dry creek beds of the Murrumbidgee River tributaries

Author/source	Year	Location	Key findings
Kabaila 1998		Duck Bend billabong (Narrandera)	Theorised to be one of the three potential locations for the Massacre Island massacre – AHIMS site card believes the site to be the most likely area, despite Massacre Island having more naming connection to the event
Nari Nari Country			
Gilmore 1986		Murrumbidgee River	Described numerous fish traps in the dry creek beds of the Murrumbidgee River tributaries
Sturt 1833		Murrumbidgee River	Described river mussels as being collected with toes
Sturt 1833	1833	Riverine Plain	Food sources are described as aquatic and terrestrial and seasonally varied. These included fish, shellfish and water birds.
Beveridge 1883	1883		The process of trapping fish during flood along the surface. seasons is described as using heat retainers to weigh down nets, while using reed bundles to float the other end. This net was stretched across the water source, and one end walked back to the river bank to create a semi-circular shape, which would be drawn to the surface. This process was described as being able to catch large numbers of fish.
Sturt 1833	1833	Murrumbidgee and Lachlan Rivers	<p>“There cannot ... be a numerous population on the banks of the Morumbidgee, from the fact of our having seen not more than fifty in an extent of more than 180 miles. They are apparently scattered along it in families”.</p> <p>Further downstream, he noted that “this part of the Morumbidgee much more populous than its upper branches ... we had no fewer than forty-one natives with us”</p> <p>Whereas near the Murrumbidgee-Lachlan junction: “a large tribe of natives ... one hundred and twenty in number”, and “from the number and size of the paths that led from the river, in various directions across the plain, I was led to conclude, that, at certain seasons, it is hereabouts numerous frequented”.</p>
Sturt 1833: 53-56	1833	Murrumbidgee River	“The old men have alone the privilege of eating emu. ... Married people alone here are permitted to eat ducks”

Author/source	Year	Location	Key findings
Sturt 1833: 53-56	1833	Murrumbidgee River	“As the grass-tree is not found westward of the mountains, they make a light spear of a reed. ... They use this for distant combat, and not only carry in numbers, but throw the boomerang to a great distance and with unerring precision. ... They have a ponderous spear for close fight, and others of different sizes for the chase.”
Sturt 1833: 53-56	1833	Murrumbidgee River	Describes a man as “one of the tallest I had ever seen”. This agrees with many reports which describe the peoples in the lower Murrumbidgee area as being tall, and sometimes taller than all Europeans present. Sturt describes his interactions as being with “a quiet and inoffensive people” who were “in some measure prepossessing” in their appearance, saying “the old men had lofty foreheads, and stood exceedingly erect.”
Sturt 1833: 53-56	1833	Murrumbidgee River	“They extract the front tooth, lacerate their bodies, to raise flesh, cicatrices being their chief ornament.”
Mitchell 1835	1835	Murrumbidgee/Lachlan Junction	“Two of the tombs here consisted of huts, very neatly and completely thatched over, the straw or grass being bound down by a well-wrought net. Each hut had a small entrance on the south-west side, and the grave within was covered with dry grass or bedding on which lay however some pieces of wood. There was a third grave with coverings of the same kind, but it was not so neatly finished, nor was it covered with net. There were also graves without any covering; one where it appeared to have been burnt; and two old-looking graves were open, empty, and about three feet deep.”
Sturt 1838 (Just before June 17th)	1838	Murrumbidgee and Lachlan Rivers	Between the “Goulburn” (Murrumbidgee) and “Delangen” (Lachlan) rivers, he describes a hilly site where “three ... [hills] extended upwards of fifty graves, perforated in every direction by ants. Many of the graves appear to have only been recently tenanted. Nothing can exceed the simplicity, and ending of those lonely depositories of their dead; no monument – no mound beyond the grave marked the spot in which the savages were laid. It may be that the unusual locality prevented the natives from marking the trees, or ornamenting the ground as they generally do, and I cannot help thinking that sandy soils are utilized as being easier to excavate, and thereby lessening the labour of kind friends.”

Author/source	Year	Location	Key findings
Mitchell (1839:2:88)	1839	Murrumbidgee and Lachlan Rivers	“On rising ground near our camp, were several graves, all enclosed in separate parterres of exactly the same remarkable double and triple ridges, as those first seen on the lower part of the Lachlan. There were three of these parterres all lying due east west. On one, evidently the most recent, the ashes of a hut appeared over the grave. On another, which contained two graves (one of a small child) logs of wood, mixed with long grass, were neatly piled transversely; and in the third, which was so ancient that the enclosing ridges were barely visible, the grave had sunk into a grassy hollow. I understood from the widow that such tombs were made for men and boys only, and that the ashes over the most recent one were the remains of a hut, which had been burnt and abandoned, after the murder of the person whose body was buried beneath, had been avenged by the tribe”
William Wills (1860) in Hercus (1989)	1860	Murrumbidgee and Lachlan Rivers	“The Blacks that are found here belong to the Murrumbidgee and Lachlan to which river they retire as soon as the water dries up on the plains”.
Cameron (1885)	1885	Nari Nari Country	Identified the Wathi Wathi as the same as the Nari Nari. This contradicts Tindale (1974), however linguistics analysis (Hercus, 1989) identified them as having differing subgroups of the Kulin language.
John Park (1934)	1934	Nari Nari Country	Notes that the Nari Nari group were found from Narrandera to the Lachlan junction along the Murrumbidgee, and south towards the Edward River.
Tindale 1938	1938	Oxley	Identifies that the Nari Nari group were located near Oxley, and had the Yita Yita to the north.
Tindale (1974:197)	1974	Nari Nari Country	Nari Nari country was described as including the area from the southern bank of the Lachlan river down to Booraban, and extending east west from Booligal to Balranald. Wiradjuri country borders the eastern side, the Muthi Muthi are to the west, and to the south both Wati Wati and Wamba Wamba.
Gordon Kirby (in Taylor and Undy 1994)	c. 1930	Oxley	“When I was a kid, people mainly cooked out of doors. We’d get kangaroo and emu, goannas, possums, porcupines, and cook them in an earth oven. They’d dig a hole; fill it with wood and light a fire. When the wood was burned, they’d shovel all the coals out, put in the meat and cover it with leaves - maybe tips of gum leaves or sandalwood to give it a flavour - then fill in the top with earth and coals. With big animals like kangaroo

Author/source	Year	Location	Key findings
Muthi Muthi Country			<p>or emu, they might put a hot stone in its stomach to help cook it right through. Then after 2-3 hours, they'd open the oven. We weren't short of meat in those days"</p>
Sturt 1833, Vol. II Ch. IV	1833	Balranald	<p>"About noon, we fell in with a large tribe of natives, but had great difficulty in bringing them to visit us. If they had heard of white men, we were evidently the first they had ever seen. They approached us in the most cautious manner, and were unable to subdue their fears as long as they remained with us. Collectively, these people could not have amounted to less than one hundred and twenty in number."</p>
Mitchell (1839:2:105	1839	West of Lake Benanee	<p>"On this upper ground we observed several tombs all enclosed within parterres of the same boat like shape first seen by us in the day we traced the Lachlan into the basin of the Murrumbidgee. Two of the tombs here consisted of huts very neatly and completely thatched over, the straw or grass being bound down by a well wrought net. Each hut had a small entrance on the south west side and the grace within was covered with dry grass or bedding, on which lay however, some pieces of wood"</p>
Mitchell (1839:70-71). Mitchell (1839:87-88).	1839	Murrumbidgee/ Murray Junction	<p>"On a corner of the plain, just as we approached the land of reedy hollows, I perceived, at some distance, a large, lonely hut. ... It was closed on every side, the materials consisting of poles and large sheets of bark, and it stood in the centre of a plot of bare earth of considerable extent, but enclosed by three small ridges, the surface within the area having been made very level and smooth. I had little doubt, that this was a tomb. ... The floor was covered with a bed of rushes, which had been recently occupied. ... This bed covered a grave. ... The rushes within that solitary tomb were actually the nightly bed of some near relative ... and the body was thus watched and attended ... until no flesh remains on the bones: 'and then he yan (i.e. goes) away"</p> <p>Near the Murrumbidgee-Murray junction, he goes on to describe another series of graves. He notes the graves have earth ridges like the other graves described, but are on high ground: "Several graves, all inclosed in separate parterres of exactly the same remarkable double or triple ridges, as those formerly seen on the lower part of the Lachlan. There were three of these parterres all lying due east and west. On one ... the ashes of a hut appeared over the grave. On another, which contained two graves, (one of a small child) logs of wood, mixed with long grass, were neatly piled, transversely: and in the third, which was so ancient that the enclosing ridges were barely visible, the grave</p>

Author/source	Year	Location	Key findings
			<p>had sunk into a grassy hollow. I understood from the widow that such tombs were made for men and boys only, and that the ashes over the most recent one were the remains of the hut, which had been burnt and abandoned, after the murder of the person ... had been avenged”</p>
Hobler, 1825-1871: Entry for 10/10/1846	1846	Balranald	<p>“Hobler was also fascinated by the discovery of what was thought to be a bunyp skull on his neighbour’s station in 1846, and his men reported sightings of these creatures in Paika Lake itself. He refers to this creature as a “Kinepratit” or “Burryin” and describes its skull as “...a round head like a man with a sort of bill-shaped jaw projecting armed with powerful teeth” (Hobler, 1825-1871: Entry for 10/10/1846). The local Aboriginal people certainly believed in the existence of such a creature (Hobler, 1825-1871: Entry for 10/10/1846).” (Anderson, 2015)</p>
Hobler, 1825-1871	1846	Balranald	<p>The Paika station area area was subject to much cross-cultural conflict, despite better relations in earlier years. Raids were conducted by both parties, and Hobler abandoned certain structures on the station due to stockmans fears of working in these areas. This culminated in an abandonment of much of the station for over 7 months.</p> <p>Conflict becomes much reduced after Hobler responds to later sheep raids by declaring he and others will shoot any Muthi Muthi who cross onto ‘his’ side of the river. In connection with this, he choses to “increase their panic” by riding up and down the river when possible with his gun.</p> <p>Following this, and the reoccupation of Paika by Hobler, he describes the Muthi Muthi as “...very timid when approaching as if doubtful of the reception they are to have”. And within two years, Hobler ‘employs’ Aboriginal men and boys for bark stripping, and trades with the Muthi Muthi for possum skins.</p>
Hobler, 1825-1871: 7 March, 1847	1847	Balranald	<p>“The blacks do not always pay so much respect to the dead as we supposed—I heard lately of their turning the bones out of an old grave to make room for another body—and a few days ago they opened an old grave at the end of the garden and tucked in the body of an old man so quickly that we were not aware of it till the stench found the fact—I gave them credit for acting the part of Scots Old Mortality as they observed to have packed the bark upon the grave more carefully and scraped away the weeds for a few</p>

Author/source	Year	Location	Key findings
			yards around it, but it seems it were from laziness only—they made the sunken grave hold another tenant.”
Hobler, 1825-1871: Entry for 7/3/1847	1847	Balranald	<p>Describes an instance in which an old grave was ‘reused’. This practice involved opening the grave and placing the body of the elderly man within it, and covering it with bark, and generally tidying the area of weeds.</p> <p>He describes the process as occurring so quickly that he did not realise it had been conducted until a few days after.</p>
(MacDonald 1850[1969]).	1850	Murrumbidgee/Murray Rivers	<p>Fish species, described as the primary food source observed, were noted as “abundant, varied, and excellent” for the majority of the year, with the exception of seasons of rising floodwater (July-October).</p> <p>During this period the primary food resources are described as being “roots, herbs, grass seeds, fungi &c”, with little meat sources, with the exception of occasional possum and “wild fowl”.</p>
Goodwin 1854 (in Massola 1970)	1854	Muthi Muthi Country	Goodwin describes the “Muttee Muttee” of the Murrumbidgee/Murray junction as having 100-150 people,
Kreffit (1866)	1865	Muthi Muthi country	Suggests that the Muthi Muthi resided in the lake and river areas during the summer months, moving inland to the sandplain areas in the winter rain seasons.
ALP Cameron 1899	1899	Muthi Muthi Country	Mathi Mathi country is also described as being bordered to the west by Ta-Tathi, and to the east by Wathi Wathi, and not having country across the Murray.
Norton (1907:102)	1917	Murrumbidgee and Murray Rivers	<p>Norton describes how along these rivers: “numbers of weirs constructed of saplings were built beside the river bank across the blind gullies, an opening being left in the middle, through which, when the river was swollen by reason of the melting snow on the mountains, the fish entered into the still water; the entrance having been closed, they could be easily captured”.</p> <p>He goes on to describe how most traps and weirs were constructed on the mouths of swamps and reed beds, and theorises they were used to store fish sources in post-flood seasons.</p>

Author/source	Year	Location	Key findings
Radcliffe Brown 1918	1918	Murrumbidgee/ Murray junction	Radcliffe Brown [1918] identified the Kerinma (Keramin), Laitju Laitju, Tati Tati, Waka Waka, Mati Mati, Wamba Wamba, and Barabara as subgroups of the Wati Wati in the Murray and Murrumbidgee areas. He also identified the Murrumbidgee/Murray junction as being occupied by the Waka Waka (or Wakaua), while the Mathi Mathi (or Mataua) occupied country which bordered to the north
Feldtmann 1976: 17]	1976	Balranald	Three Indigenous reserves existed in the Balranald area. One of these was a 142-acre site west of Balranald on the Murrumbidgee. This site had 70 residents in 1963, and housed a Mission church, within a year it had reduced to only 31 residents, and by 1976, only 2.
Dadi Dadi/Tati Tati Country			
Morey nd		Lake Benanee to Euston	“To give their fish diet a relish the natives ate it with pig face which grew abundantly on every plain until eaten out by sheep, and I can testify to the toothsome of fish cooked in a native oven and eaten with young pig-face, for I have partaken of some. The native oven was a round shallow hole made in the ground, a fire was kindled in it and flat round stone laid on it, and when sufficiently heated through, a thin layer of young gum branches were placed on the stone and the cleaned fish carefully laid on them, and on top of all a thick layer of gum branches. The old gins knew exactly how long to keep the oven covered up, and the fish came out beautifully cooked and were served on small pieces of bark to their lords and masters. The fish were steamed in fact and looked appetising.”
Goodwin 1854 (in Massola 1970)	1854	Tati Tati Country	Goodwin describes the “Taatee Tatee” group as having a population of approximately 200-250.
Cameron 1885: 368-369	1885	Tati Tati Country	“This story tells how the secret of fire was learned, but as with much mythology, the creation and development of the landscape is also explained. In the following versions of this story (Wathi-wathi and Ta-ta-thi [=Tati-tati = Dadi-dadi]) we see an explanation for the treeless expanses of the Riverine Plain.

Author/source	Year	Location	Key findings
			<p>'There is a tradition ... that the earth was originally peopled by a race much more powerful, especially in the arts magic, than that which now inhabits it. The Wathi-wathi call them Bookoomuri, and say they were famous for fighting, hunting &c., and were eventually changed into animals by Tha-tha-puli, who then created the present race. Others say that the Bookoomuri effected the transformation themselves, and that as animals they felt an interest in the new race that succeeded them, and imparted to it much valuable knowledge. A belief exists that the magical powers of the doctors, disease makers, and rainmakers has been handed down to them from the Bookoomuri.'</p> <p>Koorambin (a water rat) and Pandawinda (codfish), were the sole possessors of fire, which they jealously guarded in an open space among the reed-beds of the Murray River.</p> <p>Many efforts were made by other Bookoomuri, and by the present race, to obtain a spark of it, but without success, till one day Karigari (a hawk), who of course had originally been a Bookoomuri, discovered Koorambin and Pandawinda in the act of cooking mussels, which they had obtained from the river. He flew up to such a height that they could not see him, and then caused a strong wind to blow the fire among the dry reeds. This was, however, extinguished. He then sent a wind from the opposite direction, and eventually a whirlwind, which scattered the fire in every direction, causing a conflagration which set the whole of the reed-beds on fire, and extending to the forests, laid waste vast tracts of country, upon which trees have never since grown, so that where there were once forests we find now immense bare plains.</p> <p>The Ta-ta-thi have another version. Ngwoorangbin (water rat), who lived in the Murray River, had a large hut in which he kept the fire for the purpose of cooking the mussels which he brought out of the river. This fire he very jealously guarded, but one day whilst he was down in the river gathering mussels, a spark flew out of the hut and was caught by Kiridka (a small hawk), who, having some inflammable materials ready, kindled a fire, by means of which he burned down the house of Ngwoorangbin, and also at the same time a large tract of forest, so that it is now open plains.</p>

Author/source	Year	Location	Key findings
Morey nd	ca 1907	Lake Benanee to Euston	<p>A burial ground was present “on a high bank overlooking the river” in a clearing. This burial ground contained a number of graves, including a large and relatively recent one.</p> <p>Morey describes it as standing “within two elliptical ridges of sand, even in height and breadth, most carefully kept, [with] no bits of wood or rubbish of any kind ... to be seen within this enclosure. Stepping over these encircling ridges and up to the grave itself I found it made of stout logs lengthwise to form a foundation for its sides and poles pushed under the logs, but meeting over the grave about four feet above the ground, then length wise on these rafters lighter sticks carried a thick covering of grass and overall was a large fishing net. One end was covered with grass but the other had a small doorway with a small sheet of bark across it.”</p>
Morey nd	ca 1908	Lake Benanee to Euston	<p>Morey was invited to witness the burial of “a leading man or chief”, as it was “an important event”. Morey participated in the procession of old and middle aged men, and describes the way in which mourners covered their heads with “pipeclay”, and made bands and marks on their body with white clay. He notes that the man was carried on a frame to the burial ground. This burial ground was not close to the camp.</p> <p>He describes the grave as being “dug on a sandy rise sloping to the river ... about three feet deep ... [with] a sheet of bark on the bottom”. He then describes the way that the men fill the grave with “fresh-pulled grass and carefully placed the body, which was covered with a possum rug, on it, and then put another sheet of bark on and finally heaped more grass on top of that”.</p> <p>More also note the lack of women or young men involved in the procession or the burial practice.</p> <p>He notes that this burial is an abnormal event and says in his experience “it was not customary to go to much trouble for ordinary members of a tribe or for women”.</p> <p>He notes that burial was the only burial practice he knew of in the area, and usually occurred in “sandy rises, above the floodmark”. He explains that for important men they would be taken “some miles even” to a specific cemetery, while “ordinary” others would be buried in the nearest suitable location.</p>

Author/source	Year	Location	Key findings
Edmonds, 2000	c. 1930	Robinvale	Many indigenous people returned to the Robinvale area c.1930, with approval to camp on the river areas – resulting in loss of homes during the 1956 flood. Tents were given as temporary accommodation, but ended up becoming permanent (Edmonds, 2000)
Tindale (1974)	1974	Tati Tati Country	Describes Tati Tati country as stretching from approximately 13km south of Euston, to 25km north of the Murrumbidgee-Murray junction on the south bank, and north to Lake Benanee. He also describes them as being bordered to the east by Wati Wati country, and the west by Jari Jari country.
Cupper (2019)			The Muthi Muthi, Kurinji and Tati Tati language groups were reported to share similar languages and kinship systems. Cupper 2019
Clark (1990)		Muthi Muthi Country	The Muthi Muthi, Kurinji and Tati Tati language groups were reported to share similar languages and kinship systems. Muthi Muthi, most notably, had a two-part matrilineal moiety of “Kailpara” (emu) and “Makwara” (hawk).
Edmonds (2003)		Muthi Muthi Country	Early ethnographies suggest that the Muthi Muthi were a demographically small group (c. 100-150) residing along the Murrumbidgee River to the south of Wadi Wadi country.
Edmonds (2003)			“Although the diet of the Muthi Muthi would have principally comprised fish, turtles, birds and their eggs, yabbies, mussels, crayfish and the all important vegetable staple, Typha sp., were among those resources hunted and gathered from the river and creeks. Kangaroos and emus would have been hunted on the plains back from the river as well as along the river itself. Thus the Murrumbidgee River and its floodplain and the adjacent sandplains formed an important resource zone for the Muthi Muthi tribe and there is no doubt that the study area would have formed part of the foraging zone for this tribe” (Edmonds, 2003)
Kureinji Country			
Sturt 1833	1833	Darling River region	Noted that prior to his arrival the Indigenous population had already been subject to European diseases in the Darling River region.

Author/source	Year	Location	Key findings
Mitchell 1839	1839	Wentworth/ Darling River	Notes that grindstones and pestles are used for processing roots and mill seed, and also the cultivation and harvesting of wild millet species
Mitchell 1839 vol 1: 262	1839	Murray and Darling Rivers	“On this hill, were three large tombs of the natives, of an oval shape, and about twelve feet in the greater axis. Each stood in the centre of an artificial hollow, the mound, or tomb in the middle ... on each of them were piled numerous withered branches and limbs of trees”
Beveridge [1883:28-29]	1883	Moama - Wentworth	<p>“Graves were dug in every instance, bearing east and west” and could be filled with various materials including plant matter, earth, stone, termite mounds, skins, or various artefacts.</p> <p>Prior to filling in the grave however, “sticks are placed across the grave, the ends of which rest on ledges a few inches above the body; over these and crossing them at right angles sticks the length of the grave are arranged; then bark, or a good thick covering of grass, hides the body from view, and prevents earth (which is now filled in) from coming into contact therewith”.</p>
Meehan [1971:177]	1971	Murray/Darling junction	“Grave goods were often associated with burial huts which were built on mounds. At the junction of the Murray and Darling rivers spears, waddies, and shields were found in huts over the graves of males and nets and other articles in huts over graves belonging to females”
Tindale [1974:196]	1974	Euston to Wentworth	<p>Describes Kureinji country as including the area north of the Murray river from near Euston, and northwest to Wentworth. The area then extends north to just south of Arumpo Station. He also notes Kureinji country is bordered by the Muthi Muthi to the east.</p> <p>Tindale also theorises that as languages are similar, the Kureinji were closely related to the “Jita Jita” of the Lachlan River area.</p>
Bonhomme [1990]			“There are several references to the use of fences around graves on the Darling and Murrumbidgee Rivers. The use of semi-circles of vegetation and the placing of bark tiles around graves was also recorded in specific instances in New South Wales.”

Author/source	Year	Location	Key findings
Cupper 2019			The Muthi Muthi, Kurinji and Tati Tati language groups were reported to share similar languages and kinship systems.
Hobler, 1825-1871: Entry for 31/3/1848]	1848	Lartje Lartje	Hobler’s description of a tribe who inhabited the extensive inland plains between the Murrumbidgee and the Darling. He calls them the Larche Larche. About 20 of them were obliged to come to the Lachlan for water. This group were unacquainted with Europeans, wore no clothing whatsoever and could not swim (which was seen as evidence of the dry nature of their country). These inland people would deepen the depressed areas in the Mallee plains and depended entirely on surface water. They carried water by making a water bag out of a possum skin from which they had drawn all the flesh out through the neck and tied up the legs to make it water tight.
Tala and Yanga Lakes			
George Augustus Robinson (1846)	1846	Tala and Yanga Lakes	Both lakes recorded as being part of “Watte Watte” country, although did seem to also be a meeting place for other groups. He notes at one point that “Walgerre” people are visiting Lake Tala
George Augustus Robinson (1846)	1846	Tala Lake	There was “an assemblage of tribes” 40 men from the area, and 120 from Yanga. There was also in the area a camp of approximately 300 men women and children, including “Walgerre, Tala, Yanga, and other blacks”.
George Augustus Robinson (1846)	1846	Tala Lake	Describes women “fishing for shells”
George Augustus Robinson (1846)	1846	Lake Tala	“Reached Tala near the junction of the Lachlan a shallow basin of fresh water three miles n circumference abounding in water fowl, fish and aborigines Tala shallow and Yangha, but deep in winter, 20 feet water. Number [of] ducks and wildfowl: native companion, pelican, crane, and swans. Got good net from natives... net is called Tare.le... counted 40 native camps. Upwards of 100 or 200 pelicans, crane, white, large number of ducks, plovers, miles of swans, white spoon bills. No stones in country descended to a large camp on beach, went through the camp about 300 natives altogether, men, women and children, very civil. Walgerre [Walgeers], Tala, Yanga, and other blacks present. Said women fishing for shells. One large cod caught.”

Author/source	Year	Location	Key findings
George Augustus Robinson (1846)	1846	Lake Tala	“Grave ... north end of lake ... ancient grave, raised ridges, bark hut five feet high, four feet wide made of bark and timber, hollow inside, wooden shield ... Visited second grave with two bodies, made in same manner but no bark hut only old wood laid on grave”
George Augustus Robinson (1846)	1846	?	Noted matrilineal moieties in at least some of the groups, specifically the Makwara and Kilpara moieties. And that in some groups, these were divided further into matrilineal totemic clans.
Hercus (1971: 137)	?	Lake Yanga	<p>“The Crow always sneaked after women, and one time as he was sneaking, the Eaglehawk speared him. He struck him with a stabbing-spear. The Eaglehawk incinerated the Crow with a big fire: he burnt a whole tree, he stacked up the fire with its foliage, he burnt the sticks and the foliage. But the Crow tricked him and got away: The Crow dug up the ground and made an underground grave, and crawled right inside. He shut off this gravelike hole and was not burnt by the fire nor suffocated by its smoke. He lay down. He might have slept there for a day or two, anyhow he could feel how the heat was by that dirt he had heaped up. As he lay buried he dug a hole, he made a very small opening for this grave.</p> <p>Through that hole he could hear the fire and the smoke. The fire burnt down altogether. The Crow says to himself: ‘There is no more smoke coming out now, so I can go now.’ He dragged away the soil that he had heaped up. Finally he got out from that hole and crawled out, and he had a look, the Crow: ‘There is no more firewood, and the hot coals up above the hole have gone out.’</p> <p>The Crow flew right up and looked around: ‘The Eaglehawk fellow is not here any more, he must have gone; I can’t see him.’ The Crow flew up saying: ‘Whereabouts has this fellow gone? Eh, I shall go now, and I shall get to the place where my own people are, I shall return among my own people, among my uncles and elder brothers, among my younger brothers and sisters and my cousins.’</p> <p>Later on he went hunting, the Crow, and fishing by the river, the Wakool; it wasn’t exactly by the river, it was a kind of lake just north of the Wakool Crossing, Spink’s Crossing (Kyalite), about nine miles from where the Edward joins the Wakool. That Eaglehawk, he followed the Crow. The Eaglehawk struck the Crow with his</p>

Author/source	Year	Location	Key findings
			<p>stabbingspear, but this time the Crow jumped into the water and was completely submerged by the Eaglehawk and drowned.</p> <p>Later on the Crow returned to the land, but he returned as a bird, he grew feathers and was black, and his eyes were white, that was because he had been through all that smoke earlier on. This happened by that small lake just north of Spink’s Crossing (Kyalite), but the Eaglehawk, he used to camp by Yanga Lake near Balranald in a huge tree that was there.</p>
Wadi Wadi Country			
Beveridge 1889 Krefft 1866		Wadi Wadi	Both authors describe cooking oven, plant processing and habitation sites as being associated with mound features.
Beveridge (1883: 47-48)		Wadi Wadi	“When a small assemblage, such as two or three families, happen to be encamped in near proximity to a lake, they fix a net in zig-zag lines about 20 yards from the shore, or perhaps a little further out than that should the lake be a shallow one, and from this net daily supplies of fish are drawn, consisting principally of perch and catfish; occasionally a monster codfish is enmeshed, when of course the net suffers considerably, and in most instances with the loss of the fish. An accident of this kind give rise to much aboriginal language of, to put it in the mildest form, a demonstrative description ... Nets so staked are visited morning and evening, and on each occasion from eight to a dozen fish are taken, varying in size from a minimum of 2 up to 10 pounds in weight.”
Beveridge (1883)	1883	Wadi Wadi	<p>Ducks and other water birds are also described as being caught through the use of large nets. Eggs were also collected through the use of canoes.</p> <p>He also describes pronged fish spears which were used to both catch fish in shallow reed areas, and to paddle and direct canoes.</p> <p>He goes on to note that when floodwaters declined seasonally, women used wooden stakes and weirs to create fish traps</p>
Beveridge (1883)	1883	Wadi Wadi	Describes a wooden trough placed over coals for cooking and “flints, mussel shells, kangaroo bones and split reeds were used in cutting and skinning foods”

Author/source	Year	Location	Key findings
Beveridge 1883	1883	Wadi Wadi	Describes trapping nets made of plant fibre cord
Beveridge 1889	1889	Wadi Wadi	Notes skin bags and bark troughs used for carrying water, and grass, rush, and netting baskets
Stone 1911:434	1911	Wadi Wadi	“In this district there are hundreds of their cooking ovens or middens, some of them of very large extent, and containing hundreds of yards of burnt earth and ashes, and freely mixed with it are the remains of mussel shells and bones, with a very occasional chisel, tomahawk or grinding stone; and in rare instances an aboriginal skeleton has been found when these ovens have been ploughed over or removed, but I do not think that the practice of burying a deceased member of the tribe in an oven was often resorted to.”

5 ARCHAEOLOGICAL CONTEXT

5.1 AHIMS register search

An extensive site search was conducted of the AHIMS database on the 22nd March 2021 by David Gordon of Heritage NSW as a GIS file. The search was conducted with a buffer of 1km either side of the Sturt Highway project area.

Six hundred and ninety-three (693) sites or objects were listed as being present within the search area (see Appendix 1). By section there are: 209 sites recorded on AHIMS in section 1; in section 2 there are 161 sites; in section 3 there are 236 sites; in section 4 there are 41 sites; and in section 5 there are 46 sites recorded on AHIMS. Of these sites, 52 are located within the Sturt Highway road corridor reserve.

It must be noted that the number of sites physically located within the road corridor may be significantly different to what is recorded on AHIMS. This is the result of errors in the translation of site coordinates from earlier mapping systems, as well as the lack of spatial information recorded on AHIMS that shows the physical extent of site boundaries. For example, the GPS coordinates of a site recording may show that the site is located outside the road reserve, however, the actual dimensions of the site boundary may extend within the reserve. As such, Lantern has expanded the limits of the AHIMS search results to include sites within a 100m buffer of proposed impacts. As shown in Table 7 this brings the total number of sites recorded within the road reserve and within 100m of proposed impacts to 87.

Error! Reference source not found.6 provides an overview of the 693 previously recorded sites according to site types and features. The number of sites totals more than 693 as some sites are recorded with more than one feature. For example, one site could be a burial with shell and artefact scatter. As noted below, the vast majority of sites are culturally modified or scarred trees (CMT) (654), followed by artefact scatters (272). A number of other site types are also recorded. These include hearths, earth mounds, burials, shell scatters, PAD areas, ceremony and Dreaming sites, resource and gathering sites, ceremonial rings, conflict sites, habitation structures, ochre quarries, a grinding groove, non-human bone and organic material, a stone arrangement, stone quarry, and a waterhole.

The mapping in Figure 14 to Figure 35 show the location of each recorded AHIMS site in relation to the Sturt Highway project area.

Table 6: Overview of previously recorded site types within the AHIMS search area (1km buffer either side of Sturt Highway project area). *Note that as some sites are recorded with more than one feature, the number of site features is greater than the number of sites within the study area.

Site features	Total	% of total
Modified Tree (Carved or Scarred)	654	55.8
Artefact	272	23.2
Hearth	66	5.6
Earth Mound	55	4.7
Shell	35	3.0
Burial	34	2.9
Potential Archaeological Deposit (PAD)	21	1.8
Aboriginal Ceremony and Dreaming	15	1.3
Aboriginal Resource and Gathering	6	0.5
Ceremonial Ring (Stone or Earth)	2	0.2
Conflict	2	0.2

Site features	Total	% of total
Habitation Structure	2	0.2
Ochre Quarry	2	0.2
Grinding Groove	1	0.1
Non-Human Bone and Organic Material	1	0.1
Stone Arrangement	1	0.1
Stone Quarry	1	0.1
Water Hole	1	0.1
Total	1171*	100.0

Table 7 provides a record of the 87 AHIMS sites located within 100m of either side of the Sturt Highway road corridor. It should be noted that an absence of AHIMS sites in a given area, does not mean there are no Aboriginal cultural heritage values. In general, this absence of AHIMS sites is an indication of a lack of cultural heritage and archaeological survey in any given area.

Table 7: AHIMS sites located within or less than 100m from the Sturt Highway Road corridor

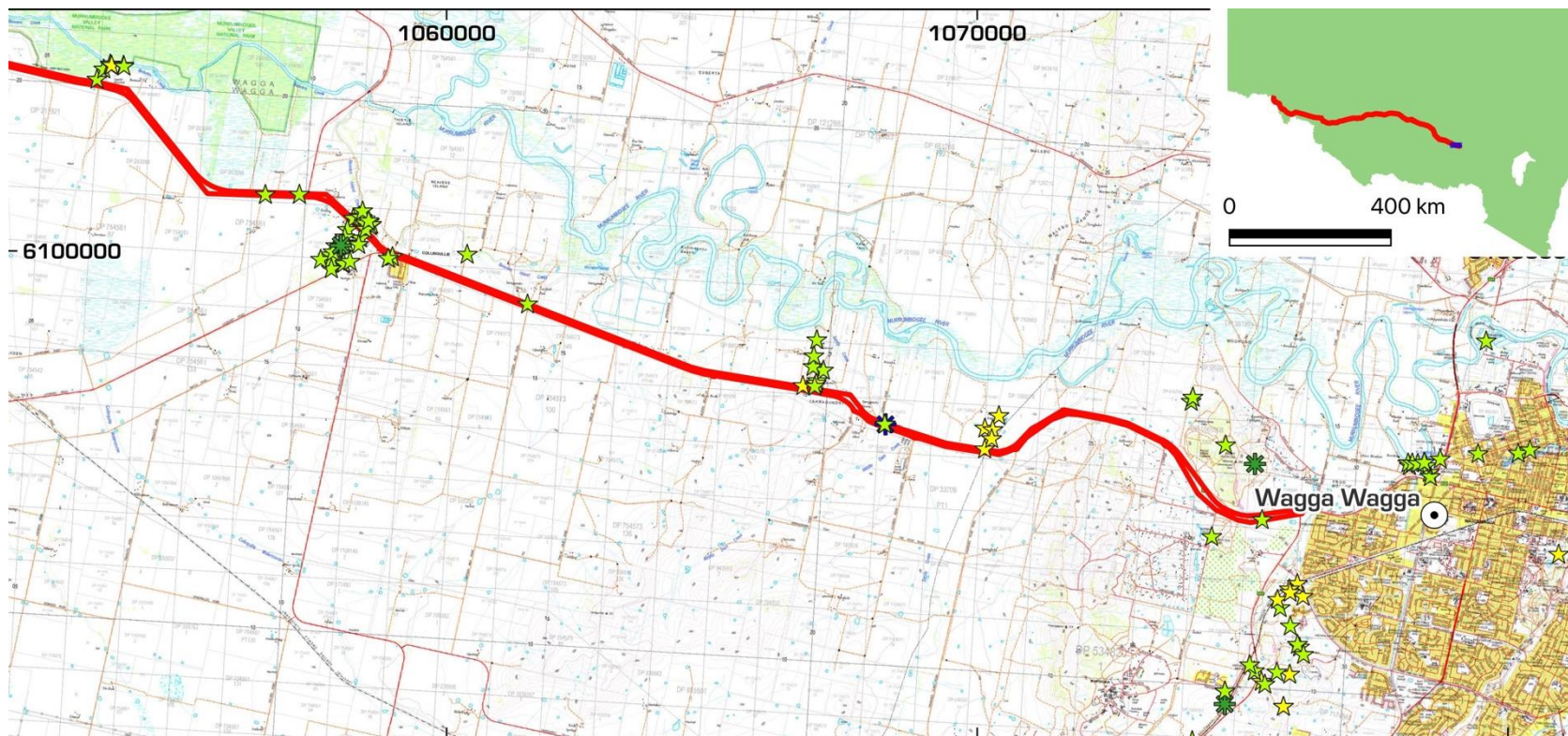
AHIMS #	Site name	Feature/s	Proximity to Road reserve
Section 1: Wagga Wagga to Narrandera			
49-6-0037	Kindra 1	Modified Tree (Carved or Scarred)	Within reserve
49-6-0038	Sandigo 1	Modified Tree (Carved or Scarred)	Within reserve
49-6-0039	Sandigo 2	Modified Tree (Carved or Scarred)	Within reserve
49-6-0047	Galore TSR Scar Tree 5	Modified Tree (Carved or Scarred)	<100m
49-6-0048	Galore TSR Scar Tree 6	Modified Tree (Carved or Scarred)	<100m
49-6-0065	Galore TSR Scar Tree 4	Modified Tree (Carved or Scarred)	<100m
55-3-0057	Woodend TSR Scar Tree 1	Modified Tree (Carved or Scarred)	<100m
55-3-0058	Woodend TSR Scar Tree 2	Modified Tree (Carved or Scarred)	<100m
56-1-0083	WW113	Modified Tree (Carved or Scarred)	Within reserve
56-1-0092	WW 114	Modified Tree (Carved or Scarred)	Within reserve
56-1-0094	WW 111	Modified Tree (Carved or Scarred)	Within reserve
56-1-0132	Berry Jerry Ring Tree	Modified Tree (Carved or Scarred)	Within reserve
56-1-0200	Yarra 15	Modified Tree (Carved or Scarred)	<100m
56-1-0201	Vincent 1	Artefact	<100m
56-1-0272	Gorman Gadi	Modified Tree (Carved or Scarred)/ Aboriginal Ceremony and Dreaming	<100m
56-1-0273	Collin E 1	Modified Tree (Carved or Scarred)	<100m
56-1-0277	Collin E 5	Modified Tree (Carved or Scarred)	<100m
56-1-0283	Sawpit 1	Modified Tree (Carved or Scarred)	<100m
56-1-0284	Sawpit 2	Modified Tree (Carved or Scarred)	<100m
56-1-0488	Olympic Highway Ashmont 1	Modified Tree (Carved or Scarred)	<100m
56-1-0546	Tank Junction TSR 3	Modified Tree (Carved or Scarred)	< 100m

AHIMS #	Site name	Feature/s	Proximity to Road reserve
56-4-0036	WP4	Artefact	<100m
Section 2: Narrandera to Hay			
48-3-0110	Gin Site Artefact Scatter	Artefact	<100m
48-3-0122	RivCott3	Potential Archaeological Deposit (PAD)	<100m
48-3-0235	HY-ST-002	Modified Tree (Carved or Scarred)	<100m
48-3-0236	HY-IF-002	Artefact	<100m
48-3-0237	DP-IF-003	Artefact	Within reserve
48-3-0238	DP-IF-004	Artefact	Within reserve
48-5-0430	HY-IF-001	Artefact	<100m
48-5-0431	HY-ST-001	Modified Tree (Carved or Scarred)	Within reserve
48-6-0158	DP-AS-001	Artefact	Within reserve
48-6-0159	DP-IF-002	Artefact	Within reserve
49-4-0088	Murrumbidgee Valley National Park 3	Burial/ Aboriginal ceremony and dreaming/ modified Tree (Carved or Scarred)	<100m
49-4-0208	Yarrada modified tree g	Modified Tree (Carved or Scarred)	<100m
49-4-0217	DP-ST-001	Modified Tree (Carved or Scarred)	Within reserve
49-4-0218	DP-IF-005	Artefact	<100m
49-4-0219	DP-ST-002	Modified Tree (Carved or Scarred)	<100m
49-4-0220	DP-ST-004	Modified Tree (Carved or Scarred)	<100m
49-4-0221	DP-ST-005	Modified Tree (Carved or Scarred)	<100m
49-4-0222	DP-ST-006	Modified Tree (Carved or Scarred)	<100m
49-5-0213	Sturt Hwy Waddi modified tree	Modified Tree (Carved or Scarred)	Within reserve
Section 3: Hay to Balranald			
47-6-0022	Yanga Creek #2;	Modified Tree (Carved or Scarred)	<100m
47-6-0024	Yanga Creek 1;YC-1;	Earth Mound/ shell/ artefact	<100m
47-6-0025	Yanga Creek Midden 2;YCM-2;	Earth Mound/ shell/ artefact	<100m
47-6-0026	Yanga Creek Scarred Tree-4;YCST-4;	Modified Tree (Carved or Scarred)	Within reserve
47-6-0027	YC1;Yanga Creek;	Modified Tree (Carved or Scarred)	<100m
47-6-0028	YC2;Yanga Creek;	Modified Tree (Carved or Scarred)	Within reserve
47-6-0030	YC 3;Yanga Creek;	Modified Tree (Carved or Scarred)	<100m
47-6-0169	Horse 15	Modified Tree (Carved or Scarred)	Within reserve
47-6-0170	Horse 16	Modified Tree (Carved or Scarred)	Within reserve
47-6-0171	Horse 17	Modified Tree (Carved or Scarred)	Within reserve
47-6-0172	Horse 18	Modified Tree (Carved or Scarred)	Within reserve
47-6-0173	Horse 19	Modified Tree (Carved or Scarred)	Within reserve

AHIMS #	Site name	Feature/s	Proximity to Road reserve
47-6-0174	Horse 20	Modified Tree (Carved or Scarred)	Within reserve
47-6-0175	Horse 21	Modified Tree (Carved or Scarred)	Within reserve
47-6-0176	Horse 22	Modified Tree (Carved or Scarred)	Within reserve
47-6-0195	Horse 25	Modified Tree (Carved or Scarred)	Within reserve
47-6-0196	Horse 26	Modified Tree (Carved or Scarred)	Within reserve
47-6-0197	Horse 27	Modified Tree (Carved or Scarred)	Within reserve
47-6-0198	Horse 28	Modified Tree (Carved or Scarred)	Within reserve
47-6-0199	Horse 29	Modified Tree (Carved or Scarred)	Within reserve
47-6-0200	Horse 30	Modified Tree (Carved or Scarred)	Within reserve
47-6-0201	Horse 31	Modified Tree (Carved or Scarred)	Within reserve
47-6-0202	Horse 32	Modified Tree (Carved or Scarred)	Within reserve
47-6-0203	Horse 33	Modified Tree (Carved or Scarred)	Within reserve
47-6-0204	Horse 34	Modified Tree (Carved or Scarred)	Within reserve
47-6-0205	Horse 35	Modified Tree (Carved or Scarred)	Within reserve
47-6-0206	Horse 36	Modified Tree (Carved or Scarred)	Within reserve
47-6-0207	Horse 37	Modified Tree (Carved or Scarred)	Within reserve
47-6-0208	Horse 38	Modified Tree (Carved or Scarred)	Within reserve
47-6-0209	Horse 39	Modified Tree (Carved or Scarred)	Within reserve
47-6-0210	Horse 40	Modified Tree (Carved or Scarred)	Within reserve
47-6-0274	Horse 50	Modified Tree (Carved or Scarred)	Within reserve
47-6-0275	Horse 51	Modified Tree (Carved or Scarred)	Within reserve
47-6-0276	Horse 52	Modified Tree (Carved or Scarred)	Within reserve
47-6-0278	Horse 54	Modified Tree (Carved or Scarred)	Within reserve
47-6-0279	Horse 55	Modified Tree (Carved or Scarred)	Within reserve
47-6-0748	WA-ST4 (West Abercrombie Scarred Tree 4)	Modified Tree (Carved or Scarred)	<100m
48-1-0019	Waimea Downs 5	Burial	Within reserve
48-4-0465	KE-IF-001	Artefact	Within reserve
48-4-0466	KE-AS-001	Artefact	<100m
48-4-0467	KE-IF-002	Artefact	Within reserve
48-4-0468	KE-IF-003	Artefact	Within reserve
48-4-0469	KE-IF-006	Artefact	Within reserve
48-5-0426	KE-IF-004	Artefact	<100m
Section 4: Balranald to Euston			
47-4-0023	Dry Lake Midden 1	Ceremonial Ring (Stone or Earth)/ hearth/ shell	<100m
47-4-0019	Dry Lake north 01	Shell	Within reserve
Section 5: Euston to Buronga			
46-3-0019	Mallee Cliffs Site 4;	Hearth/ shell/ artefact	<100m

AHIMS #	Site name	Feature/s	Proximity to Road reserve
46-3-0081	Bowen Park_1;	Artefact/ shell	<100m
47-4-0009	three;	Modified Tree (Carved or Scarred)	within reserve

The large number of sites located within Section 3 is due to the Sturt Highway road reserve corridor including both the highway and the entry and exit to Yanga Creek rest stop.



Sturt Highway AHIMS Sites - Section 1-1

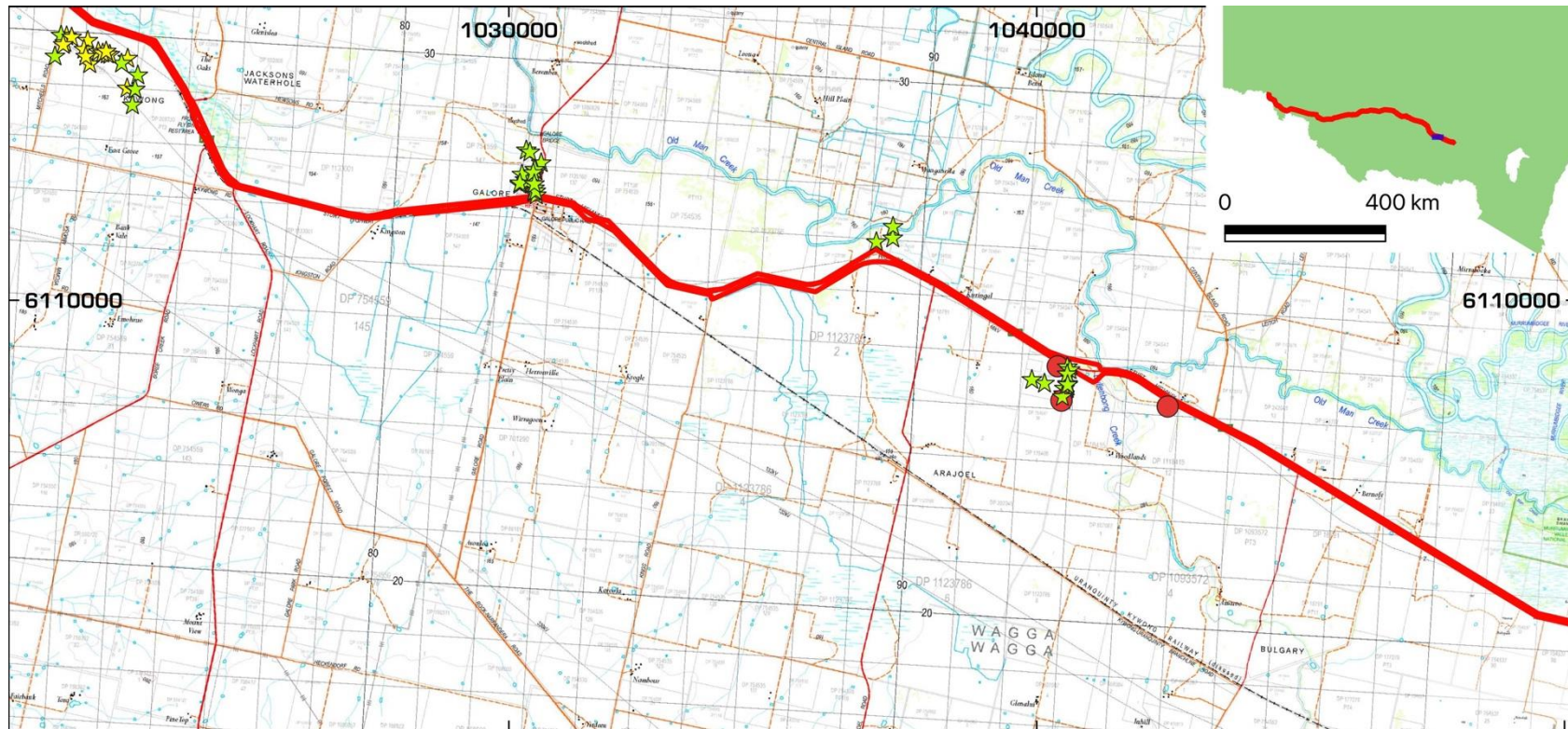


Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 14: Location of sites by type recorded on the AHIMS database – section 1.1



Sturt Highway AHIMS Sites - Section 1-2

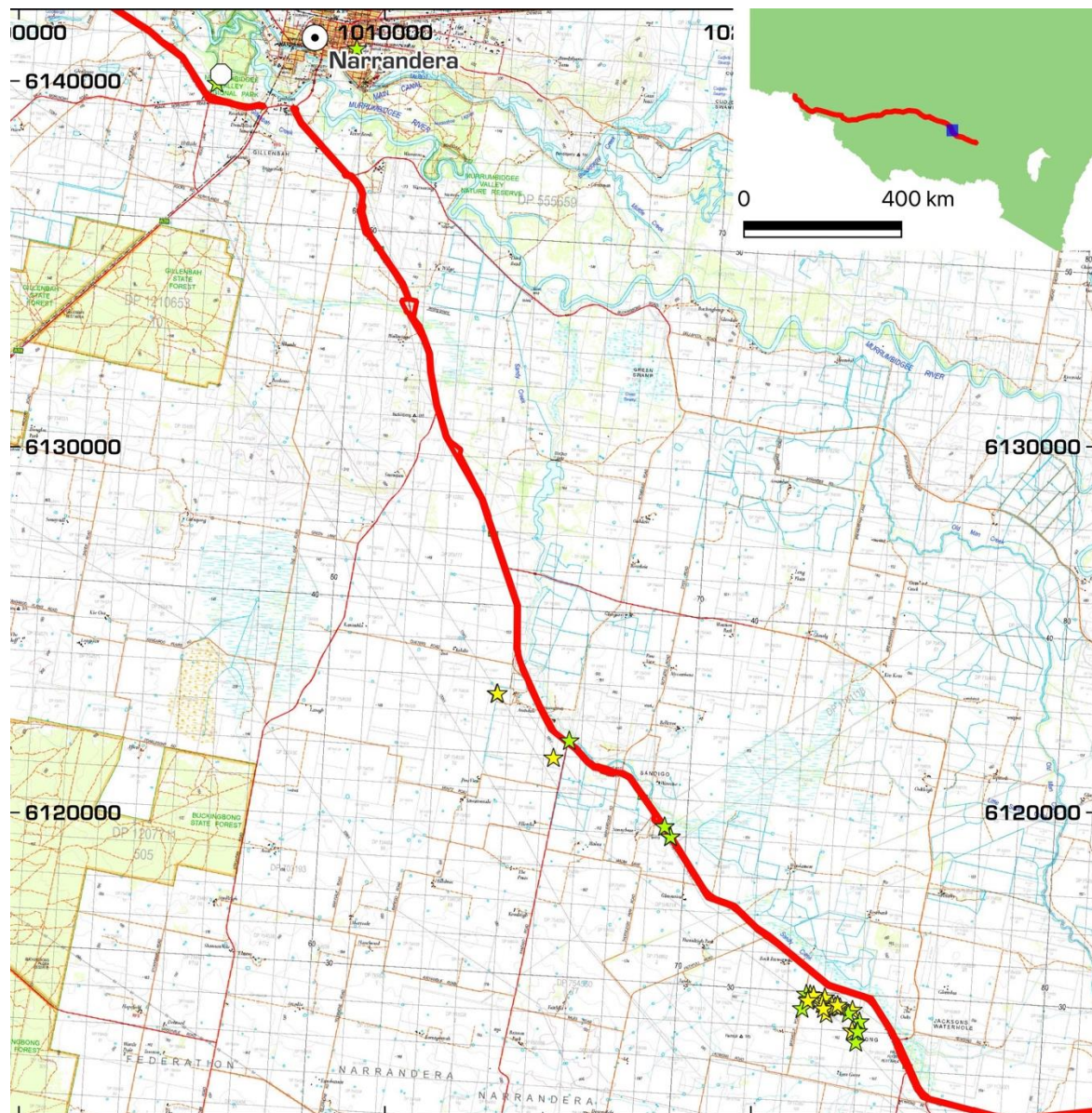


Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 15: Location of sites by type recorded on the AHIMS database – section 1.2



Sturt Highway AHIMS Sites - Section 1-3

Legend

- | | |
|-----------------------------------|--|
| Study Area | Conflict |
| AHIMS Sites along route | Earth Mound |
| Aboriginal Ceremony and Dreaming | Habitation Structure |
| Aboriginal Resource and Gathering | Hearth |
| Artefact | Modified Tree (Carved or Scarred) |
| Burial | Non-Human Bone and Organic Material |
| Ceremonial Ring (Stone or Earth) | Potential Archaeological Deposit (PAD) |
| | Shell |

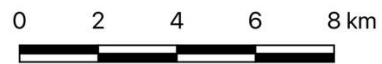
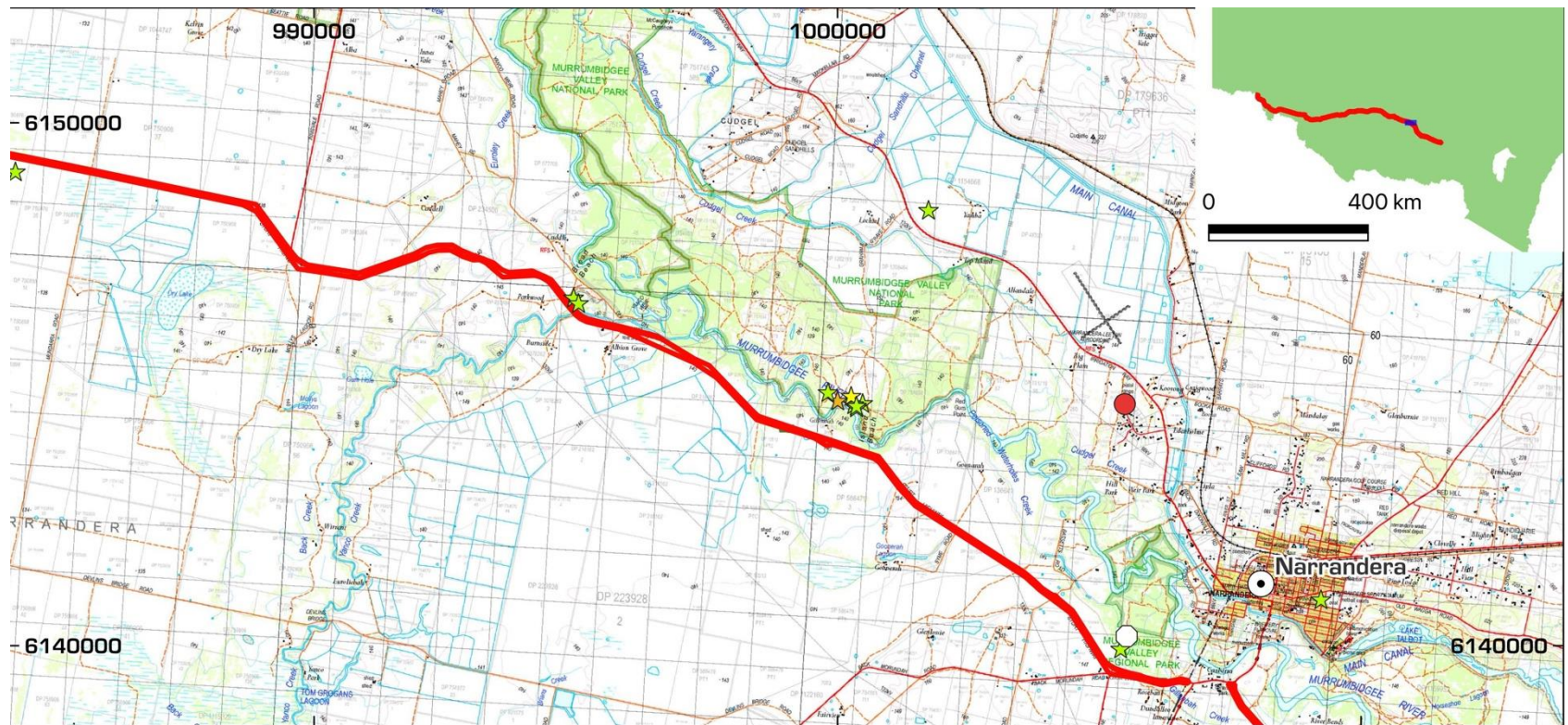


Figure 16: Location of sites by type recorded on the AHIMS database – section 1.3



Sturt Highway AHIMS Sites - Section 2-1

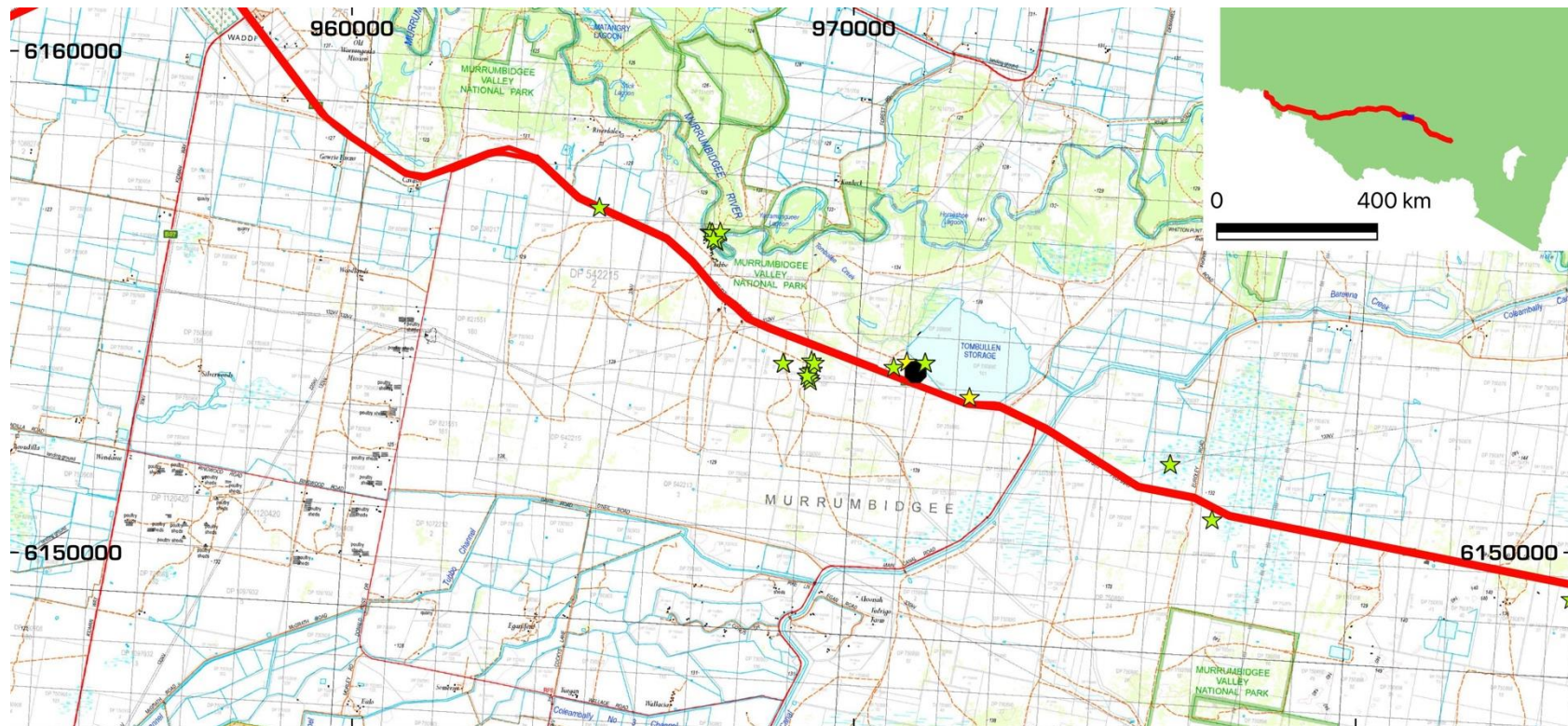


Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 17: Location of sites by type recorded on the AHIMS database – section 2.1



Sturt Highway AHIMS Sites - Section 2-2

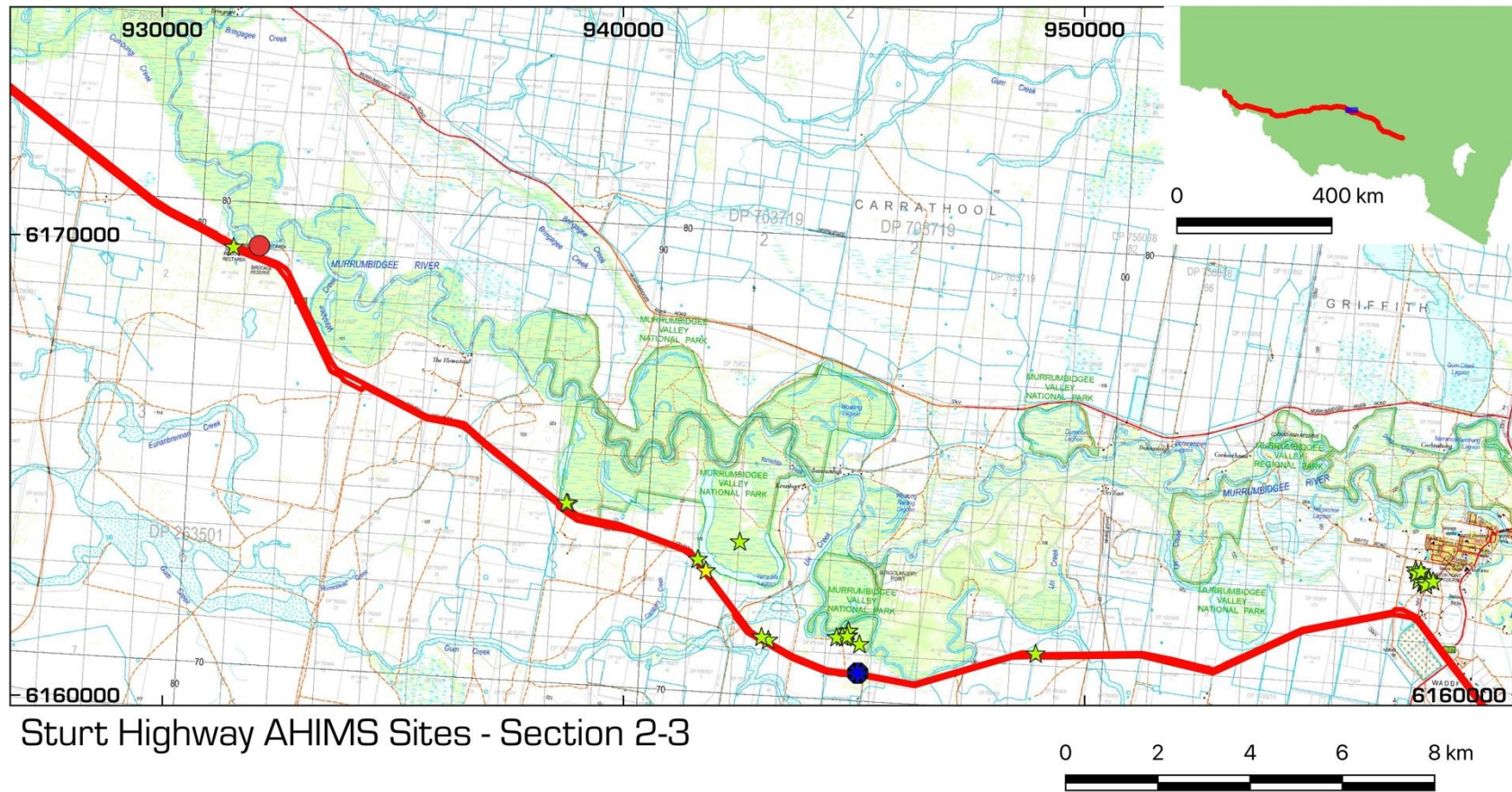


Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 18: Location of sites by type recorded on the AHIMS database – section 2.2

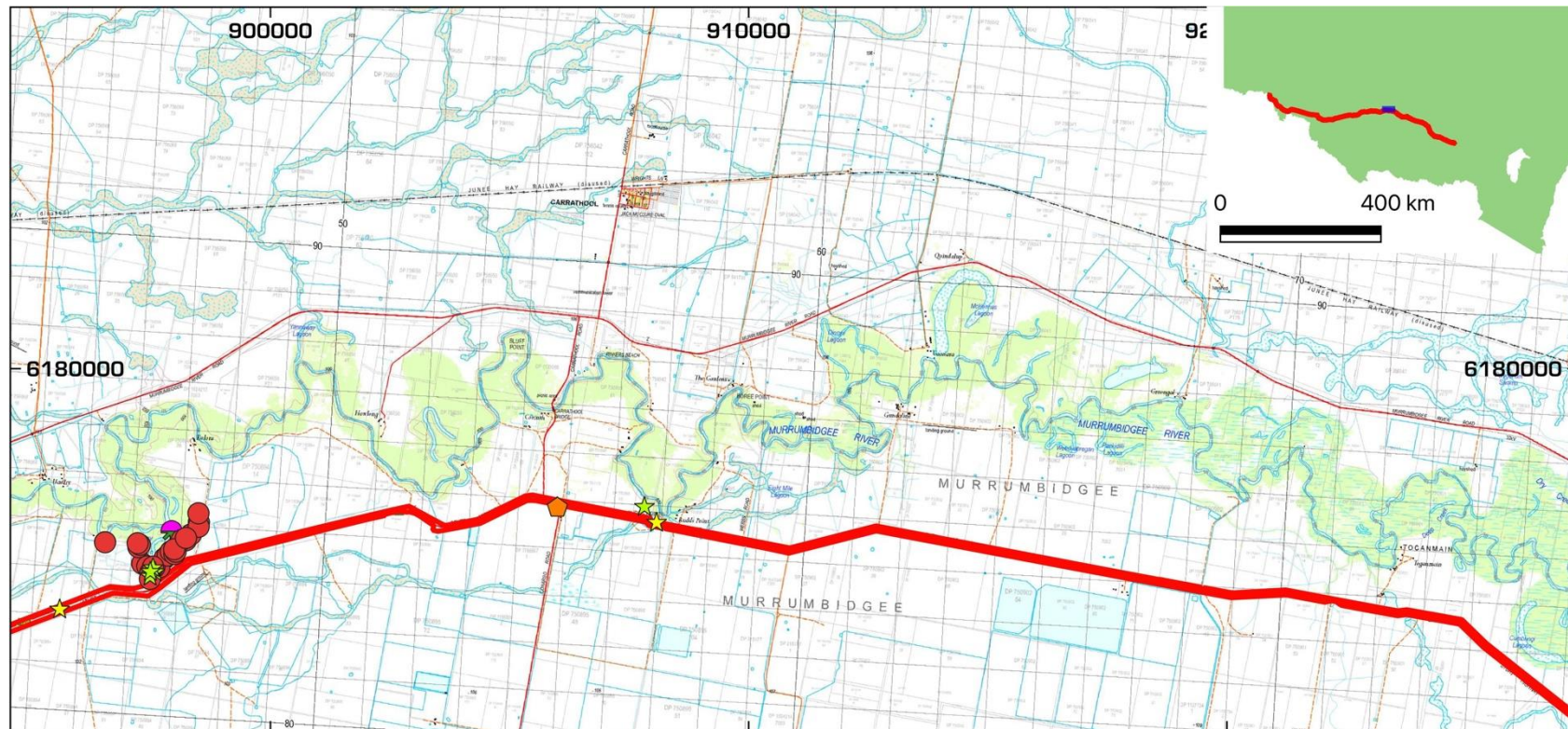


Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 19: Location of sites by type recorded on the AHIMS database – section 2.3



Sturt Highway AHIMS Sites - Section 2-4



Legend

Study Area

AHIMS Sites along route

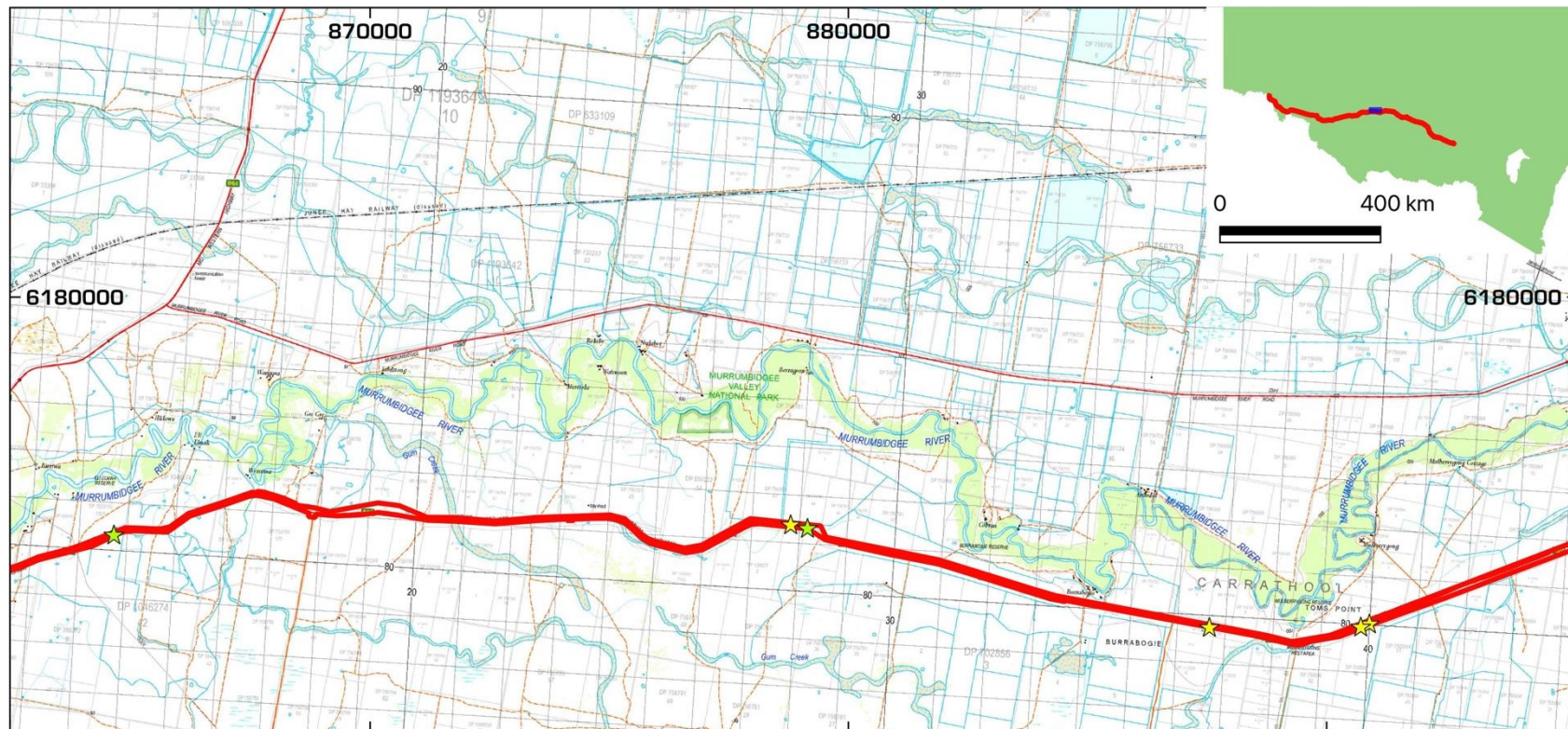
- Aboriginal Ceremony and Dreaming
- Aboriginal Resource and Gathering
- Artefact

- Burial
- Ceremonial Ring (Stone or Earth)
- Conflict
- Earth Mound
- Habitation Structure

- Hearth
- Modified Tree (Carved or Scarred)
- Non-Human Bone and Organic Material
- Potential Archaeological Deposit (PAD)
- Shell



Figure 20: Location of sites by type recorded on the AHIMS database – section 2.4



Sturt Highway AHIMS Sites - Section 2-5



Legend

Study Area

AHIMS Sites along route

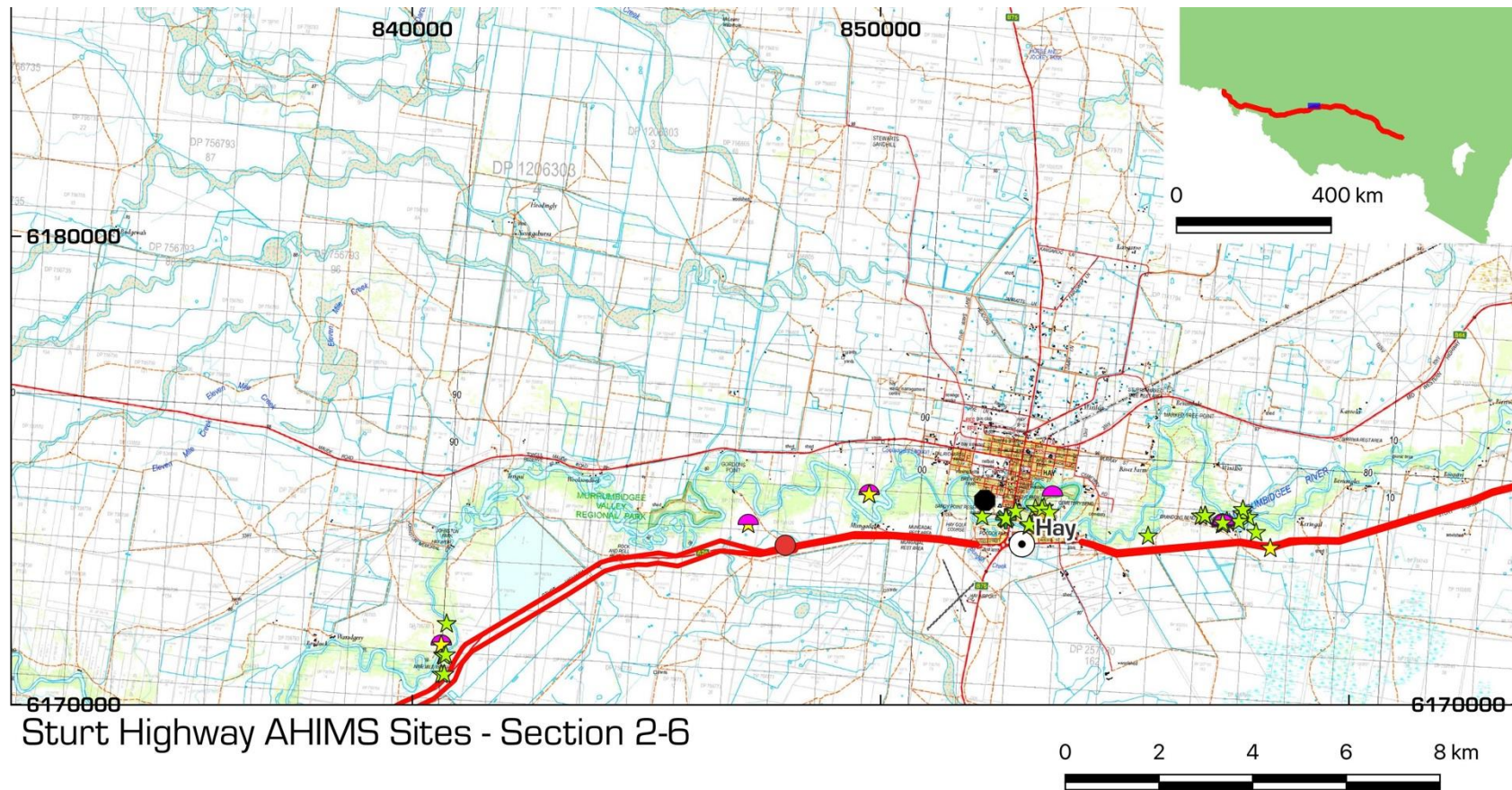
- Aboriginal Ceremony and Dreaming
- Aboriginal Resource and Gathering
- Artefact

- Burial
- Ceremonial Ring (Stone or Earth)
- Conflict
- Earth Mound
- Habitation Structure

- Hearth
- Modified Tree (Carved or Scarred)
- Non-Human Bone and Organic Material
- Potential Archaeological Deposit (PAD)
- Shell



Figure 21: Location of sites by type recorded on the AHIMS database – section 2.5



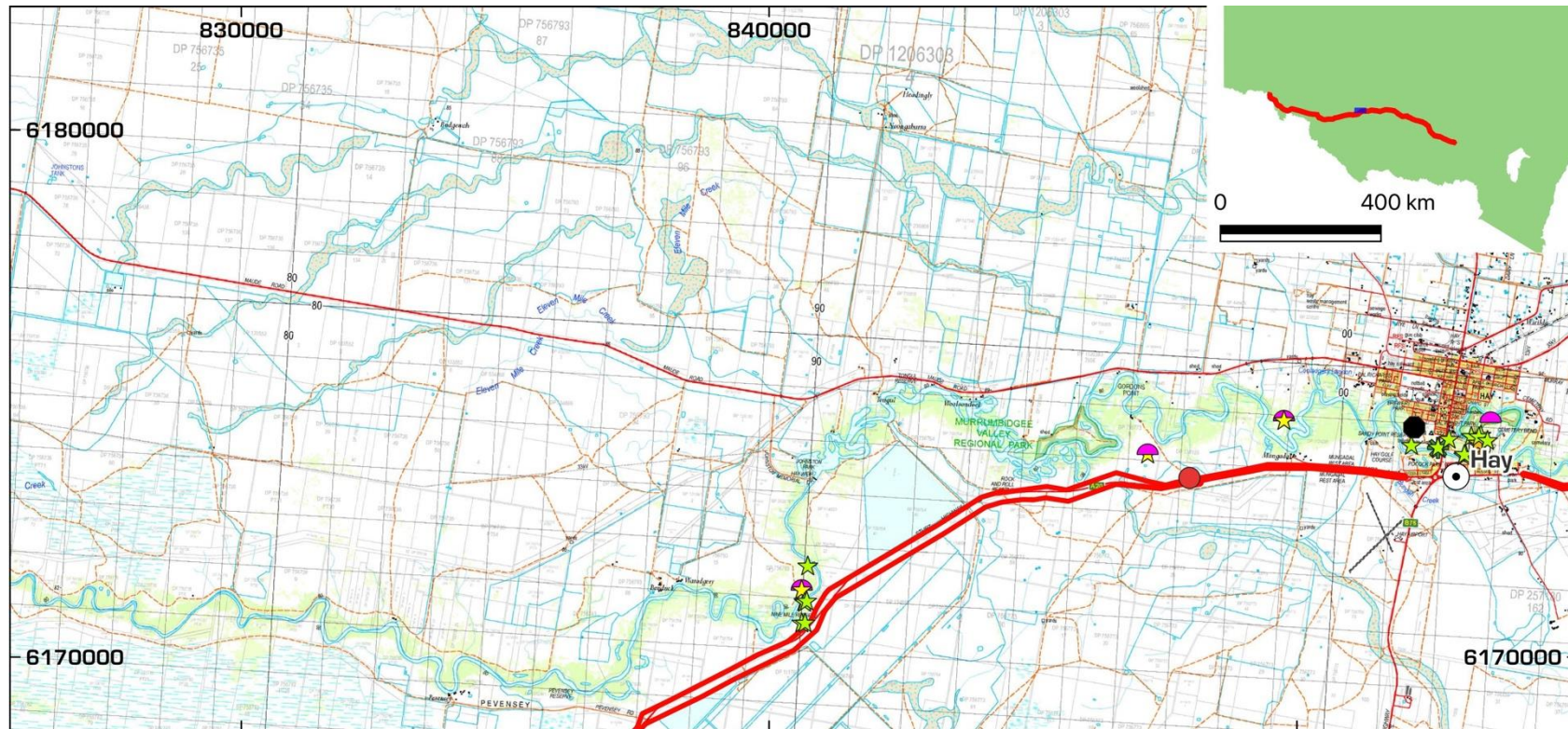
Sturt Highway AHIMS Sites - Section 2-6

Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 22: Location of sites by type recorded on the AHIMS database – section 2.6



Sturt Highway AHIMS Sites - Section 3-1



Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 23: Location of sites by type recorded on the AHIMS database – section 3.1



Sturt Highway AHIMS Sites - Section 3-2



Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 24: Location of sites by type recorded on the AHIMS database – section 3.2



Sturt Highway AHIMS Sites - Section 3-3

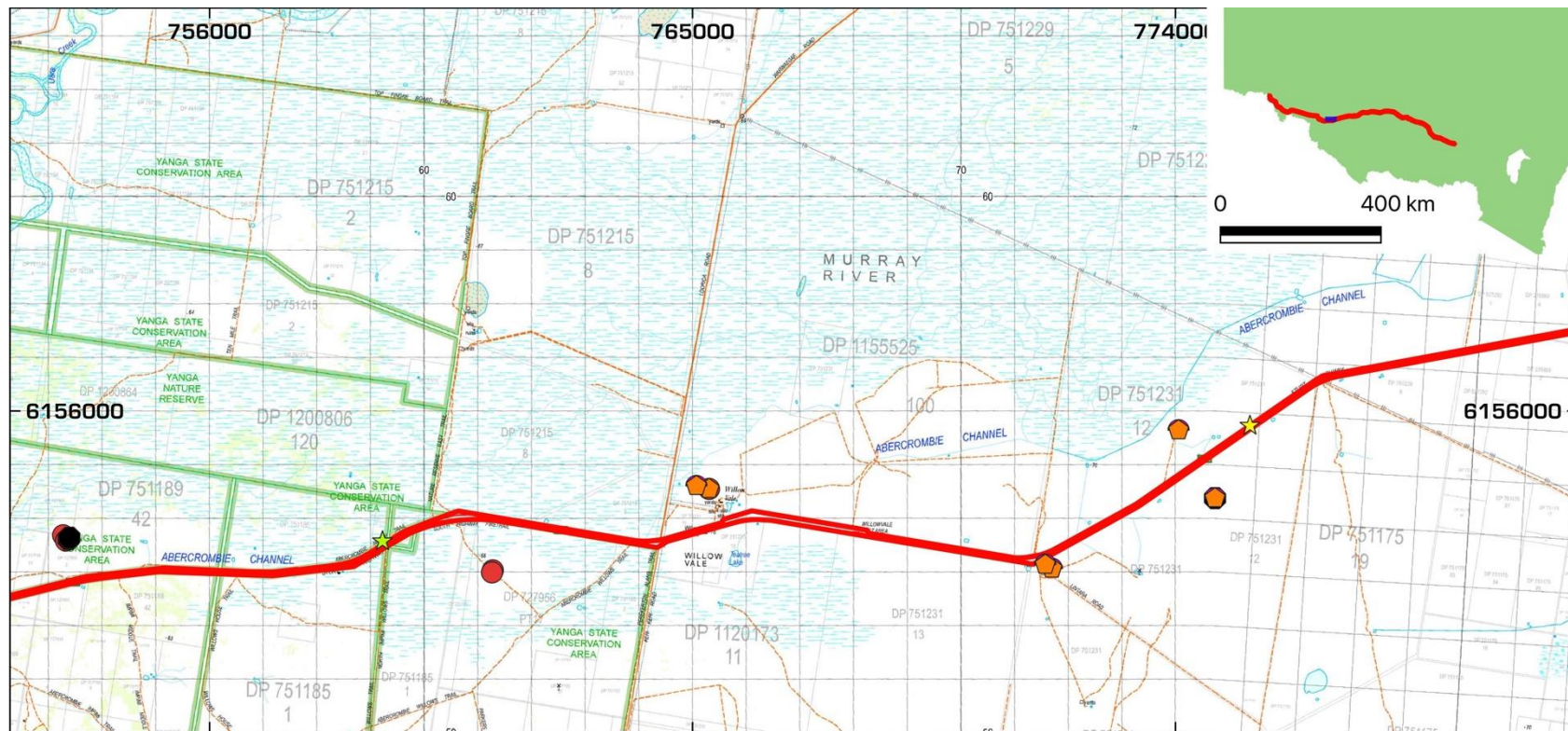


Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 25: Location of sites by type recorded on the AHIMS database – section 3.3



Sturt Highway AHIMS Sites - Section 3-4

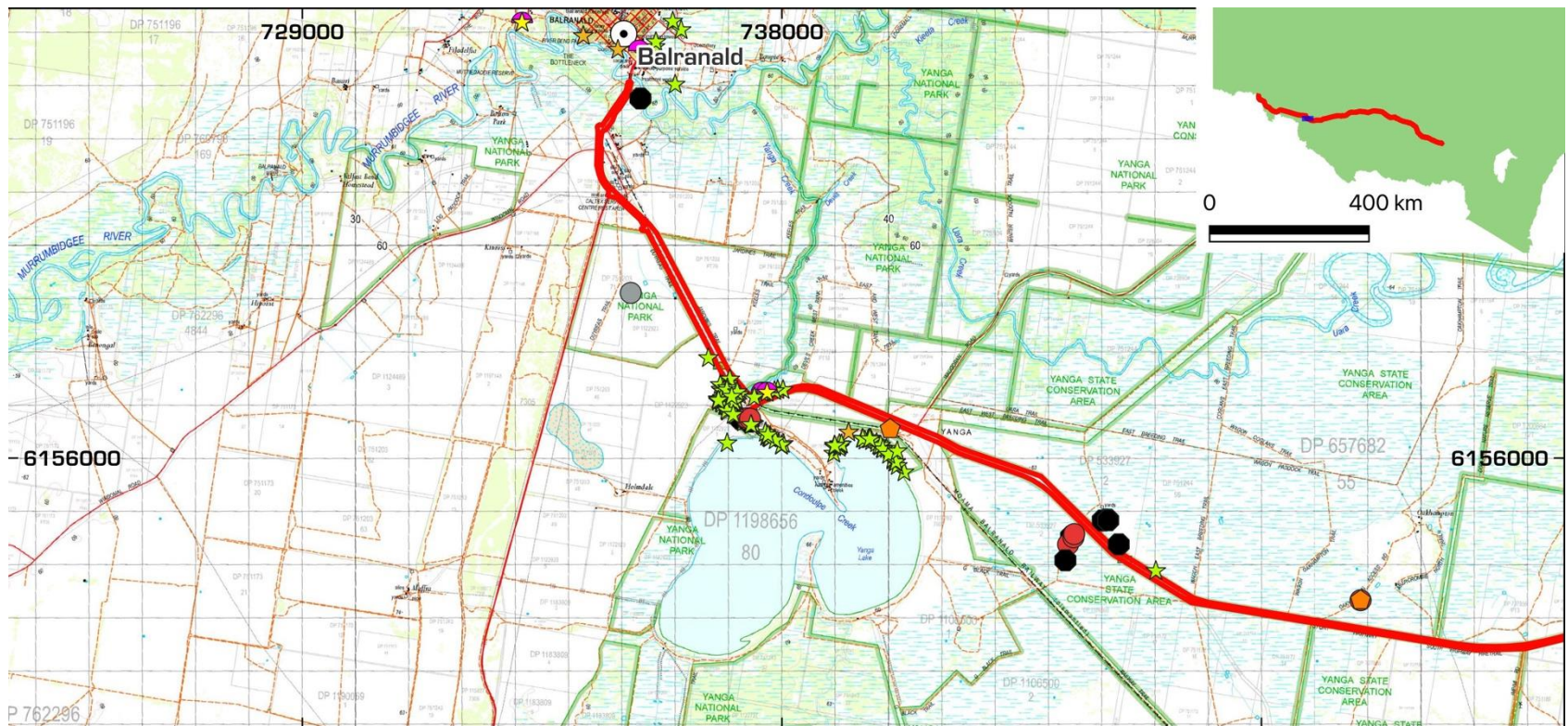


Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 26: Location of sites by type recorded on the AHIMS database – section 3.4



Sturt Highway AHIMS Sites - Section 3-5

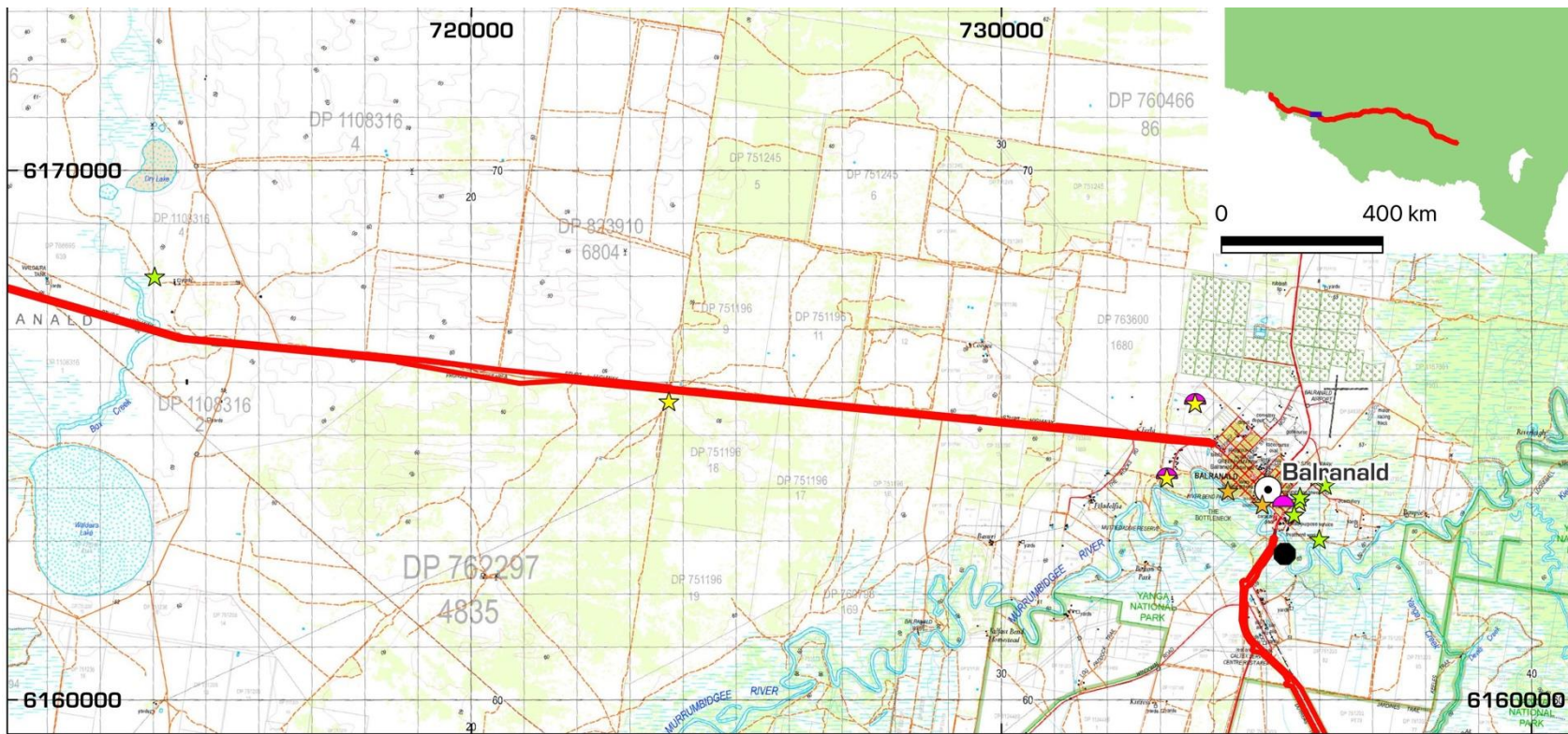


Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 27: Location of sites by type recorded on the AHIMS database – section 3.5



Sturt Highway AHIMS Sites - Section 4-1

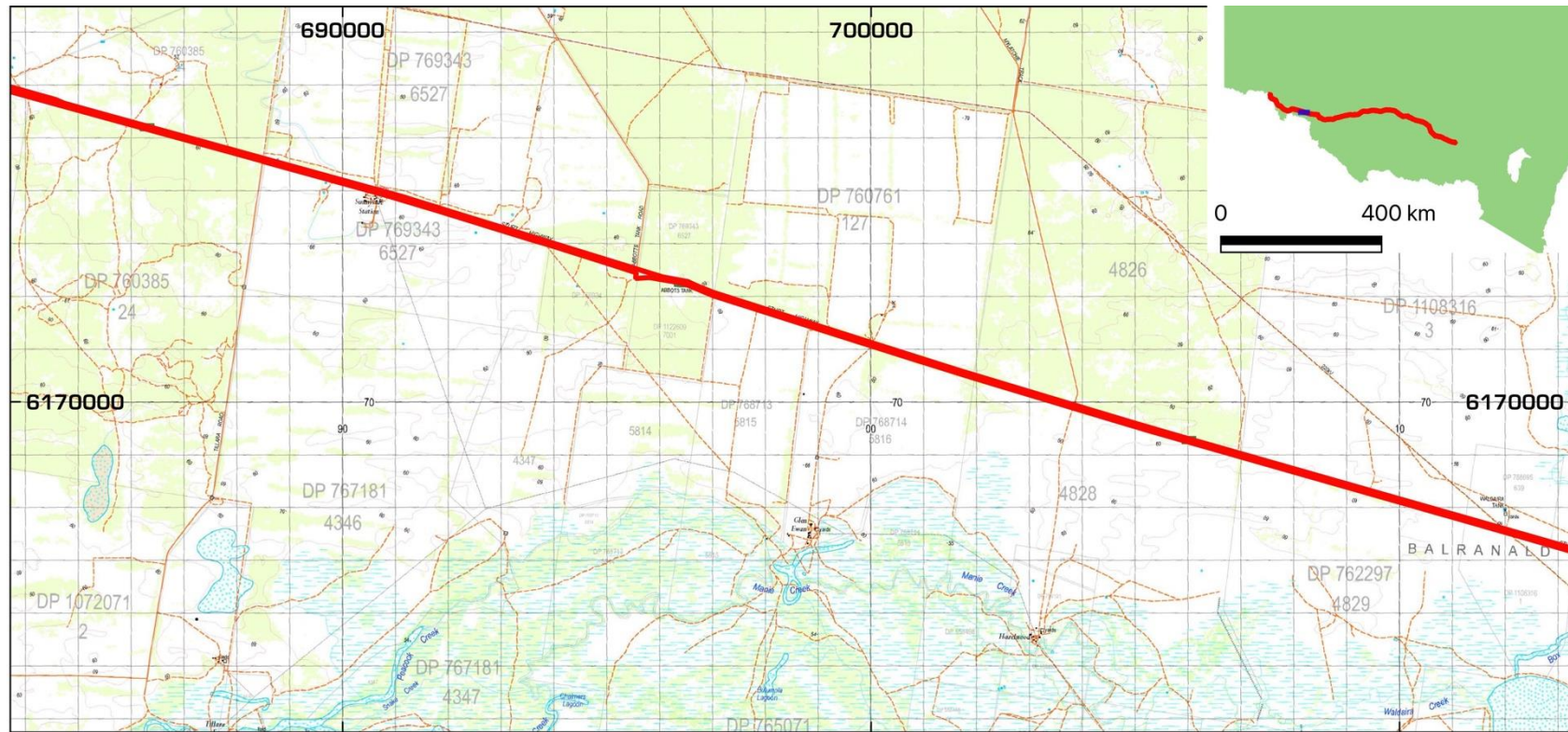


Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 28: Location of sites by type recorded on the AHIMS database – section 4.1



Sturt Highway AHIMS Sites - Section 4-2

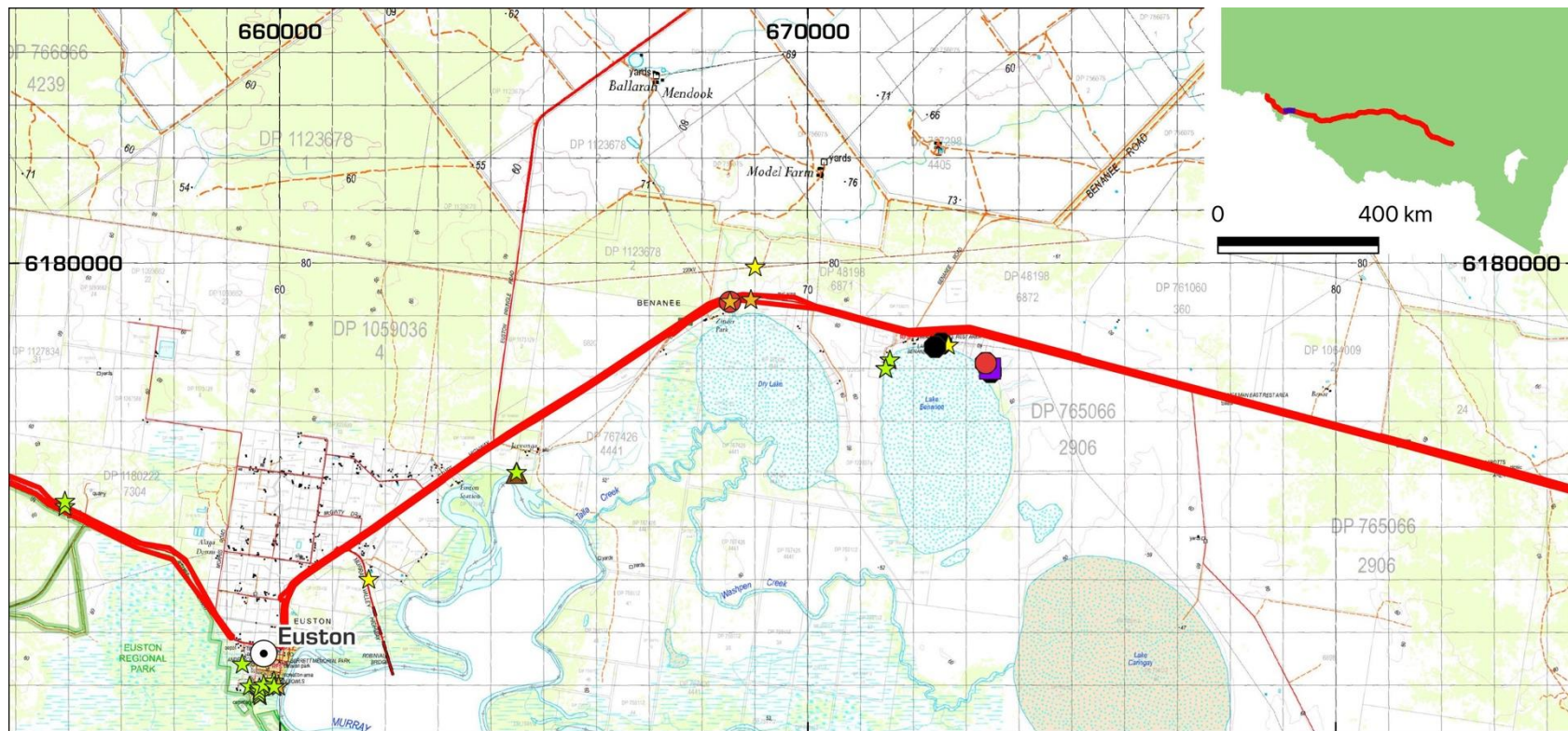


Legend

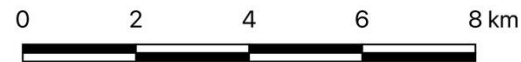
- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 29: Location of sites by type recorded on the AHIMS database – section 4.2



Sturt Highway AHIMS Sites - Section 4-3



Legend

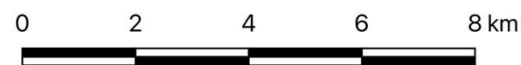
- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 30: Location of sites by type recorded on the AHIMS database – section 4.3



Sturt Highway AHIMS Sites - Section 5-1

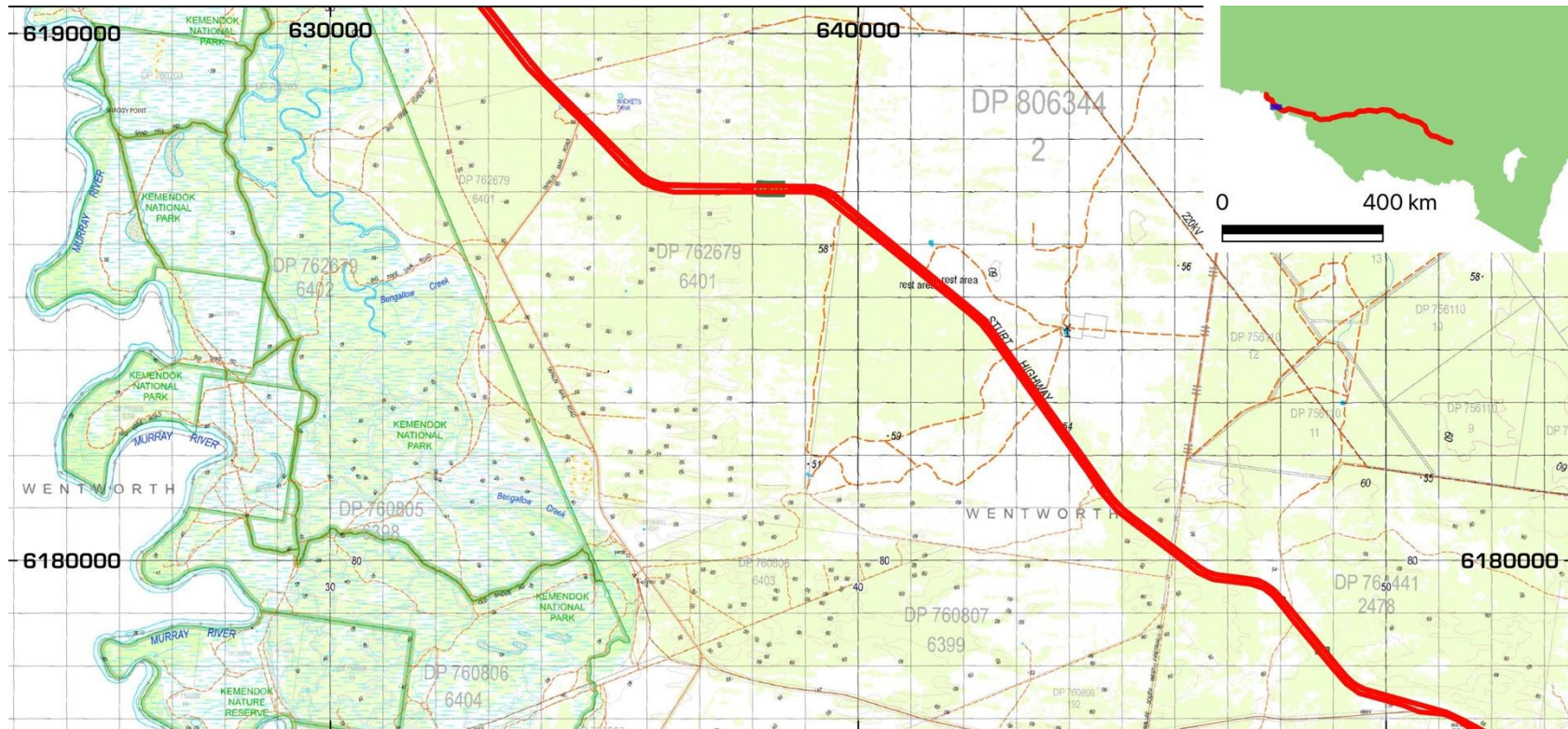


Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 31: Location of sites by type recorded on the AHIMS database – section 5.1



Sturt Highway AHIMS Sites - Section 5-2



Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 32: Location of sites by type recorded on the AHIMS database – section 5.2



Sturt Highway AHIMS Sites - Section 5-3

Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 33: Location of sites by type recorded on the AHIMS database – section 5.3



Sturt Highway AHIMS Sites - Section 5-4

Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 34: Location of sites by type recorded on the AHIMS database – section 5.4



Sturt Highway AHIMS Sites - Section 5-5



Legend

- | | | |
|-----------------------------------|----------------------------------|--|
| Study Area | Burial | Hearth |
| AHIMS Sites along route | Ceremonial Ring (Stone or Earth) | Modified Tree (Carved or Scarred) |
| Aboriginal Ceremony and Dreaming | Conflict | Non-Human Bone and Organic Material |
| Aboriginal Resource and Gathering | Earth Mound | Potential Archaeological Deposit (PAD) |
| Artefact | Habitation Structure | Shell |



Figure 35: Location of sites by type recorded on the AHIMS database – section 5.5

5.2 ACHRIS site search

Given sections 4 and 5 of the Sturt Highway project are very close to Victoria, an extensive site search was conducted of the Victorian heritage database via ACHRIS on the 22nd March 2021. The aim of this search was to provide a broader understanding of site types found within these sections of the study area. The search was conducted of the area along the Murray River from Euston to Mildura as shown in Figure 36.

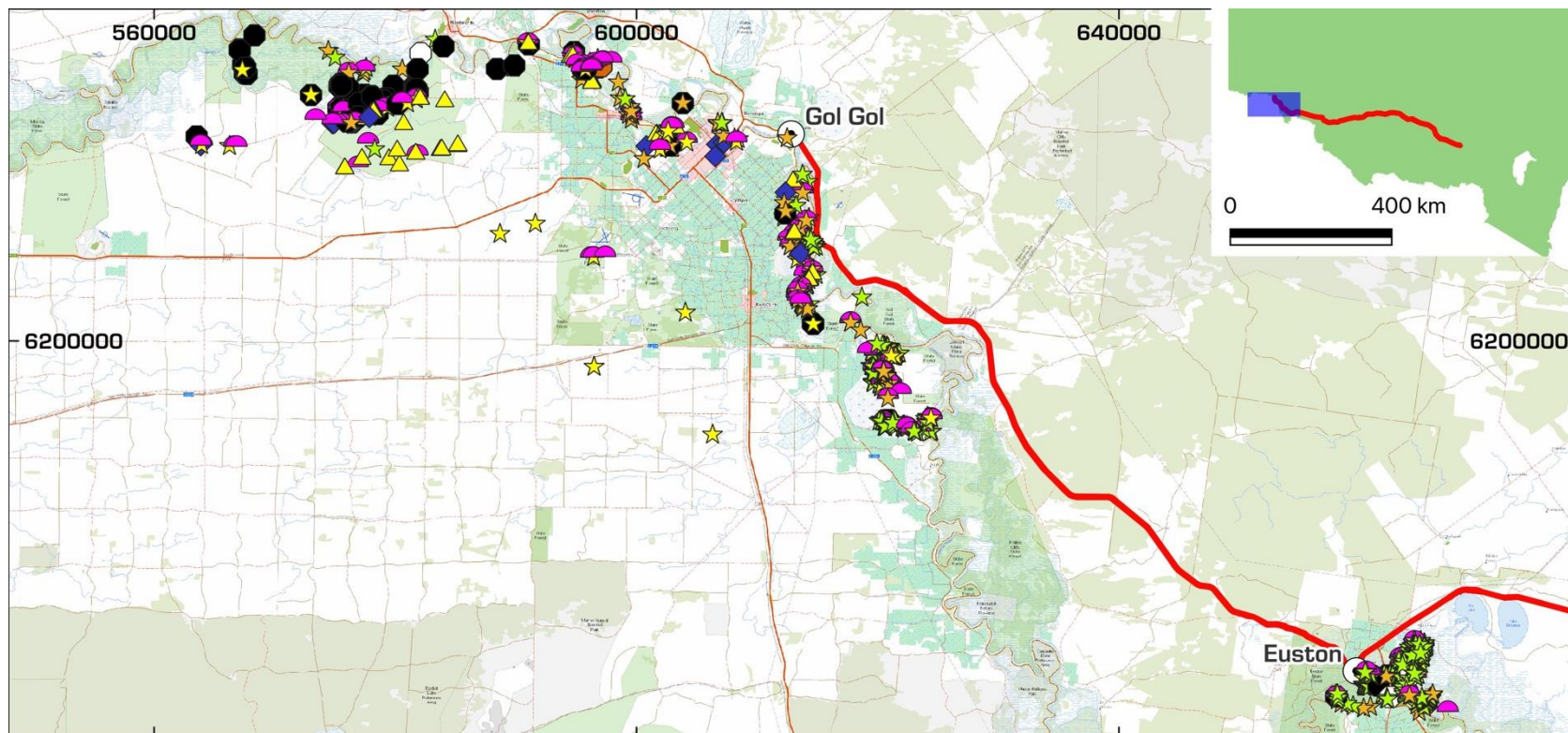
Two thousand two hundred and thirty (2,230) sites or objects were listed as being present within the search area. Table 8 provides a summary of the site types and features. As seen in the NSW site register results, the vast majority of the sites are culturally modified trees (CMT) (1,795), followed by shell middens (196). The frequency of shell middens in Victoria compared to the NSW sites is a reflection of the presence of the Murray River within the search area. A number of other site types are also recorded. These include heaths, artefact scatters, a variety of earth features, burials, historic places and two locations of object collections.

Table 8: Summary of ACHRIS search results

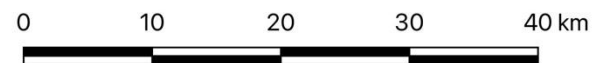
Site Type	Total	% of total
Scarred Tree	1795	80.5
Shell Midden	196	8.8
Earth Feature - Hearth	86	3.9
Artefact Scatter	60	2.7
Earth Feature - Soil Deposit	30	1.3
Low Density Artefact Distribution	28	1.3
Aboriginal Ancestral Remains (Burial)	23	1.0
Aboriginal Historical Place	4	0.2
Aboriginal Ancestral Remains (Reinterment)	2	0.1
Earth Feature - Oven	2	0.1
Earth Feature - Soil Feature	2	0.1
Object Collection	2	0.1
	2230	100.0

5.3 Other heritage register searches

Searches were made of the NSW State Heritage Inventory and the Australian Heritage Database on 1 May 2021 (see Appendix 1). While 23 Aboriginal sites are registered within the local government areas along the Sturt Highway study area, no Aboriginal places or places with identified Aboriginal cultural values are listed within or adjacent to the proposed activity area.



Sturt Highway ACHRIS Sites - Section 5



Legend

- | | | |
|----------------------------------|--|-----------------------------------|
| Study Area | Artefact Scatter | Earth Feature |
| ACHRIS sites near the Study Area | Aboriginal Ancestral Remains (Burial) | Low Density Artefact Distribution |
| Scarred Tree | Aboriginal Ancestral Remains (Reinterment) | Object Collection |
| Shell | Aboriginal Historical Place | |



Figure 36: Overview of location of sites by type recorded on the ACHRIS database – Euston, Robinvale and Mildura search results

5.4 Material Evidence of Aboriginal Land Use

Aboriginal occupation of Australia extends back well into the Pleistocene. Current theories place the arrival of humans to Sahul between 47,000 years before present (BP) and 65,000 BP [O'Connell and Allen 2004, 2015; Allen and O'Connell 2014; Clarkson *et al.*, 2017, O'Connell *et al.*, 2018]. While debate continues regarding the earliest arrival in Australia, there is general agreement that all environmental zones across the continent were colonised by around 35,000 BP [Mulvaney and Kamminga 1999]. Since that time there has been substantial climatic variation, which has influenced choices people made regarding the locations they lived.

5.4.1 Section 1: Wagga Wagga to Narrandera



Aboriginal Cultural Heritage Assessment Avonlie Solar Farm- Draft (Grounds, Barber, Bradley & Dillon, 2018)

This study was conducted as a result of proposed Avonlie Solar Farm at Sandigo, south of Narrandera. The desktop assessment did not identify any previously recorded sites within the proposed survey area, and in a wider search, the closest site were culturally modified trees approximately 5km away, in the Sturt Highway road reserve. This assessment identified culturally modified trees as the most prevalent site type in previously recorded sites.

A pedestrian surface survey was conducted over approximately 70% of the proposed area. This survey identified four artefact scatter sites, 64 isolated artefacts, and a scarred tree. Due to the land use history at the site, it was predicted that the proposed development area had low archaeological potential. Six culturally significant Grey Box trees were also identified outside the proposed development area. An additional scarred tree was also identified, however it has high potential to be natural, rather than cultural in origin

Three artefact scatter sites have been identified as being outside the impact area. However all other site and artefacts are at risk of impact during development. The artefact scatters and isolated finds are deemed to have low scientific significance, however the scarred tree is deemed to have high significance.

The report notes that as the Avonlie Solar Farm is identified as a State Significant Development under the EP&A Act, impact to Aboriginal sites does not require an AHIP. The report recommends that exclusion zones should be applied to sites outside the impact area, and that development must be adapted to avoid the scarred tree within the current impact area. It recommends partial salvage of one of the artefact scatters which is likely to be partially impacted. Likewise, it recommends salvage of isolated artefacts and artefact scatter sites within the impact area, and repatriation to a safe area outside of the development area by an archaeologist and RAP representative(s).



Murrumbidgee Province Aboriginal Cultural Heritage Study (Pardoe & Martin, 2011)

This study is conducted as part of a Cultural Heritage Study into the entire Murrumbidgee Province area, for the basis of identifying archaeological areas for protection. The desktop assessment aspect of the study identified 307 previously recorded sites within the province area. The study identified that there was likely to be an underrepresentation of recorded sites within scalded red texture contrast soils, and an overrepresentation of recorded sites within clay and sand soils. The study also suggests an overrepresentation of previously recorded confined trace, lunette, lake, and channelled and general plain landforms; and an underrepresentation of depressed and scalded plains.

A surface survey was conducted over a non-randomly sampled area comprising of under 1% of the total Province area. This survey identified 347 new sites. The report does not, however, identify solely new sites by landform, and instead analyses both previously recorded and new sites within the survey area. The report extrapolates the site data of the surveyed areas to suggest that over 92 000 sites or features are likely to exist in the Province area.

AHIMS Duck Bend Site Recording (1999)

The Duck Bend site, AHIMS 49-6-0031, 6km south of Narrandera. The site was identified during CHSO Aboriginal Cemeteries Project research in *Wiradjun Places: The Murrumbidgee River Basin* (Kaballa 1998). This paper identified the Duck Bend waterhole as being the most likely location of the Massacre Island massacre in the 1840s. Despite this, it is Massacre Island, not the Duck Bend site that is deemed to be “most significant because it provides the clearest link between oral tradition and place”. There is also no physical evidence visible at the site.

5.4.2 Sections 1 and 2: Wagga Wagga to Hay

An archaeological survey of the proposed 330kV transmission line, Wagga-Darlington Point (Hiscock, 1983)

This study was conducted as a result of a proposed 330kV transmission line from Wagga Wagga to Darlington Point. A finalised study of the Yanco to Darlington Point survey was not conducted due to an incomplete route layout confirmation. As such a survey of the likely route was undertaken, but additional survey may be required in the future for this section, depending on route layout for this area. A desktop analysis of previous archaeological investigations within the wider area, identify the two predicted main site types as being isolated lithic artefacts, and CMT. Interaction with farmers and landowners in the locality also identified a rock art and campsite area to the south of the proposed development area, and also a burial location to the north of the proposed development area. Neither area are at risk of the current development.

Archaeological survey of the proposed Wagga to Darlington Point 330kV transmission line (McIntyre, 1987)

This study was conducted in response to a proposed 150km 330kV transmission line route from Wagga Wagga to Darlington Point. The desktop survey conducted in the beginning of the study did not identify any previously recorded Indigenous sites within the survey corridor, however several sites were recorded in the wider locality.

A surface survey was conducted of the entirety survey area, with the exception of the Somerset Park property, due to disputes with the landowner. The report identifies that though within a significant landform, previous agricultural development is likely to have destroyed any archaeological sites. This survey identified a number of new sites within the survey corridor. These consisted of seven scarred trees, and four occupation sites (two of which included lithic artefact(s)). These sites were not located within the proposed impact area, and as such the report recommended the development could continue.

A number of scarred trees are recorded in the Darlington Point area. Likewise, to the northeast, burials and artefact scatters have been recorded. However these sites are not at risk of the current development.

A pedestrian surface survey was conducted over the proposed corridor. This survey identified 12 CMT, of which 6 are only tentatively cultural in origin. 13 isolated artefacts were also identified.

5.4.3 Section 2: Narrandera to Hay

Aboriginal Cultural Heritage Assessment Gunbar Water Pipeline (Bradley, Barber and Dillon, 2017)

This study was conducted in response to the proposed Gunbar Water Pipeline Project at Gunbar, NSW. The proposed development requires a survey of a proposed 20m wide pipeline corridor of the 296km, stretching northeast from Hay, NSW. A desktop survey identified two previously recorded AHIMS sites within or adjacent to the proposed development corridor. These sites consisted of artefact (scatter or isolated find) sites. Additional previously recorded sites were also identified in the wider locality of the proposed development area. These sites included culturally modified trees, hearth sites, earth mound sites, artefact sites, midden features, resource sites, PAD sites, and at least one burial. As such, it is recognised that there is potential for such sites

within the proposed development corridor, especially due to the lack of previous aboriginal heritage surveys within much of the corridor area.

Both a vehicle survey with associated targeted pedestrian survey, and a pedestrian survey, were conducted of the entire proposed development areas. These surveys identified 93 new sites. These sites consisted of 54 artefact scatters, 33 isolated artefacts, and 6 hearth sites.

Aboriginal Cultural Heritage Assessment Gunbar Water Pipeline Additional Areas) (Barber, Dillon, & Bradley, 2018)

This study was conducted as a result of proposed additional areas in need of survey for a water pipeline project at Gunbar, NSW. Previously recorded sites, as part of both a search of earlier recorded sites, and site identified in the previous Gunbar Water Pipeline Project identified in the area include hearths, and isolated and scattered lithic artefacts. The previous Aboriginal heritage survey of the original proposed Gunbar Water Pipeline project (Bradley, Barber and Dillon, 2017) identified 93 previously unrecorded sites. No burials, scarred trees, or mound sites were known to be recorded in the survey area. An AHIMS search of the additional proposed development area identified one previously recorded site. Seven sites identified during the previous wider Gunbar Water Pipeline Project survey also lie within this proposed area, five artefact scatters and two isolated artefacts.

A pedestrian survey was conducted over all proposed additional development areas. This survey identified 21 new sites within the survey area. These sites consist of eight isolated finds and thirteen artefact scatters. Eighteen of these sites are identified to be within the impact area of the proposed development.

The report recommends avoidance of sites, and development within pre-disturbed areas of ground where possible. They also recommend salvage and testing of the impact corridor should an AHIP be approved and realignment of the impact area not be accepted. The report also recommends a due diligence survey be conducted for all landforms previously identified as being of low significance within the project boundaries.

Aboriginal Cultural Heritage Assessment Gunbar Water Pipeline (Bradley, Barber and Dillon, 2017)

This study was conducted in response to the proposed Gunbar Water Pipeline Project at Gunbar, NSW. The proposed development requires a survey of a proposed 20m wide pipeline corridor of the 296km, stretching northeast from Hay, NSW. A desktop survey identified two previously recorded AHIMS sites within or adjacent to the proposed development corridor. These sites consisted of artefact (scatter or isolated find) sites. Additional previously recorded sites were also identified in the wider locality of the proposed development area. These sites included culturally modified trees, hearth sites, earth mound sites, artefact sites, midden features, resource sites, PAD sites, and at least one burial. As such, it is recognised that there is potential for such sites within the proposed development corridor, especially due to the lack of previous aboriginal heritage surveys within much of the corridor area.

Both a vehicle survey with associated targeted pedestrian survey, and a pedestrian survey, were conducted of the entire proposed development areas. These surveys identified 93 new sites. These sites consisted of 54 artefact scatters, 33 isolated artefacts, and 6 hearth sites.

The report recommends avoidance of all sites by limiting development to pre-disturbed land areas where possible, at the request of RAP consultation.

Addendum to the Euroley Poultry Production Complex Aboriginal Archaeological (Bertolani, 2015)

This report is an addendum to the 2015 *Euroley Poultry Production Complex Aboriginal Archaeological Assessment* report. The addendum report assesses a redesigned aspect of the original Euroley Poultry Production complex, which resulted in relocation of proposed work areas. Targeted pedestrian surface surveys were required for new proposed work areas, proposed

access track alignments were also vehicle surveyed. An AHIMS search was conducted in the new survey area, and identified three recorded sites, two scarred trees, and a hearth feature. A desktop survey identified the following potential site types: scarred trees, ground ovens or hearths, open camp sites/artefact scatters, and isolated finds.

Three new scarred tree sites were identified during the course of the survey. All three scarred trees are of the Black Box (*Eucalyptus largiflorens*) species, and one shows evidence of steel axe use. Two historic scarred trees were also observed. The report also states a previous OEH visit to the survey area identified two scarred trees, but as the locations were not recorded, it is unknown if these are in addition to the new recorded sites.

The recommendations of the report note the scarred trees to be of low archaeological value, low-moderate aesthetic value, and no historic value, with the exception of the steel axe-made scar, which has been identified as holding low-moderate historic value. The scarred trees are in proximity to the proposed impact area, but in the current design, are to be avoided by the track construction. Management measures are recommended to ensure no accidental damage to the sites.



Indigenous cultural heritage assessment, Euroley Bridge replacement, Murrumbidgee River south of Yanco, Southern NSW (Edmonds, 2001)

The study is conducted as a result of proposed developments which would replace the pre-existing Euroley Bridge across the Murrumbidgee River, due to the pre-existing bridge design being unsafe for large vehicle crossing. A specific new bridge design has not been confirmed, and as such the report survey area survey includes the potential impact areas of all seven proposed bridge design options. The desktop assessment conducted of the locality did not identify any previously recorded sites within 5km of the survey area. However, a wider search did identify scarred tree, hearth, and campsite sites, and a mound site, to the southwest of the survey area. Desktop research also identified scarred tree sites and being the most probably site type within the survey area.

A pedestrian surface survey was conducted over the entirety of the survey area, and one new Aboriginal site was recorded, a singular scarred tree of the Grey Box (*Eucalyptus macrocarpa*) species, 19m east of the current bridge abutment. The report suggests three of the proposed bridge designs as being preferable from an archaeological standpoint but does also recognise that the site is outside the impact zone of all proposed designs.




An archaeological survey of the proposed Gum Creek Bridge widening, 75km west of Narrandera on the Sturt Hwy (Mills, 1999)

This study was conducted as a result of proposed bridge widening development at the Gum Creek Bridge, 75km west of Narrandera, NSW. The desktop assessment identified five AHIMS site recordings within the locality of the study area: three open campsite sites, one mound site, and one scarred tree. An additional site is known to exist in the locality, due to a Consent to Destroy in 1996/1997 being refused, however it was not listed within the AHIMS search. All sites occur on alluvial floodplain landforms, and as such were potential site types to be identified within the survey area. Predictive modelling also identified potential for burial sites in the locality.

The survey of the proposed work area was conducted as a pedestrian survey of the entire proposed works area. RTA aerial photography was also used where available, and useful. The field survey identified one new scarred tree site, on a Grey Box (*Eucalyptus macrocarpa*) species, approximately 67m west of the original bridge. The report deems the site to have low significance, particularly relating to scientific significance. The report also deems the site to have low-moderate educational significance. Aboriginal community consultation recognises the site as having moderate to high community value, however due to the level of uncertainty in Indigenous origin of the feature, the report identifies the site as having generally low significance.

The report recommended a 15m fencing buffer zone around the site during development, as the site was not within the proposed impact area.

 **An archaeological study of the proposed optic fibre cable route between Narrandera and Euroley, South-Western NSW (Kelton, 1998)**

The study was conducted in order to investigate the proposed Telstra optic fibre cable route from Narrandera to Euroley. The desktop survey of the proposed route corridor did not identify any previously recorded sites, however three previously recorded scarred tree sites were noted to be within 500m of the proposed route corridor. Due to the distance, there was deemed to be no threat to these sites from activity in the proposed route corridor.

No Aboriginal sites were identified during the field survey of the proposed route. Two sandhill areas were identified during this survey however, and were deemed to be areas of potential archaeological sensitivity. As such, monitoring of these areas during development and cable laying by an experienced and qualified LALC member, and/or archaeologist, is required.

 **Archaeological survey of the route of a proposed electricity transmission line from Hay to Darlington Point (Gollan, 1982)**

This study was conducted in response to a proposed 120km transmission line easement from Hay, NSW to Darlington Point, NSW. The proposed easement corridor is 90m in width.

A surface survey was conducted on the entire survey area, with additional pedestrian survey in the form of lateral transects and grid searches of high significance landforms. This study identified 26 new sites, including 9 CMT, 10 hearth sites, 3 artefact scatter sites, and 8 hearth and artefact complexes. An earth mound was also identified and examined using test pitting. The identification of this mound as Indigenous in origin is unconfirmed, but potentially an ash mound, as there is no hearth material identified during this additional analysis.

The report recommends realignment adjustments to the proposed transmission line to avoid significant sites, such as several CMT, at no cost to other sites.

 **Survey of Aboriginal and Historic Sites: Darlington Point – Yanco, 132kV transmission line (Thompson, 1982)**

This study was conducted as a result of a proposed transmission line from Darlington Point to Yanco. The report makes no mention of any previously identified sites within the development corridor.

A pedestrian survey was conducted over the majority of the site, however a vehicle survey was conducted in areas with low ground visibility. Due to a fire accident causing some site listing to be rewritten from memory and photos, some areas of research may be missing.

This survey identified 57 new sites. These sites consisted of 40 CMT, four isolated artefacts, one hearth and artefact complex, and 12 oven mound sites in various degrees of preservation. CMT are primarily Black Box species, although they are also recorded on Cypress Pine species, primarily in 'long thin scars', which a local Wiradjuri man informed Thompson were for strips of bark used for torches. Some Yellow Box species are also recorded, however the report identifies it is difficult to identify indigenous origin scars on Yellow Box species with any certainty.

5.4.4 Sections 2 and 3: Narrandera to Balranald

 **Hunter-gatherer burials and the creation of persistent places in southeastern Australia (Littleton, J & H Allen, 2007)**

The paper argues for Indigenous multi-burial sites to be considered through the lens of 'persistent places' rather than cemeteries, due to the variation in burial practices. Due to burials occurring in areas of high erosion, as such interpretation, and knowledge, of burial practices is biased towards burials in these contexts.

In ethnographic sources, burial sites were primarily described as being mounded, having some form of boundary, and having a structure above, which some sources describe as being burnt as part of the final mourning stage. Regional variations described often related to burial location, not

burial site type or appearance. Scar trees are described in association with burials, but this is primarily noted in areas east of the Riverine Plain.

Within areas of interest to the survey, sites have primarily been recorded as a result of developments, sand quarries, and erosion as a result of natural events, or as a result of overstocking. This visibility as a result of exposure changes is as a result of shallow graves in sand bodies and other light soils as preferential burial locations.

The paper also notes that in general, burials have been identified on dunes bordering sources, or on lunettes near permanent lake or river water sources. However, the Hay Plain area has additional variations, and are less confined to one identifiable landform. Burial sites are also noted to be in the less conspicuous locations, and more likely to be on low rise dunes, than high ground. It is also noted that they are more likely to be associated with ephemeral water courses, and a significant number are associated with areas of cultural deposits, such as within middens or oven mounds.

Multi-burial sites are also reported less commonly in the Hay Plain area, than in the Murray Corridor area. In the Murray corridor area, the authors note approximately 50% of burial sites containing 2-10 individuals, and approximately 25% containing over 20 individuals, whereas in the Hay Plain, approximately 40% of burial sites contain a single individual, and approximately 50% of burial sites contain less than 10 burials. However, the authors do note this may not be a purposeful choice, and the shared burial spaces may be due to less variation in burial locations, causing coincidental sharing of locations. As such, density, and the identification of cluster burials, is used to identify sites of purposeful high density burials, rather than accidental sharing of locations.

Burials are commonly identified as primary inhumations, however small numbers of cremation or bundle burials have been noted. Cremations are recorded as having a higher occurrence (8.3% v 2.9%) in the Hay Plain area. These burial types are potentially associated with delayed burial practices, as described by Musgrave 1930 in relation to child burials.

Research notes in both the Murray Corridor and Hay Plain areas male burials are more frequent than female, however in the Hay Plain, males are more likely to be interred in isolated burials, and females in group contexts. However this excludes the demographic of middle aged women, who are scarce in such contexts within the Hay Plain, but not within the Murray Corridor. Subadult burials are more frequent in the Hay Plain area than the Murray Corridor, although in both areas are primarily found in proximity to other burials. However, subadult remains are less common than remains of other demographics.

Burials in the Murray Corridor are primarily buried extended, and oriented southwest. However variations do occur, particularly regionally, East Nanyah, for example, has common extended southwest oriented remains, yet a separate site in relative proximity, has burials primarily flexed, and south oriented. However in the Hay Plain area, orientation is not consistent regionally, but rather clustered burials tend to share an orientation. More generally, burials are primarily in a flexed position across the region.

The paper notes few cases of dating of remains, or burial complexes, although does note stratigraphic examples of long-term usage of sites, as well as relative co-current internment.

Ethnographic sources support the concept of occupational avoidance of burial sites, and a memory of burial site locations as a result. Occupation deposits are rare in burial contexts outside the pre-occupation of burial sites in the Hay Plain area.

5.4.5 Section 3: Hay to Balranald




Aboriginal cultural heritage assessment: Combined paraway WES at west Pevensey B, The Link, and Rosevale (Barber and Zeising, 2019)

This study was conducted as a result of a proposed water pipeline development south of Hay, as part of the Combined Paraway Water Efficiency Scheme (WES). A desktop analysis did not identify

any previously recorded AHIMS sites within the proposed development area. However, 62 sites were identified within a 10km locality of the proposed area. These sites included various complexes of features, including some with burial sites, 9 artefact scatters, 16 isolated artefacts, 3 ceremony and dreaming sites, 18 hearth sites, 2 earth mound sites, 3 burials with artefacts, and 1 single burial.

A pedestrian survey was conducted over all proposed development areas. This survey identified 73 new sites. These sites included artefact scatters, isolated artefacts, hearths, and various multi-feature complexes, at least one of which contained a burial site. Sub-surface testing excavations also occur within the survey area. Of 36 test pits excavated, only 21 artefacts were identified.

 **Nimmie-Caira interim land management (ILM) and sustainable diversion limits (SDL) projects: Aboriginal cultural heritage assessment report (Markham, Keats & Atkinson 2018)**

This survey was conducted as a result of proposed ILM and SDL works at Nimmie-Caira, as well as upgrades to associated access tracks. The desktop assessment associated with the survey identified 1086 previously recorded AHIMS sites both within, and in the locality of, the survey area.

A preliminary field inspection also identified 36 previously unrecorded Aboriginal sites within the survey area. A pedestrian surface survey was conducted of the access tracks, channel walls, fence lines, and fire breaks within the survey area. This survey identified 76 new sites. These sites consist of stone artefacts, earth mounds, hearths, modified trees, and burial sites. Additional surveys conducted identified 16 new sites. A total of 128 new sites were identified during the entire course of the survey. The ILM works have potential to impact some of these sites.

Text excavation was conducted in areas proposed for urgent grading and other disturbance works. 17 test pits were excavated in two PAD sites within these areas, and no artefacts were identified, however some burnt bone, heat retainer and charcoal fragments were present in the uppermost 30cm. However, these were in low frequency, and as such could not be determined to be cultural or natural. The report notes that some proposed developments have been rerouted to avoid impact upon sites, this includes all but one burial site. An AHIP is recommended for the relocation and reburial of an exposed and disturbed burial, under the supervision of appropriate RAPs. The track associated with this site is also recommended to be capped as part of conservation management. Additional burial sites have also been recommended AHIPS to facilitate management and conservation, despite no development impacts to the sites. AHIPS are also recommended in the report to relocate and rebury artefacts from sites, and also for complete or partial destruction of a number of earth mound, hearth, and PAD sites. Many of these have already been subject to some degree of disturbance.

 **Waimea Downs Aboriginal burials, Toogimbie Station (Johnston, 2013)**

This report was written up as a result of an inspection of Toogimbie Station, following cultivation impacts to Aboriginal heritage areas, primarily burial sites, at the request of Hay LALC. The area of the study corresponds with the AHIMS #102799 report. Part of Toogimbie Station has been previously designated an Aboriginal Place, and is heavily signed as such. Signage advises the presence of Indigenous burials, and other occupation sites and material in the locality. 'Please do not drive across this area' signage is also present where relevant.

In 2012, aspects of Aboriginal heritage sites were impacted through unauthorised ploughing of a 50x15m area, immediately adjacent to signage, by two Danish agricultural work experience students. Four burials (including a reburial location from the 1990s), an anvil/grindstone, and hearth were known to be in and around this area of impact; of these, two burials were impacted by the cultivation.

The report recommended the following: a warning letter be issued to the property sub-leasee, advising of the presence of Aboriginal heritage sites; reburial and covering of exposed burials, in line with the precedent set by other Toogimbie reburials; employment of an cultural heritage officer, experienced in Aboriginal burial identification and protection, by the property; and a more

detailed series of information and maps of areas of sites or sensitivity be provided to the sub-leasee by Hay LALC.



Cultural heritage statement of impact: NSW RTA – Willow Vale rest area Crew and Pappin, Yarkuwa Indigenous Knowledge Centre, 2010a

Yarkuwara Indigenous Knowledge Centre was contracted to conduct both a desktop assessment, and surface survey, of a proposed works area for the Willow Vale rest area on the northern aspect of the Sturt Highway road corridor. The desktop assessment consults local site location recordings, however notes that due to “local protocols”, the locations of sites not within the study area are not reported. However, they do record the existence of sites within the general area, and the proximity to water of these sites. The desktop assessment also identified potential to locate scarred tree, oven mound, hearth, culturally significant food and medicine plant resources, and burial sites.

A fieldwork survey conducted of the primary proposed works area identified two isolated flake artefacts, one of which was located within a clay pan landform, and an artefact scatter and oven mound site, with evidence of knapping, and burnt clay. This site is associated with an open plain landform with low vegetation cover. Following the identification of these sites, work was proposed to be relocated towards the east. The sites in this area are identified as having potential association with the nearby major sandhill landscape feature that lies to the west of the study area.

A fieldwork survey was conducted of the secondary proposed works area, and no Aboriginal sites, or culturally significant areas were identified. Recommendations for the site were that the oven mound site should be protected through a design modification, and that instead works should continue in the secondary proposed works area, with no impact to the primary proposed works area.



Cultural heritage statement of impact: NSW RTA – A/04958 Yanga Widening (Crew & Pappin, 2009)

Yarkuwara Indigenous Knowledge Centre was contracted to conduct both a desktop assessment, and surface survey, of a proposed works area/road corridor for the widening of the Yanga section of the Sturt Highway. The desktop assessment consults local site location recordings, and AHIMS site recordings in the general area, however, notes that due to “local protocols”, the locations of sites not within the study area are not included in the report.

The report does, however, note the existence of sites within the general area, and that the majority are sites associated with the Yanga Lake Floodplain landform. Though unrecorded in location, number, or type, the report notes that most sites are burials and associated sites. The desktop assessment also identified potential to locate scarred tree, oven mound, hearth, culturally significant food and medicine plant resources, and/or burial sites.

The fieldwork survey of the proposed works area identified culturally significant plant species, including yellow broom bush, lignum, Nelia, saltbush and dillon bush species. Several scarred and marked trees were also identified within the study area. Two scarred trees are identified as Box species of eucalypt, however all other tree species are unidentified. Additionally, only two of the 13 identified trees were located within the proposed impact area. These trees were located in the far east of the impact area, within 10m of the current bitumen line, and are not deemed to be at risk within the current development proposal. Mary Pappin, as the Mutthi Mutthi Nation chairperson, also noted that the area lies within a cultural landscape of significance to both pre- and post-contact periods.

The report recommends protection of the two scar trees within the impact area during construction, as there were no plans to remove or impact trees in the eastern most vicinity. It is also recommended generally, that no mature trees be impacted during the development process.

 **An archaeological assessment of two truck parking areas (eastbound and westbound), on the Sturt Hwy, 55km west of Hay, western NSW (Edmonds, 1999)**

The study is undertaken as a result of proposed truck stops on both the eastbound and westbound lanes of a section of the Sturt Highway. The desktop assessment did not identify any previously recorded sites within the survey area, with the closest site in the wider locality being an earthen mound approximately 1 km to the north. Due to the nature of the featureless floodplain landform, there is not predicted to be a high probability of encountering Aboriginal archaeological material.

A pedestrian surface survey was conducted of the entire survey area. The survey did not identify any Aboriginal heritage sites, or any potentially sensitive landforms. As such the report recommends the development can proceed.

 **An archaeological survey for the proposed bridge and road approaches at Yanga Creek, near Balranald, western NSW (Edmonds, 1993)**

The study was conducted as a result of proposed changes to the approach to, and bridge over, Yanga Creek, in response to increased road traffic accidents associated with the previous road design. The desktop survey consulted records of Indigenous sites in the Balranald area, and identified a number of previously recorded sites. These consist of 13 scarred trees, and three midden sites, as well as an oven mound, mia mia site, fish trap, and ceremonial site. The report notes that the lack of sites recorded in additional surveys conducted in the area make it reasonable to suggest that the frequency and type of sites recorded in total are not likely to be extrapolated across all unsurveyed areas.

The pedestrian surface survey was conducted over the entirety of the survey area. Six Indigenous sites were identified during this survey, four scarred trees, and 2 midden sites. All sites were observed within the alluvial plain landform. Both middens are small scale mussel shell middens. Two of the scarred trees are identified as having moderate significance, while all other sites are identified as holding low significance.

Three of the scarred trees are not within an impact area, however one scarred tree, and both middens are within the impact area. The report recommends that in light of the Balranald LALC's (BLALC) identification of all sites as being of low significance to them, a Consent to Destroy should be applied for in order to continue the development process in the proposed area. The report also recommends that if development should identify further Aboriginal material or sites, work should cease, and BLALC and NPWS NSW should be informed.

5.4.6 Sections 3 to 4: Hay to Euston

 **Aboriginal cultural heritage assessment: Balranald Solar Farm (Barber, Ruhl and Bradley, 2016)**

This study was conducted as a result of development of the proposed Sunraysia Solar Farm near Balranald, NSW. The desktop assessment did not identify any previously recorded sites within the proposed development area. In the wider locality however, four hearth/PAD sites have been previously recorded between 100-500m away from the proposed development area. The wider archaeological context of the area suggests the possibility of a number of site types within the development area. These possible sites include lithic artefacts, heart sites, and scarred trees.

A pedestrian surface survey was conducted over approximately 15-20% of the proposed development area. This survey was conducted over proposed development areas deemed to hold higher archaeological potential, and the report does acknowledge the potential of additional sites within the predicted low archaeological potential landforms. This survey identified three new sites. Sites consisted of a hearth and stone artefact scatter complex, and two oven sites, one with an additional lithic artefact.

The hearth complex site is not within the proposed impact area, and thus is not at risk of harm from the development. The two oven sites are within the direct proposed impact area. The report recommends that as the proposed Sunraysia Solar Farm is classified as a State Significant

Development under the EP&A Act, an AHIP is not required to impact these sites. The report also recommends that in the case of the stone artefact associated with one of the oven site, it should be relocated as seen fit by appropriate RAP representatives, should impact go forward within this proposed development area. The report does not recommend any further archaeological investigation of the current proposed development area.

Aboriginal stone technology in Yanga National Park, NSW (Kamminga, 2010)

This paper is a review of stone technology within the Yanga National Park. The study focuses on two indigenous site complexes consisting of hearth, artefact scatter, and midden site features, within the national park, with a specific focus on providing a detailed analysis of the stone artefacts of these sites. An artefact collection from within the national park is also analysed in detail.

Cultural heritage assessment for the Balranald levee (Edmonds, 2003a)

The study was conducted into proposed levee flood protection development in the locality of Balranald. The desktop assessment identified 14 previously recorded sites within a 6km locality of the survey area. These sites included seven scarred trees, two shell middens, one ceremonial site, one fish trap, one Mission site, and a burial site. The desktop assessment also identified the following potential sites. Artefact scatters and scarred trees within floodplain systems, and artefact scatters, scarred trees, middens, and burials within sand plain landforms.

A pedestrian surface survey was conducted of the entire survey area. This survey identified a number of new Aboriginal sites, twelve scarred trees, and two shell midden sites. One historical blazed tree was also identified during this survey. Six of the scarred trees are identified as being within areas of potential impact from the works. The report recommends that all sites within areas of potential impacts be protected through a prohibition on works within 10m of the sites, and in situations where impact is unavoidable an Aboriginal Heritage Impact Permit be applied for before any works take place.

5.4.7 Section 4: Balranald to Euston

Junction Park Irrigation Dam, Canally Orchards: Aboriginal cultural heritage assessment (Copper, 2019)

A study is conducted to investigate a proposed location for a 420ML water storage dam at Weimby-Kyalite Rd, near Balranald on behalf of Canally Orchards. The proposed area has been subject to European land use modification, including vegetation clearing, land levelling, ploughing and crop harvesting, and stock grazing. The state of the proposed area is as a harvested wheat crop. A predictive model, based on previous archaeological research in the wider area, is used to identify potential areas of potential within the proposed impact area. Based on this, much of the impact area is understood to have low archaeological potential. A pedestrian survey was undertaken on the entirety of the proposed impact area, with particular attention paid to areas of high visibility. Despite intensive survey, no sites were observed, and consultation with the local Aboriginal community both at the site, and in additional discussions, did not identify any culturally significant areas.

Limondale sun farming project, NSW: Heritage management plan (Keats & Markham 2017)

This study was conducted as a result of proposed construction of the large scale Limondale Sun Farm photovoltaic generation facility project. The desktop assessment associated with the study identified 22 previously recorded sites both within, and in the locality of, the survey area. Previously recorded sites located within the survey area consisted of three hearth and PAD complexes, one isolated hearth, and a highly significant complex which includes an earth mound, PAD, lithic artefact, and habitation structure.


This surface survey identified 12 new sites. These sites included a modified tree, earth mounds, isolated hearths, an isolated lithic artefact, and complexes of varying hearth/PAD/mound/and artefact scatter combinations. Eight of these sites were identified as being outside of the proposed

impact area. A historical site consisting of a complex of weatherboard and corrugated iron structures was also identified during the survey. This site was not located within an area of proposed impact. Two previously recorded sites were identified as being within the proposed impact area, both sites consisted of hearths and PADs. 50x50cm test excavations were conducted within these sites. The results of this subsurface testing are not included within the report. Three of the new sites were identified as being within the proposed impact area, and total impact and harm was proposed by the report, after salvage of surface remains. These site types include an isolated flake, an isolated hearth, and a complex of hearth, artefact scatter, and PAD.

 **Balranald sun farming project, NSW: Archaeological report (Atkinson, Morris & Smith, 2017)**

In addition to Keats and Markham (2017), this study was also conducted in response to the proposed Limondale Sun Farm, south of Balranald. A desktop analysis identified 22 previously recorded AHIMS sites both within the proposed development area, and in the close locality.

A vehicle survey, and targeted pedestrian surface survey were conducted. These surveys identified 11 new sites. These sites include two earth mound sites, two hearth sites, an isolated find, and five complexes with various hearth/mound/artefact combinations, at least one including a PAD area. A CMT was also identified, however it is potentially a historic, rather than Aboriginal cultural feature.

 **North Waldaira Water Efficiency Scheme: Aboriginal cultural heritage assessment report, Balranald Local Government Area (Montero Lopez, 2016)**

The study was conducted in response to a proposed Water Efficacy Scheme in North Waldaira, NSW. The desktop study identified seven previously recorded AHIMS sites within the project area and surrounds, these consisted of two scarred trees, one burial site, and four sites comprising of PADs with associated artefact scatters and hearths. None of these sites are within the proposed project area. The report also recognises Aboriginal sites recorded in systematic surveys conducted of Waldaira-Juno station between 2005 and 2009. They note that none of the many sites recorded in these surveys were registered as AHIMS sites at the time of publication. These sites include scarred trees, mounds, artefact scatters, isolated artefacts, midden deposits, and burials. The majority of these sites are located along the margins of Box Creek and its associated waterways. The desktop survey also identified potential for the following sites within the proposed impact area: scarred trees, non-insitu artefact scatters, hearths, and mound sites. These are predicted to be most prevalent in the floodplain landform in the south of the project area.

A pedestrian surface survey was undertaken over the entire proposed impact area. This survey identified a number of sites. These sites consist of two multicomponent sites, four artefact scatters, one heart, one PAD site, and five isolated artefacts. This PAD is a sensitive women's site, and as such its location information is restricted.

The report recommended changes be made to the proposed design footprint where appropriate to avoid archaeological sites, this included rerouting part of the original design to avoid impacting the women's PAD site. A separate cultural values survey was conducted with Muthi Muthi RAPs, in both pedestrian and vehicle formats, depending on the area. The report also recommends access to the property only occur through approved access roads, and that all visitors to the project be informed of the project boundaries, and accessible areas. Three of the isolated finds were relocated as part of approved harm to the site during development. No other sites were harmed.

5.4.8 Section 4 to 5: Balranald to Buronga

 **Cultural heritage statement of impact: NSW RTA – A/06918 HW 14 Euston widening (Crew and Kennedy, 2010b)**

Yarkuwara Indigenous Knowledge Centre was contracted to conduct both a desktop assessment, and surface survey, of a proposed works area/road corridor for the widening of the Euston section of the Sturt Highway. The desktop assessment identified four AHIMS site recordings in the locality. All sites are classified as scarred trees. The desktop assessment also identified potential to locate

scarred tree, oven mound, hearth, culturally significant food and medicine plant resources, and burial sites. The proposed project also noted potential private land acquisition for the widening, however this had not been confirmed, and such sites were not surveyed.

A pedestrian survey of the entire proposed road corridor was conducted. 19 scarred or marked trees were identified during this survey, and additionally an isolated artefact. All sites were identified within floodplain landforms, however the sand body landscapes were identified as sensitive, and of high potential for burial or occupational sites. All scarred or marked trees are identified as being of the Black Box (*Eucalyptus largiflorens*) species. Bush tomatoes, gum leaves, and specialty wood species including Black Box, pine, and mallee, were also identified as being culturally significant plant resources within the proposed road corridor.

The study recommended minimised impact to, and protection of, scarred trees, and additional surveys prior to any impact within sand body landforms.



Sub-surface testing: Robinvale Bridge replacement, NSW floodplain, near Euston (Edmonds, 2003b)

This study was conducted as a continuation of the proposed Robinvale Bridge Replacement (Edmonds, 2000). As a bridge replacement design has been confirmed, three Indigenous archaeological sites associated with the floodplain-riverbank landform, and four PAD areas lie within the proposed development area. Two PAD sites lie within the proposed impact zone. Predictive analysis also suggests significant site sites such as burials, scarred trees, artefact scatters, and hearth sites may be present within these PAD areas.

As such, subsurface testing was recommended to be conducted in two areas of PAD which would be impacted by bridge construction. Subsurface testing in these areas involved the use of 50mm diameter auger boring, with sediment analysed at 10cm intervals, with additional test pitting to occur should cultural material be identified. As testing did not identify any cultural material, additional test pitting was not conducted. The development was recommended to continue with no additional survey, on the condition of a stop work order being issued should any potential cultural material be identified during construction.



A heritage assessment for the proposed Robinvale Bridge replacement (Edmonds, 2000)

This study has been conducted in response to a proposed replacement of the current Robinvale Bridge across the Murray River at Robinvale. Due to concerns on the heritage significance of the current Robinvale Bridge, the assessment focuses on proposed new locations for the crossing between Robinvale, Victoria and Euston, NSW. A desktop assessment identified six previously recorded sites in or in the locality of the study area, on both sides of the state border. These sites consisted of two midden sites, three scarred trees, and a burial site.

A pedestrian surface survey was conducted of the proposed area for various bridge designs. Six new sites were identified during this survey. Sites were identified on both the NSW and Victorian sides of the river. These sites consisted of nine scarred trees, four shell middens, and a hearth complex. Four PAD areas were also identified in addition to these sites.

5.4.9 Section 5: Euston to Buronga



Preliminary archaeological assessment report: TransGrid Project EnergyConnect (Costello, 2019)

This study was conducted as a result of proposed EnergyConnect 160km transmission line development. The proposed transmission line development area will include a 10km wide corridor from Buronga to the SA/NSW border. The study consisted solely of a desktop assessment which aimed to provide data around the predicted potential for new Aboriginal heritage sites within the study area. A large number of previously recorded AHIMS and ACHRIS sites were identified within the proposed development corridor. These sites included 111+ burial, scarred tree, midden, or hearth sites, 200+ isolated or scattered artefact sites, and at least one quarry site.

The report identifies that as the majority of previously recorded sites within the study area are adjacent to water sources, this is the area with the highest likelihood of archaeological sites. The report identifies river and creek margins as highly sensitive, and having potential to contain midden, burial, scarred tree, and hearth sites. It identifies sand dunes, lunettes, and source bordering dunes as highly sensitive land forms, and having potential to contain burial and campsite sites. It identifies elevated box plains near ephemeral water sources as having potential for sites, but in a less frequent density. It identifies low lying floodplains as having potential for scarred trees, but low potential for other sites. It also identifies dune crests near Lake Victoria as having potential for moderate sensitivity shell middens. The report finally identifies that sandplain-floodplain transition areas are likely to be of high sensitivity, especially if high cliffs or embankments are present, but does not identify site types likely within this.

The report recommends avoidance of previously recorded sites where possible, as well as that an Aboriginal cultural heritage assessment (ACHA) be undertaken of the survey area.

Previously recorded site location data has been redacted from the public version of the report.



Balranald Mineral Sands Project NSW Environmental Impact Statement: Aboriginal cultural heritage assessment appendix (Anderson, 2015)

This study was conducted as a result of proposed mineral sand mining near Balranald. A desktop assessment identified one previously recorded site within the proposed project area.

249 previously recorded sites were identified as being in the wider locality. These sites are primarily stone artefact, or hearth sites, however various other site types are also present. These include CMT, conflict sites, fish traps, grinding grooves, midden sites, and earth mounds.

A sampled pedestrian surface survey was conducted over the wider proposed project area. The surveys conducted over the period of study identified 548 new sites. 417 of these sites are located in, or within 100m of the project area, 383 within the project area, and 256 within the proposed impact area. These sites include 230 artefact scatters, 246 isolated artefacts, 42 artefact and hearth complexes, 27 hearth sites (5 with an associated isolated artefact), one CMT, one artefact scatter, hearth, CMT, Shell and PAD complex, and one artefact scatter, mound, hearth, and PAD complex site.



Aboriginal burials and sand mining on the Riverine Plain, NSW (Bonhomme, 1990)

This study was conducted as a result of a commission by NSW NPWS into Aboriginal burials in the Riverine Plain, particularly in relation to sand resources. No surveys were undertaken in this study, and it was collated from literature and past research data only. However, previously recorded sites were physically inspected in order to identify the accuracy of reported sand body types, and additional new sites identified as a result of this are recorded.

As only the western riverine plain is relevant to the current study, research in the eastern riverine plain in this study are not addressed in this summary or in the summarised table. Additional information is available in the paper on burial grounds at: Fletcher's lake, Willandra lakes, Anabrach lakes, Lake Victoria, the Wakool River area, the Moana to Albury area, Koonadan, the Lachlan River, and Know Swamp.

The Snaggy Bend and Tucker's Creek are outside of the current survey area. However, they are close enough to the westernmost end of the survey area for their data to be relevant to this study.

The Snaggy Bend burial ground consists of 200+ burials over an area of approximately 100m², in a dune crest area. The dune system is primarily yellow quartz sand topped with a red-brown sandy soil. The majority of burials are east-west oriented, in a flexed or extended position. The degradation of remains makes identification of age and sex difficult, however from the intact remains, all burials appeared to be adults, with the exception of the burial of one child. Some compound burials are present at the site in the form of cremations, ochre internments, or bundle burials.

The site is understood to have been a long-term burial ground, but subject to various phases. Midden and occupation material is associated with the site, and it is understood that there is

potential for the site to have been used as a campground intermittent to the burial ground periods. This suggests a large usage period of the site, as well as abandonment periods, for campgrounds to occur at the site despite the presence of burials.

Tuckers Creek is a much smaller burial ground, with at least 26 burials identified over an area of 54m along a dune crest. The site has a high shell and lithic material density over a wider area than the current known burial extent. The burials are, in most cases, cut into this midden material. There is, however potential for additional remains to be present in the dune system, as the majority of remains are only known due to exposure at the site.

A site at Mallee Cliffs is also known to have the remains of at least three individuals, which were identified eroding from a riverbank landform. However, the remains were mixed, and a great amount of detail about the burial(s) could not be understood.

A large burial site also exists at Robinvale. The site is known to extend in an area of approximately 70m², however, it may extend to an area as large as 400m². An approximately 4m² pit was excavated in 1983, and identified the remains of 11 individuals. These burials are primarily in the extended supine position, with no grave goods. The exception to this is the burial of an infant, which has an associated possum teeth head band. The density of burials in this excavation suggests a density of approximately 3.5 individuals/m². When this density is extrapolated to the wider dimensions of the site estimated, the site may contain from 245 to upwards of 1400 burials.

The site is understood to have two phases of burials, as later burials disturb some of the earlier burials. A later use of the site as a campsite is also known, however it is estimated that this occurred a significant period of time after use of the burial ground ceased. This is understood to likely be prior to the ethnographic period.

Individual burials have also been identified throughout the Riverine Plain. Areas relevant to the current study include Robinvale, Buronga, Euston, Balranald, and Yanga Lake. These burials are primarily located in dune/sandhill landforms, or in source and/or water bordering lunettes.

The paper suggests that overall, the majority of burial, both individual burials and burial grounds, are present in sand dune crest/ridge landforms. This majority has been reflected in the sites relevant to this study. Sites in this study also show riverbanks as being likely burial areas. The paper recognises the proximity of water as being relevant to burial locations, but does also note that it is unknown if this is an influential factor on burial location choice, or if this is related to the frequency of landforms in proximity to water.

5.4.10 Outside study area



An archaeological investigation of local Aboriginal responses to European colonisation in the South Australian Riverland via an assessment of culturally modified trees (Dardengo et al., 2019)




This paper is an academic writing which discusses and analyses culturally modified trees within Calperum Station, as part of the Calperum Station research project. This study does not identify the landforms associated with such culturally modified tree sites, but does, however, identify variations in scar type, and frequency based on species. Culturally modified trees identified in this survey area have been identified as being of the Red Gum (*Eucalyptus camaldulensis*) and Black Box (*Eucalyptus largiflorens*) eucalypt species.

5.5 Limitations

The following limitations should be noted with regard to the investigations for the Sturt Highway route safety review project:



AHIMS site recordings provide one GPS location for the site rather than a polygon representing the site area boundary. As such it is possible that sites recorded outside the study area may extend inside it.

-  As a desktop survey, this investigation relies on the quality of previous archaeological investigations and site recordings. Within this large study area there is great variation in the depth of previous investigations from detailed investigations that provide a level of predictive modelling at a local level, to small scale due diligence reports.
-  Along the length of the Sturt Highway study area it is highly likely that there are sites that have yet to be recorded. This has an impact on the robustness of AHIMS database information.
-  This report is unable to provide a high level, detailed analysis of the Aboriginal cultural heritage values of the study area. As a desktop survey, this report is unable to provide an assessment of current extent and condition of sites.

6 REGIONAL CHARACTER

6.1 Predictive Model

The archaeology of the study area from the South Western Slopes across the Riverina, to the Murray Basin region is complex and varied. Archaeological site recordings within the study area are dominated by scarred or culturally modified trees, artefact scatters, hearths, earth mounds, shell middens and burial sites. Less common sites include ceremonial and Dreaming sites, resource and gathering sites, conflict sites, habitation structures, ochre or stone quarries, grinding grooves, stone arrangements and significant waterholes. The prevalence of surface ground exposure, together with erosional features that expose subsoils, will often dictate the likelihood of identifying the presence of stone artefacts during survey.

This Study Area covers a 550 km stretch of highway between Wagga Wagga and Buronga, crossing three, distinct bioregions, each of which consist of varied landscapes (Section 3). Firstly, general predictions related to each bioregion are discussed, then, the likely distribution of archaeological sites within each section of the Sturt Highway is considered individually, in detail. This predictive model is summarised in Table 9. This section expands upon the archaeological implications for each landscape type in the study area, as listed in Table 3.

6.1.1 Hilly landscapes: the western slopes of the Great Dividing Range

In granite uplands to the east of the study area, including the Wonga Hills and Ranges and the Coffin Rock Granite Hills landscapes in the vicinity of Wagga Wagga (NSW NPWS 2003:120), the dominant site types are artefact scatters and culturally modified trees (Section 5.4.1). Previous studies in this landscape setting have suggested that, in these uplands, low valley floors were not preferred occupation locations (Reidel, 2013). Rather, sites were established on elevated terraces or low spur tops that overlook, or are adjacent to, water sources. In this area as in others, proximity to a permanent water supply is the primary factor determining the location of Aboriginal campsites. McDonald (1997), demonstrates a significant correlation between the permanence of a water source and the permanence and/or complexity of the area's Aboriginal occupation, based on the results of targeted excavations.

6.1.2 Alluvial landscapes: crossing the Riverina

In the extensively farmed, lower-lying alluvial landscapes, such as the Brokong Plains, the dominant landforms are Quaternary alluvial features (NSW NPWS 2003: 92), which preserve a greater range of site-types than the granite uplands. These landscapes were resource-rich, and the rivers that traverse them are associated with many wetlands. Wetlands were a focus of relatively intensive Aboriginal occupation activity, as evidenced by ethnographic sources and recent archaeological investigations (Sections 4; 5). In these lower lying areas, culturally modified trees may be found anywhere with undisturbed vegetation, but are more likely to be found near water courses. These vegetated areas may also preserve culturally significant plant resources, such as Bush tomatoes (Crew and Pappin, 2009). Several culturally significant areas are located within this landscape, including Yanga National Park and Toogimbie Indigenous Protected Area (IPA).

Burials in this area are typically found on raised alluvial landforms, and the location of occupation sites is correlated with the relative permanence of a water source (Littleton and Allen, 2007). Burials are not restricted to one specific landform, but upstanding alluvial features often consist of sand. The relative ease of digging through these sandy soils and sediments was probably a factor in the location of those archaeological sites. Burials are frequently associated with other archaeological features, such as culturally modified trees. Occupation sites include complex types, such as fish traps, and shell-middens related to mussel processing. It is important to note that archaeological sites may be associated with palaeochannels of the Murrumbidgee and Lachlan rivers, as well as their modern channels and tributaries.

6.1.3 Dune systems, lakelands and rivers: landscapes of the Murray-Darling Depression

The complex landscapes of the Murray-Darling are formed on sands, limestones and other sedimentary deposits that relate to a series of marine transgressions during the Pliocene and preceding periods (Fabris, 2002). Throughout the Quaternary period, the actions of the Murray and Murrumbidgee river systems have resulted in the formation of extensive wetlands and lake systems, as well as incising and redepositing the sedimentary units from earlier periods (Costello, 2019). Aeolian processes have created extensive dunefields, and lunettes that are often found on the eastern edges of extant and relict lakes. Aboriginal communities were attracted to this region because of the richness of the wetland resources. The persistent accumulation of aeolian sediments means that the evidence of intensive occupation is preserved in the dunes, lunettes and other Quaternary landforms that border watercourses and lake systems (Costello, 2019).

Table 9: Summary of predictive model for ecoregions, highway sections, landscape types and landforms covered in study area.

Ecoregion	Highway Section	Landscape type	Landform	Potential Sites	Archaeological potential
Western Slopes	Wagga Wagga to Narrandera	Granite hills	Steep slopes and crests	Isolated artefacts, artefact scatters	Low
			Moderate slopes	Isolated artefacts, artefact scatters	Low
			Gentle slopes overlooking water courses	Isolated artefacts, artefact scatters, hearth-artefact complexes, ovens	Low-moderate
			Valley floors	Isolated artefacts, artefact scatters	Low
		Murrumbidgee floodplain	Alluvial flatland	Isolated artefact, artefact scatters, culturally modified trees	Low-moderate
			Raised alluvial landforms	Burials, culturally modified trees, artefacts, artefact scatters, hearths, ovens, ceremonial sites	High, dependant on proximity to modern or ancient watercourses
			Watercourses and wetlands	Shell processing sites, artefacts, artefact scatters, culturally modified trees	Moderate-high
			Palaeochannels	Shell processing sites, artefacts, artefact scatters, culturally modified trees	Moderate-high

Ecoregion	Highway Section	Landscape type	Landform	Potential Sites	Archaeological potential
Riverina	Narrandera to Hay	Murrumbidgee and Lachlan Floodplain	Alluvial flatland	Isolated artefact, artefact scatters, culturally modified trees	Low-moderate
			Raised alluvial landforms	Burials, culturally modified trees, artefacts, artefact scatters, hearths, ovens, ceremonial sites	High, dependant on proximity to modern or ancient watercourses (note that burials are located in a greater diversity of landforms within this ecoregion)
			Watercourses and wetlands	Shell processing sites, artefacts, artefact scatters, culturally modified trees	Moderate-high
			Palaeochannels	Shell processing sites, artefacts, artefact scatters, culturally modified trees	Moderate-high
	Hay to Balranald	Murrumbidgee and Lachlan Floodplain, swamps and wetlands	Alluvial flatland	Isolated artefact, artefact scatters, culturally modified trees	Low-moderate
			Raised alluvial landforms	Burials, culturally modified trees, artefacts, artefact scatters, hearths, ovens, ceremonial sites	High, dependant on proximity to modern or ancient watercourses (note that burials are located in a greater diversity of landforms within this ecoregion)
			Watercourses and wetlands	Shell processing sites, culturally significant plant resources, artefacts, artefact	High

Ecoregion	Highway Section	Landscape type	Landform	Potential Sites	Archaeological potential
				scatters, culturally modified trees	
Murray Basin	Balranald to Euston	Dune fields	Aeolian landforms (source bordering dunes, lunettes)	Burials, campsites, ceremonial sites, culturally modified trees, artefacts, artefact scatters	High, dependant on proximity to modern or ancient watercourses
			Scalds	Artefacts, artefact scatters	Low-moderate
			Flatlands	Artefacts, artefact scatters, culturally modified trees	Low-moderate
			Watercourses and wetlands	Shell processing sites, shell middens, culturally significant plant resources, artefacts, artefact scatters, culturally modified trees	High
		Raised alluvial landforms	Burials, culturally modified trees, artefacts, artefact scatters, hearths, ovens, ceremonial sites	High, dependant on proximity to modern or ancient watercourses (note that burials are located in a greater diversity of landforms within this ecoregion)	
		Alluvial plains	Alluvial flatland	Isolated artefact, artefact scatters, culturally modified trees	Low-moderate
			Raised alluvial landforms	Burials, culturally modified trees, artefacts, artefact	High, dependant on proximity to modern or ancient watercourses (note that burials are

Ecoregion	Highway Section	Landscape type	Landform	Potential Sites	Archaeological potential
				scatters, hearths, ovens, ceremonial sites	located in a greater diversity of landforms within this ecoregion)
			Watercourses and wetlands	Shell processing sites, middens, artefacts, artefact scatters, culturally modified trees	Moderate-high
			Palaeochannels	Shell processing sites, middens, artefacts, artefact scatters, culturally modified trees	Moderate-high
	Euston to Boronga	Dune fields	Aeolian landforms (source bordering dunes, lunettes)	Burials, campsites, ceremonial sites, culturally modified trees, artefacts, artefact scatters	High, dependant on proximity to modern or ancient watercourses
			Scalds	Artefacts, artefact scatters	Low-moderate
			Flatlands	Artefacts, artefact scatters, culturally modified trees	Low-moderate
			Watercourses and wetlands	Shell processing sites, shell middens, culturally significant plant resources, artefacts, artefact scatters, culturally modified trees	High
			Raised alluvial landforms	Burials, culturally modified trees, artefacts, artefact scatters, hearths, ovens, ceremonial sites	High, dependant on proximity to modern or ancient watercourses (note that burials are located in a greater

Ecoregion	Highway Section	Landscape type	Landform	Potential Sites	Archaeological potential
					diversity of landforms within this ecoregion)
		Alluvial plains	Alluvial flatland	Isolated artefact, artefact scatters, culturally modified trees	Low-moderate
			Raised alluvial landforms	Burials, culturally modified trees, artefacts, artefact scatters, hearths, ovens, ceremonial sites	High, dependant on proximity to modern or ancient watercourses (note that burials are located in a greater diversity of landforms within this ecoregion)
			Watercourses and wetlands	Shell processing sites, middens, artefacts, artefact scatters, culturally modified trees	Moderate-high
			Palaeochannels	Shell processing sites, middens, artefacts, artefact scatters, culturally modified trees	Moderate-high

6.2 Summary predictive statement

This 550 km stretch of the Sturt Highway passes through a range of archaeologically sensitive areas. Sites in the granite uplands to the east of the study area may only preserve a limited range of Aboriginal sites, predominantly restricted to culturally modified trees, along with artefacts and artefact scatters that are likely to have been affected by colluvial movement. However, these landscapes only account for the portion of the study area around Wagga Wagga, while the low-lying wetlands, floodplains and dunefields that characterise the rest of the study area have much greater archaeological potential.

Quaternary landforms such as sand dunes, lunettes and raised alluvial features may preserve a range of sensitive and scientifically important archaeological sites, such as stratified shell middens, burials and the remains of habitation structures. The primary factors determining their location is the proximity of persistent water sources and the history of sediment erosion and deposition at the site. It is likely that, where work is carried out in the vicinity of modern or ancient watercourses, lakes, or raised landforms of Quaternary age, Aboriginal archaeology, including occupation sites, burials and ceremonial sites, may be encountered.

6.3 Predictive statement for individual sections of the Sturt Highway

6.3.1 Wagga Wagga to Narrandera: west from granite uplands into alluvial flats

This section of the Sturt Highway passes through the South Western Slopes ecoregion. Around Wagga Wagga the landscapes are characterized by the granite foothills of the Great Dividing Range (NSW NPWS 2003:120). Moving westwards, the land dips and the road passes through the flat alluvial floodplain of the Murrumbidgee. Based on results of previous archaeological investigations along the Sturt Highway corridor and surrounding regions, it is possible to provide the following predictions regarding site locations within the study area.

Isolated artefacts – are found across the entire landscape. These finds can occur in any location as Aboriginal people traversed the country for thousands of years. Isolated finds may end up in a recorded location through humans, erosion or depositional forces. These sites are likely to occur in the study area.

Scarred / Culturally modified trees – display evidence of human modification and manipulation. They require the presence of mature trees and are likely to be found along major waterways and stands of remnant vegetation. There are stands of remnant vegetation within the road corridor of this section of the Sturt Highway, and Table 7 details 20 culturally modified trees that are located within 100 m of the Sturt Highway road corridor.

Stone artefact scatters – representing a camping location, these sites are identified by a concentration of stone flakes. They are a common site type as they are more likely to survive in the archaeological record. Artefact scatters will occur across the landscape, usually in association with a resource. Within the study area it is noted that locations close to major water sources, including relict lake systems were a preferred location for camping. As the study area crosses many of these landscape features, artefact scatters may occur throughout. But more extensive lithic scatters are likely to occur in low-lying areas in association with permanent water courses. The landforms surrounding and overlooking the channels, palaeochannels and tributaries of the Murrumbidgee river are, therefore, more likely to be associated with this site type.

Hearths/ovens – indicate locations where a fire was lit for one-off (hearth) or multiple uses (oven) and are identified by presence of charcoal or burnt clay (used as heat retainers). Hearths are recorded either in isolation or association with other Aboriginal cultural features such as camp sites. Ovens are generally larger than hearths and often include other materials such as bone. Hearths/ovens have been previously recorded in close proximity to the Sturt Highway study area.

Burials – are generally found in elevated, soft sandy, alluvial deposits or in proximity to rivers and major creeks. There have been a number of burials recorded within other sections of the study area, but none are associated with this section of the Sturt Highway. It is important to note that

burials are, typically, only detected through disturbance, and that the low-lying alluvial landscapes within this section contain landforms that are of types known to be a focus of Aboriginal burials.

Shell middens – show evidence of shell discard after people have collected, eaten and discarded shellfish. Middens may also contain other cultural material including stone artefacts, other faunal remains or charcoal from cooking. These sites are found along the edges of billabongs, swamps, rivers and major creeks, and are unlikely to be found in the upland areas of this section of Highway.

Ceremonial places – are found in isolated locations throughout the landscape. The preferred location of these places will vary from region to region. A ceremonial place is associated with a culturally modified tree at Gorman Gadi, within the road reserve of this section of the Sturt Highway.

6.3.2 Narrandera to Hay: traversing the floodplains of the Riverina

This section of the Sturt Highway passes through the Riverina bioregion, alongside the Murrumbidgee river as it flows through its flood plain. This bioregion is dominated by river channels, floodplains, backplains, swamps, lakes and lunettes that are all of Quaternary age. Based on results of previous archaeological investigations along the Sturt Highway road corridor and surrounding regions, it is possible to provide the following predictions regarding site locations within the study area.

Isolated artefacts – are found across the entire landscape and such sites are likely to occur in the study area.

Stone artefact scatters – In this section the landforms surrounding and overlooking the channels, palaeochannels and tributaries of the Murrumbidgee and Lachlan rivers are therefore more likely to be associated with this site type. Examples discovered during previous investigations include the open campsites near Gum Creek Bridge, 75 km west of Narrandera (Mills, 1999).

Scarred / Culturally modified trees – There are stands of remnant vegetation within the road corridor of this section of the Sturt Highway, and Table 7 details nine culturally modified trees that are located within 100 m of the road reserve.

Hearths/ovens – Hearths are recorded either in isolation or association with other Aboriginal cultural features such as camp sites.

Burials – Burials have been discovered within the wider landscape surrounding this section of road, but none are known to be within the area of proposed works. It is important to note that burials are typically only detected through disturbance and are generally found in elevated, soft sandy, alluvial deposits or in proximity to rivers and major creeks. But burials in the Hay Plains area are known to be less confined to one identifiable landform (Littleton and Allen, 2007). Burial sites here may be in less conspicuous locations, such as low-rise dunes. It is also noted that they are more likely to be associated with ephemeral water courses, and a significant number are associated with areas of cultural deposits, such as within middens or oven mounds. Because of this, a greater variety of landforms within this section may contain burials.

Shell middens – show evidence of shell discard after people have collected, eaten and discarded shellfish. Middens may also contain other cultural material including stone artefacts, other faunal remains or charcoal from cooking. These sites are found along the edges of billabongs, swamps, rivers and major creeks.

Ceremonial places – are found in isolated locations throughout the landscape. The preferred location of these places will vary from region to region. One ceremonial place is recorded within 100 m of the Sturt Highway road corridor in Section 2.

6.3.3 Hay to Balranald: Traversing the floodplains of the Riverina

This section of the Sturt Highway continues through the Riverina ecoregion, alongside the Murrumbidgee river as it flows through its flood plain. This bioregion is dominated by river channels, floodplains, backplains, swamps, lakes and lunettes of Quaternary age (NSW NPWS

2003: 92). Significant wetlands include the Toogimbie IPA and Yanga national park in the vicinity of Balranald. From Yanga State Conservation Area, the highway crosses the Murrumbidgee Depression Plains landscape for about 22 km and ends near Balranald. This landscape is characterised by quaternary alluvial plains with numerous circular depressions interpreted as high floodplains or low terraces beyond the reach of average floodwaters (DECC 2002: 105). A relatively high density of sites are recorded within 10 m of the road reserve of this section of highway, and previous investigations in the area have stated that the area lies within a cultural landscape of significance to both pre- and post-contact periods (Crew and Pappin, 2009).

Isolated artefacts – are found across the entire landscape and such sites are likely to occur in the study area.

Stone artefact scatters – In this section wetlands, such as those of Toogimbie IPA, and the landforms surrounding and overlooking the channels, palaeochannels and tributaries of the Murrumbidgee and Lachlan rivers are more likely to be associated with this site type.

Scarred / Culturally modified trees – There are stands of remnant vegetation within the road corridor of this section of the Sturt Highway, and Table 7 details 36 culturally modified trees that are located within 100 m of the Sturt Highway road corridor.

Hearths/ovens – Hearths are recorded either in isolation or association with other Aboriginal cultural features such as camp sites. Ovens are generally larger than hearths and often include other materials such as bone. Hearths/ovens have been previously recorded in close proximity to the Sturt Highway study area.

Burials – Burials have been discovered within the wider landscape surrounding this section of road. It is important to note that burials are typically only detected through disturbance. They are generally found in elevated, soft sandy, alluvial deposits or in proximity to rivers and major creeks. But burials in the Hay Plains area are known to be less-confined to one identifiable landform (Littleton and Allen, 2007). Burial sites here may be in less conspicuous locations, such as low-rise dunes. It is also noted that they are more likely to be associated with ephemeral water courses, and a significant number are associated with areas of cultural deposits, such as within middens or oven mounds. Because of this, a greater variety of landforms within this section may contain burials. One burial (Waimea Downs 5) has been identified within 100m of the Sturt Highway road corridor in Section 3.

Shell middens – show evidence of shell discard after people have collected, eaten and discarded shellfish. Middens may also contain other cultural material including stone artefacts, other faunal remains or charcoal from cooking. These sites are found along the edges of billabongs, swamps, rivers and major creeks, and several have been detected by previous investigations in the study area (e.g., Edmonds, 1993).

Ceremonial Places - are found in isolated locations throughout the landscape. The preferred location of these places will vary from region to region.

Culturally significant food and medicine plant resources - Previous studies note the presence of culturally significant food and medicine plant resources in this part of the study area (Crew and Pappin, 2009)

6.3.4 Balranald to Euston: into the dunefields and lake systems of the Murray basin

This section of the Sturt Highway passes through the Murray Basin, a shallow crustal depression filled with marine and terrestrial sediments to a maximum depth of 600m. Prior to the development of lake systems during the Pleistocene, shallow seas moved back and forth across the plains several times (Fabris, 2002). Primarily traversing the dunefields and sandplains of the Mallee Cliffs Sandplains and the Mallee Cliffs linear dunes, this section of road also passes through the channels and seasonally inundated floodplains of the Murray Channels and floodplain. relic channels with isolated sandy rises (DECC 2002: 103).

In this area, as in others included in this study, proximity to a permanent water source is a determining factor in site location. Here, however, Costello (2019) states that “source bordering dunes, lunettes and sand dunes located near water sources are highly sensitive landforms and nearly always contain burials and campsites.” Costello (2019) also states that any areas where the sand plain abuts the floodplain are also likely to be highly sensitive.

Isolated artefacts – are found across the entire landscape and such sites are likely to occur in the study area.

Stone artefact scatters –in this section wetlands and the landforms surrounding and overlooking lakes or the channels, palaeochannels and tributaries of the Murrumbidgee and Lachlan rivers are likely to be associated with this site type. Aeolian landforms, such as the extensive dune systems around the Mallee cliffs are also likely to contain these sites.

Scarred / Culturally modified trees –there are stands of remnant vegetation within the road corridor of this section of the Sturt Highway. As such, there is potential for culturally modified trees to be located in these areas.

Hearths/ovens – Previous investigations in the surrounding area have detected hearths and oven mounds, either isolated or in close association with artefact scatters. These are more likely to be detected in alluvial landforms near watercourses or wetlands.

Burials – Burials have been discovered within the wider landscape surrounding this section of road, but none are known to be within the area of proposed works. It is important to note that burials are typically only detected through disturbance. They are generally found in elevated, soft sandy, alluvial or aeolian deposits, or in proximity to lakes, rivers and major creeks. Previous studies suggest source bordering dunes and lunettes near lakes in this area are very likely to contain burials.

Shell middens –These sites are found along the edges of billabongs, swamps, rivers and major creeks.

Ceremonial places – are found in isolated locations throughout the landscape. The preferred location of these places will vary from region to region. A ceremonial ring has been detected at Dry Lake Midden 1, within 100m of the Sturt Highway road corridor in Section 4.

6.3.5 Euston to Boronga: continuing through the dunefields and lake systems of the Murray Basin

This section of road continues through the same series of landscapes as that detailed in Section 6.3.4.

Isolated artefacts – are found across the entire landscape and such sites are likely to occur in the study area.

Stone artefact scatters –In this section wetlands, relict lakes and the landforms surrounding and overlooking the channels, palaeochannels and tributaries of the Murray river are more likely to be associated with this site type.

Scarred / Culturally modified trees –There are stands of remnant vegetation within the road corridor of this section of the Sturt Highway.

Hearths/ovens – Previous investigations in the surrounding area have detected hearths and oven mounds, either isolated or in close association with artefact scatters. These are more likely to be detected in alluvial landforms near watercourses, wetlands or relict lakes.

Burials – Burials have been discovered within the wider landscape surrounding this section of road, but none are known to be within the area of proposed works. It is important to note that burials are typically only detected through disturbance. They are generally found in elevated, soft sandy, alluvial or aeolian deposits or in proximity to wetlands, relict lakes or channels. Previous

studies suggest source bordering dunes and lunettes near lakes in this area are very likely to contain burials.

Shell middens – show evidence of shell discard after people have collected, eaten and discarded shellfish. Middens may also contain other cultural material including stone artefacts, other faunal remains or charcoal from cooking. These sites are found along the edges of billabongs, swamps, rivers and major creeks, and several have been detected by previous investigations in the study area (e.g., Edmonds, 1993). Shells have been discovered near Mallee Cliffs, within 100 m of the Sturt Highway road corridor.

Ceremonial places – are found in isolated locations throughout the landscape. The preferred location of these places will vary from region to region.

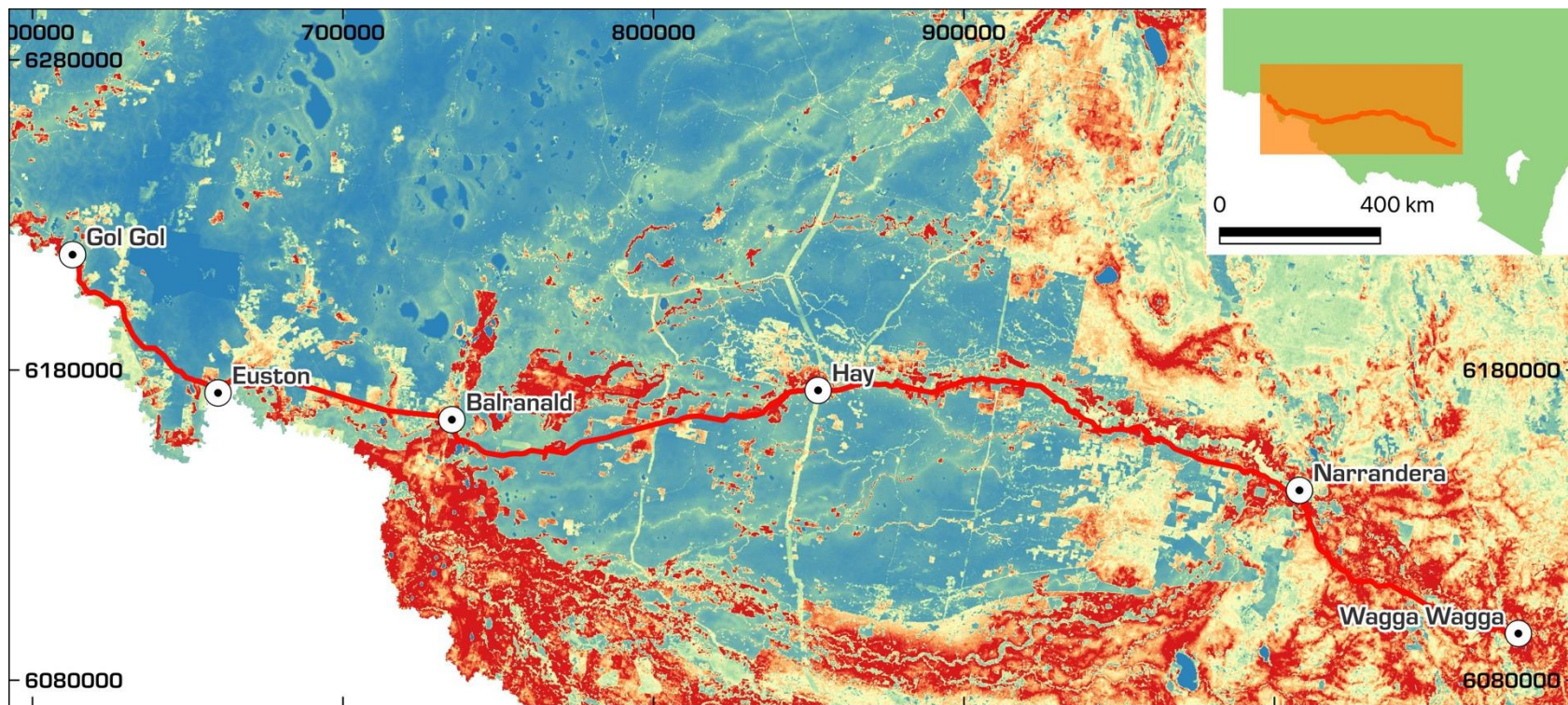
6.4 Predictive mapping from Aboriginal Site Decision Support Tool

Figures 37 through 41 provide an overview of the predictive modelling available through the Aboriginal Site Decision Support Tool (ASDST). The ASDST is a modelling tool that was developed in order to provide a set of spatial GIS layers combined with analytical techniques that provide visual and quantitative information regarding the distribution of Aboriginal site features across the landscape and associated accumulated impacts (Ridges 2010). The modelling provides GIS layers for artefacts, rock art, burials, earth mounds, grinding grooves, hearths, shell middens, stone quarries and culturally modified trees, as well as layers relating to accumulated impacts, model reliability and survey priority.

For the purposes of this preliminary desktop assessment the ASDST mapping has been used to both review the AHIMS search results and predict the likelihood of particular site types occurring in the Sturt Highway study area. Overview maps showing results of the ASDST modelling are included below with detailed maps for each section of the study area included in Appendix 2. Figure 37 illustrates areas of prior disturbance from a variety of post contact impacts such as vegetation clearance, agricultural activities and transport infrastructure. While there are areas showing high levels of accumulated impacts within the study area, this does not mean that archaeological and cultural sites are absent from these areas. Rather, it means that sites are less likely to be recorded in their original location in these areas and that they may have been partially or fully harmed.

As previously discussed, there are many areas of New South Wales that have never been archaeologically surveyed. Figure 38 combines these unsurveyed areas with landforms that have high likelihood for sites to be located. This figure aims to predict areas for further investigation based on modelling of these two factors.

Aside from artefact scatters, the most commonly recorded site types within the study area are scarred trees and Western Mounds (combining hearth and earth mounds) (AHIMS search results Table 6). Figures 39 to Figures 40 illustrate the potential location of these site types within the study area. Figure 41 models the predicted location of burials within the study area. This site type is included in this section as they have high levels of cultural significance and pose the highest risk to a development. The predicted location of other site types within the study area are included in Appendix 2.



Sturt Highway Accumulated Impacts - Overview



Legend

Study Area

ASDST Modelling

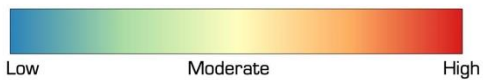


Figure 37: ASDST modelling of accumulated impacts of the Sturt Highway study area

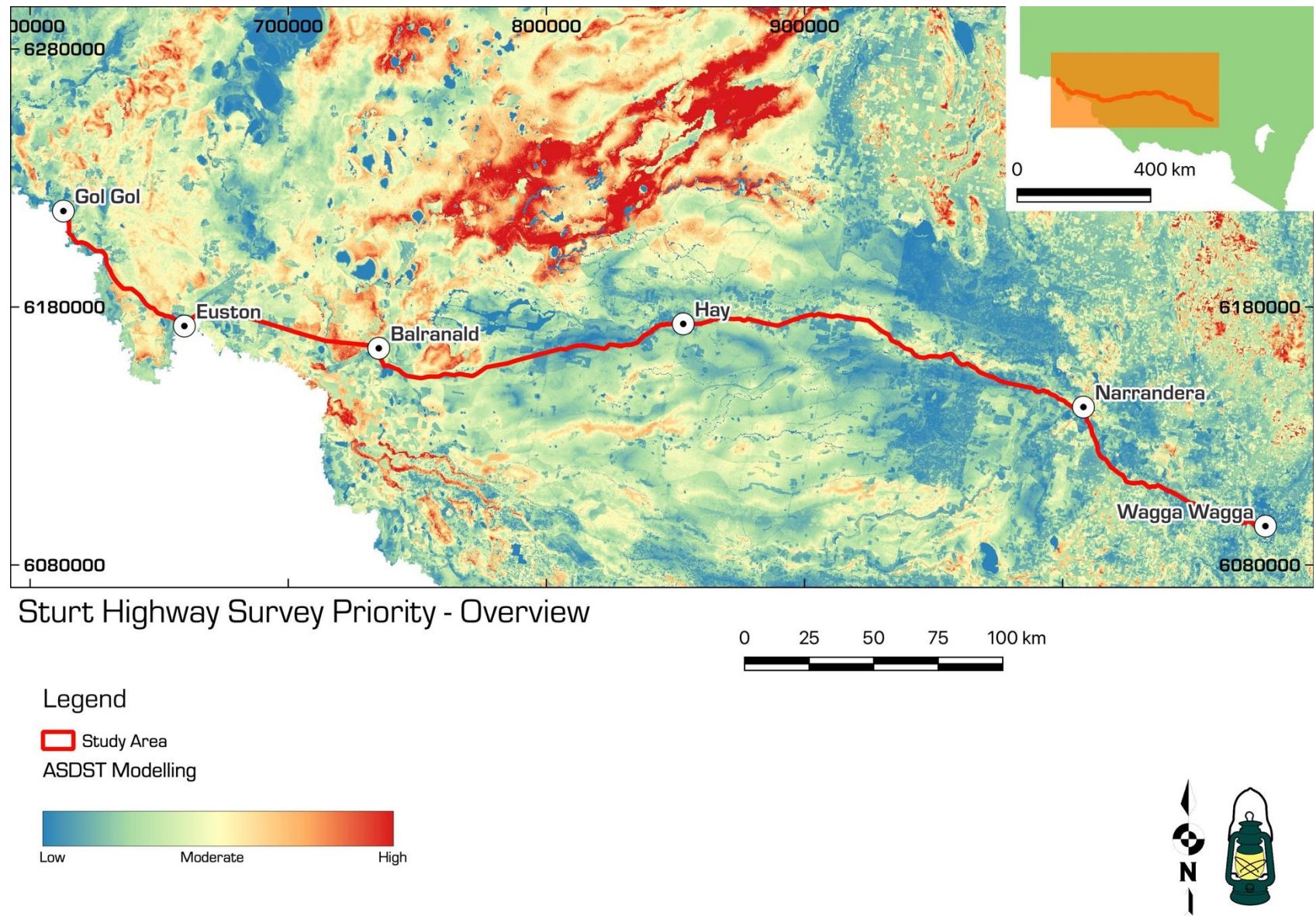
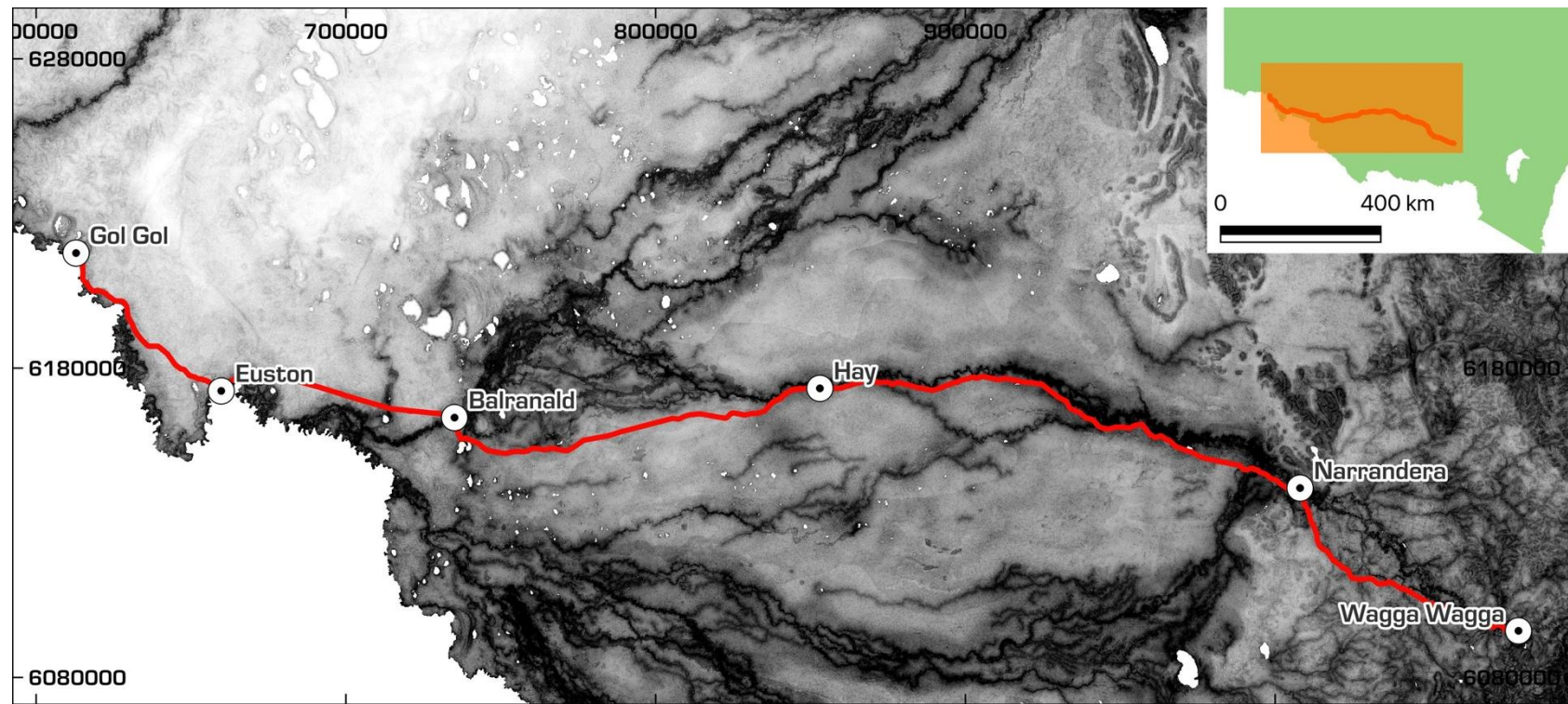


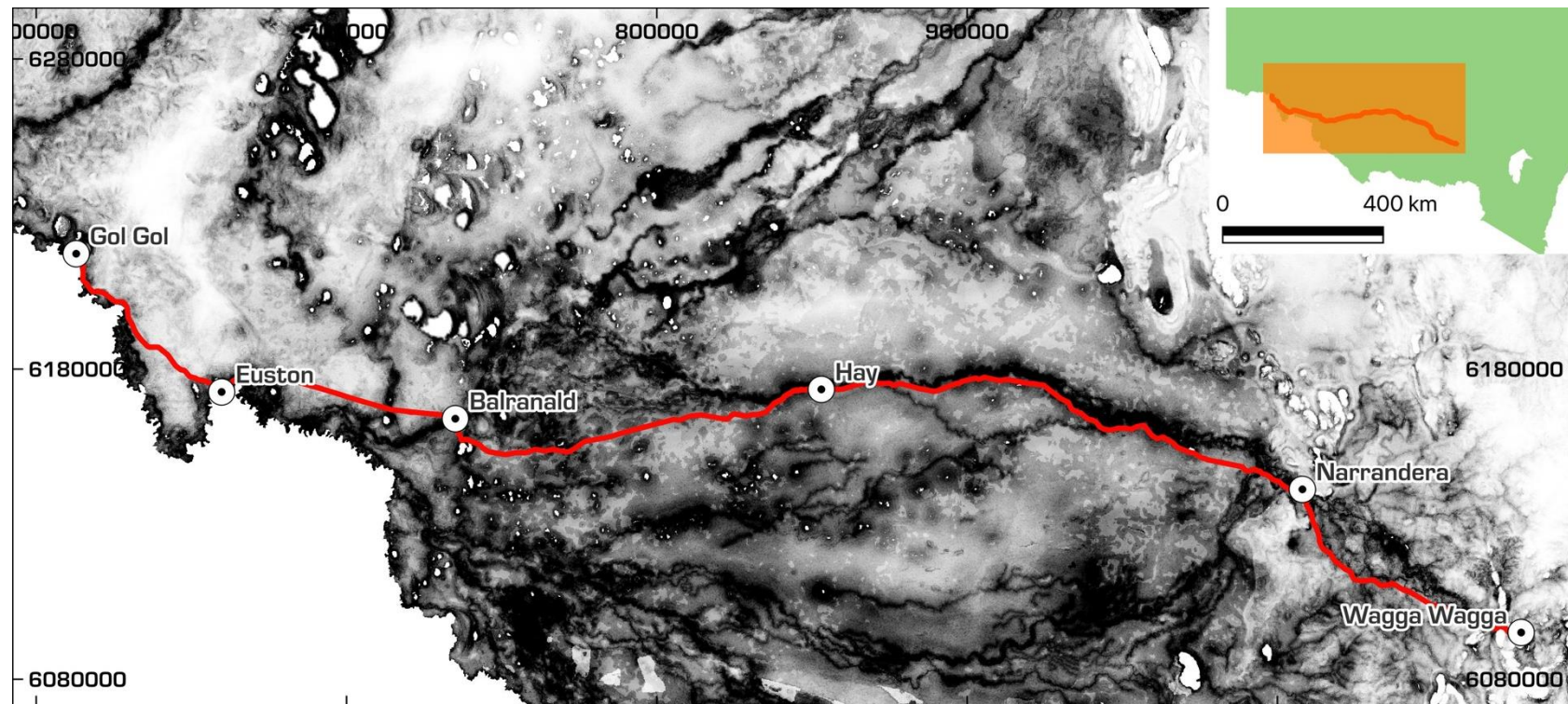
Figure 38: ASDST modelling of priority survey areas along the Sturt Highway study area



Sturt Highway ASDST Culturally Modified Trees - Overview



Figure 39: ASDST modelling of predicted locations of scarred trees within the Sturt Highway study area



Sturt Highway ASDST Western Mounds and Shell - Overview

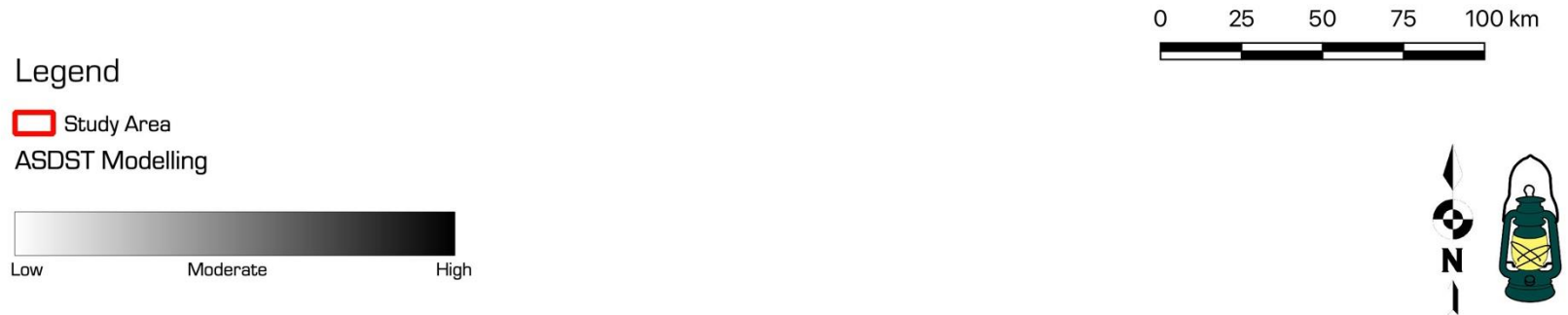
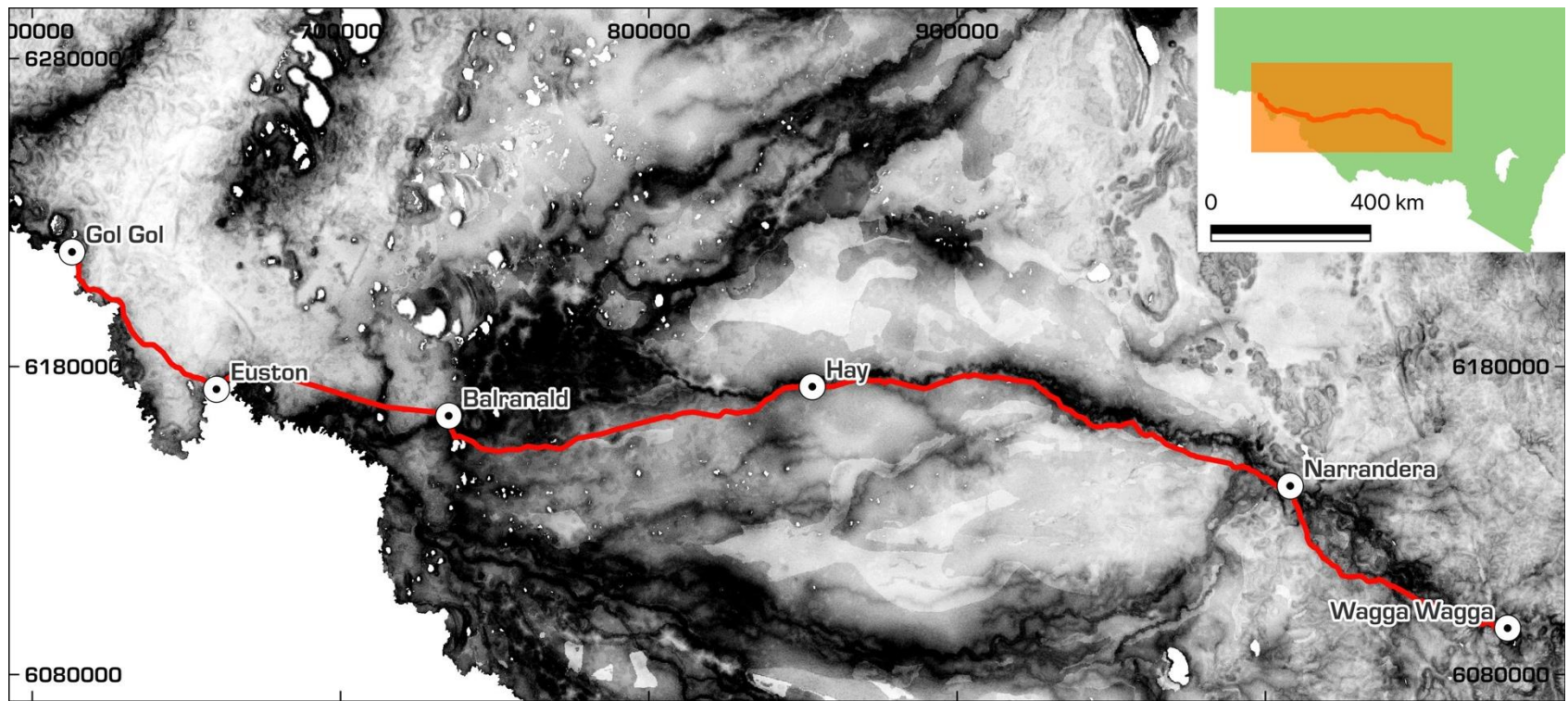


Figure 40: ASDST modelling of predicted locations of Western Mounds within the Sturt Highway study area



Sturt Highway ASDST Burials - Overview

Legend


-  Study Area
- ASDST Modelling



Figure 41: ASDST modelling of predicted locations of burials within the Sturt Highway study area

7 CONSULTATION PROCESS

7.1 Overview

The Transport for NSW *Procedure for Aboriginal cultural heritage consultation and investigation (PACHCI)* (RMS 2011) was implemented by Lantern Heritage at the commencement of the project. The consultation process is started in April 2021 with the final community meeting held in early July 2021. Summaries of the various stages in the consultation process are provided below, together with inputs received to date by registered Aboriginal parties (RAPs). Examples of correspondence and notifications sent out to Aboriginal groups and individuals are provided in Appendix 2 together with a summary log of all consultation.

7.2 Stage 1

The first stage of the consultation process involved the identification of potential stakeholders and invitations to register an interest in the program. This initially involved letters (refer to Appendix 2 for an example of the letter) sent out to the following organisations on 6 April 2021:

- Office of the Registrar Aboriginal Land Rights Act 1983 (Office of the Registrar ALRA);
- Aboriginal Cultural Heritage Regulation Team, Heritage NSW – Queanbeyan;
- Native Title Services Corp (NTS Corp);
- National Native Title Services (NNTS);
- Local Land Services;
- Wagga Wagga Local Aboriginal Land Council;
- Narrandera Local Aboriginal Land Council;
- Leeton Local Aboriginal Land Council;
- Griffith Local Aboriginal Land Council;
- Hay Local Aboriginal Land Council;
- Balranald Local Aboriginal Land Council;
- Dareton – Far West Aboriginal Land Council;
- Balranald Council;
- Hay Council;
- Murrumbidgee Council;
- Narrandera Council;
- Wagga Wagga Council.

Newspaper advertisements (refer to Appendix 2 for a copy of the advertisement) were also placed in the:

- Wagga Wagga Weekend Advertiser on 8 April 2021;
- Swan Hill Guardian 9 April 2021; and
- Sunraysia on 10 April 2021
























The closing date for initial registrations of interest was 26 April 2021.

Following receipt of advice from the above government agencies, invitations to register for the project were sent out to the following groups, organisations and individuals in early April 2021:

Aboriginal Party	Invitation Letter Sent
Hay Aboriginal Community Working Party	13/4/2021
Wagga Wagga Local Aboriginal Land Council	13/4/2021
Bundy Aboriginal Cultural Knowledge	13/4/2021
Will Carter	13/4/2021
Ray Woods	13/4/2021
Wakool Indigenous Corporation	13/4/2021
Galen Petit	13/4/2021
Daryl Singh	13/4/2021
Geraldine Johnson	13/4/2021
Yorta Yorta National Aboriginal Corporation	13/4/2021
Yarkuwa Indigenous Knowledge Centre	13/4/2021
National Koori Site Management	13/4/2021
Ta-Ru Board of Management/Maura ua Barkintji Traditional Owners	13/4/2021
Barkandji Native Title Group Aboriginal Corporation	13/4/2021
Hewitt Whyman	13/4/2021
Edie Whyman	13/4/2021
Mark Saddler – Bundy Aboriginal Cultural Knowledge	13/4/2021
Marie (Sissy) Havea	13/04/2021
John Jackson	13/04/2021
WLRWHA Aboriginal Advisory Group	13/04/2021
Miyagan Culture and Heritage/Walumarra Culture and Heritage Inc.	13/04/2021
James Ingram-Bidya Marra Consultancy (Wiradjuri NSW Australia)	13/04/2021
Peter Ingram	13/04/2021
Yalmambirra	13/04/2021
Robert Carroll - Miyagan Culture & Heritage	13/04/2021
Bangerang Aboriginal Corporation	13/04/2021
(Aunty Do) Dorothy Whyman (Wagga Wagga)	13/4/2021
Quentin Ingram (Bidya Marra Consultancy EOI)-Bidya Marra Consultancy (Wiradjuri NSW Australia)	13/04/2021
Dylan Ingram (Bidya Marra Consultancy EOI)-Bidya Marra Consultancy (Wiradjuri NSW Australia)	13/04/2021
Pappin Family Aboriginal Corporation	14/04/2021
Waagan Waagan Project Group	14/4/2021
Gary Pappin	14/04/2021
Corey Hughes	14/04/2021
Tara Dixon	14/04/2021
Jamie Woods	14/04/2021
Ian Woods	14/04/2021
Mabel Fitzpatrick	14/04/2021
Josephine Goulding	14/04/2021
Kerrie Parker	14/04/2021
Tiem Wilson	14/04/2021
Brian Gash Jnr	14/04/2021
Richard Dixon	14/04/2021
Cherokee Dixon	14/04/2021
Terence Singh	14/04/2021
Alice Pettit	14/04/2021
Alvira Wighton	14/04/2021
Marie Murray	14/04/2021
Muthi Muthi Nations	14/04/2021
Arthur Kirby	14/04/2021
Mary Ann Marton	14/04/2021
Hay LALC	15/04/2021
Nari Nari Tribal Council	15/04/2021
Far West LALC	15/04/2021

Aboriginal Party	Invitation Letter Sent
Barkandji Prescribed Body Corporate	15/04/2021
Barkandji Corporation – Derek Hardman	13/4/2021
Roland Williams	21/4/2021
Michael Lyons	21/4/2021
Far West Aboriginal Land Council	15/04/2021

Registrations of interest were received from the following groups and individuals (RAPs):

-  Dareton / Far West LALC
-  Barkandji Native Title Group Aboriginal Corporation
-  John Jackson
-  Pappin Family Aboriginal Corporation
-  Marie (Sissy) Havea
-  Peter Ingram
-  Arthur Kirby
-  Bundyi Aboriginal Cultural Knowledge
-  Yalmambirra
-  Bangerang Aboriginal Corporation
-  Robert Carroll - Miyagan Culture & Heritage / Griffith LALC
-  Hay Aboriginal Community Working Party
-  Mark Saddler - Miyagan Culture and Heritage/Walumarra Culture and Heritage Inc.
-  Hay LALC
-  [Aunty Do] Dorothy Whyman - Wagga Wagga LALC
-  James Ingram-Bidya Marra Consultancy (Wiradjuri NSW Australia)
-  Quentin Ingram (Bidya Marra Consultancy EOI) -Bidya Marra Consultancy (Wiradjuri NSW Australia)
-  Dylan Ingram (Bidya Marra Consultancy EOI) -Bidya Marra Consultancy (Wiradjuri NSW Australia)
-  Clorine Lyons
-  Nikita Ingram
-  Nathan Williams
-  Darrell Charles
-  Ronald Williams – Narrandera LALC
-  Leeton LALC

7.3 Stages 2 and 3 – community consultation meetings

Each of the RAPs were then contacted again by letter with more detailed information relating to the proposed Sturt Highway project and an invitation to attend a community consultation meeting during the week starting 15 June in four locations. The aim of this meeting was to share cultural values of the study area and surrounding region. The first round of letters were sent out on 2 June 2021 with RAPs given until 9 June to respond (refer to Appendix 1 for an example of the letter).

As only three RAPs registered an interest in attending meetings for the first dates (15 to 18 June), the meetings were rescheduled to start on Monday 28 June. A second invitation for the rescheduled meetings was sent out on 17 June 2021.

All Registered Aboriginal Parties were given until Wednesday 23 June 2021 to register their interest in attending the community consultation meetings. The following RAPs responded to attend meetings at the following locations:

Locations	RSVP Prior to Meeting	RAPs Attendance
Narrandera 2pm 28 June 2021	No registrations received	Darrell Charles – Wagga Wagga LALC Nathan Williams – Wagga Wagga LALC Nikita Ingram – Wagga Wagga LALC Chlorine Lyons – Wagga Wagga LALC James Ingram – Bidya Marra Consultancy Dylan Ingram – Bidya Marra Consultancy Dorothy Whyman – Wagga LALC Hewitt Whyman – Wagga LALC Ronald Williams – Narrandera LALC Robert Carroll – Griffith LALC
Buronga 2pm 29 June 2021	Dareton LALC Ricky Mitchell Rexy Smith – Snr Maraura Elder	Pam Handy – Dareton LALC
Balranald 10am 30 June 2021	No registrations received	Unattended Rodney Simpson Transport for NSW contacted Balranald LALC. They were unable to send a representative at short notice.
Hay 9am 1 July 2021	Kerrie Parker – Hay LALC Mabel Fitzpatrick – Hay LALC Jamie Woods – Hay LALC Ian Woods – Hay LALC Rene Woods – Hay LALC Tara Dixon – Hay LALC Gubba – Hay Aboriginal Community working party	Terry Baulch – Hay Aboriginal Community Working Party Ron Gouldins – Hay Aboriginal Community Working Party John Gubba Woods – Hay Aboriginal Community Working Party Tara Dixon – Hay LALC Rene Woods – Hay LALC Ian Woods – Hay LALC Jamie Woods – Hay LALC
Online meeting 10am 8 July 2021	None	Jamie Woods – Hay LALC Tara Dixon Hay LALC Nari Nari community members

7.4 Stage 4 – results of community consultation meetings

Narrandera Meeting 28/6/2021	
Attending	<ul style="list-style-type: none"> • Wagga Wagga LALC (Darrell Charles, Nathan Williams, Nikita Ingram, Chlorine Lyons, Dorothy Whyman, Hewitt Whyman) • Bidya Marra Consultancy (James Ingram, Dylan Ingram) • Narrandera LALC (Ronald Williams) • Griffith LALC (Robert Carroll)
Cultural info	<p>Primary outcome was that a more formalised consultation process be established asap between Lantern and the Aboriginal community.</p> <p>It was communicated that considerable cultural knowledge exists and that the following people or groups be contacted to start: Narrandera LALC, Clorine Williams, Roly Williams, Hewitt Whyman, Dorothy Whyman and James Ingram.</p> <p>Poison Waterholes Creek has some significance and is regarded as archaeologically sensitive. The exact nature of this needs to be examined too.</p>
Concerns	<p>Concerns expressed regarding native tree and habitat removal along route; an offset system was strongly encouraged (i.e. replanting in adjacent unaffected areas in lieu of tree or habitat loss). Specific reference was made to vegetation removal on the Newell Highway. Also improved habitat/animal notification or signage system to reduce wildlife impacts.</p> <p>Dorothy Whyman was worried about any potential impact/s that might occur in the vicinity of the Pomingalarna ochre quarry.</p>
Other notes	<p>A well-attended and positive group meeting. It was completely understood that we were at very early stages and that appropriate contacts be established with relevant members of the community regarding obtaining and detailing cultural information.</p>
Buronga/Gol Gol Meeting 29/6/2021	
Attending	Dareton LALC (Pam Handy)
Cultural info	Hints made at ongoing cultural connection with native vegetation growing along parts of the road.
Concerns	None recorded.
Other notes	<p>Positive meeting. Definitely contact Pam to establish information gathering.</p> <p>Requested that Lantern provide a break-down of site IDs and types/frequency within the relevant sections for the communities to look at. Forward to Pam and other RAPs.</p>
Balranald Meeting 30/6/2021	
Attending	Unattended
Cultural info	N/A
Concerns	N/A
Other notes	<p>Rodney Simpson (Transport for NSW) called Balranald LALC to discuss the Sturt Highway project as no one was at the meeting. The CEO was non-committal about sending someone to the meeting at short notice. He requested that Balranald LALC is kept updated about the project.</p>

Rodney also contacted Moores buses as they are an Aboriginal bus company based in Balranald. He asked if they had any safety concerns about the Sturt Highway project. They said they would let Rod know.

Recommendation: prepare further information pack to distribute to Balranald LALC to keep them informed of the project.

First Hay Meeting 1/7/2021

<p>Attending</p>	<p>The meeting was physically attended by four community members including John Gubba Woods, Terry Baulch, Ron Goulding all representing (Hay Aboriginal Working Party). Ian Woods also attended in person representing Hay LALC while Tara Woods and Jamie Woods (HLALC) were present via Teams.</p>
<p>Cultural info</p>	<p>It is a long-held view that the local roads and highways contain the remains of Aboriginal ancestors. This stems from the historical practice of mining of mound sites for road ballast/surfacing material in the plains districts. The mounds frequently contain burials and as a result bones have been scattered and crushed along with mound/hearth/midden into the surfaces of older roads; it is understood that the Sturt Highway now runs over and to some extent incorporates these remains. This is a long-held and ongoing grievance that requires recognition.</p> <p>Some especially significant site ‘zones’ occur in the plains country to the west of Hay in what was originally rosewood country (now cleared and used largely for intensive agriculture). Properties defining these areas included Ravensworth, Hells Gate, St Paul and Willow Park. Multiple burial sites are known to occur in the general vicinity of the highway. Of high potential significance are the rises or ‘hills’ (actually source-bordering paleolake features) at Willow Park and St Pauls (a major camping place).</p> <p>A ‘songline’ connecting groups from the north and south runs effectively north-south across a paleolake bed on section Section 3 of the highway. The zone occurs near Ravensworth and is apparent as a large ‘gap’ in known site occurrences along the road corridor.</p> <p>As a rule any landscape or terrain rises such as sand dunes and sand bodies may be assumed to hold substantial cultural value and archaeological potential.</p> <p>It was agreed that a program of information exchange should be established ASAP. This would include provision of cultural/intangible information and knowledge of physical sites both previously recorded and not on AHIMS.</p>
<p>Concerns</p>	<p>One community member expressed concern about loss of scarred trees along a current or recently completed roads upgrade (perhaps the Cobb Highway?).</p> <p>Grievances and concerns associated with previous treatment of sites within/nearby road corridors. Particularly in regard to sites seen as containing the remains of Aboriginal ancestors, and associated mound sites.</p>
<p>Other notes</p>	<p>It was requested that information collection be reciprocated by Lantern/Transport in the form of community feedback. For example, this could take the form of posters appropriately detailing the cultural information and stories for community distribution and educational use.</p> <p>Lantern could possibly act on behalf of the community to investigate the potential for storage of collected cultural information utilising</p>

proper protocols at AIATSIS (for future generations) and this was well received.

Gubba is keen to do a route walkover or visit well in advance to establish site locations and to attribute relevant knowledge on country.

Much discussion relating to employment, specifically engaging Aboriginal people and companies in the roadworks process.

Second Hay Meeting 8/7/2021 – Teams meeting

Attending	Online Teams meeting requested by Hay LALC and Nari Nari community members. Primary persons were Jamie Woods and Tara Woods, plus five or so other community members including Rene Woods.
Cultural info	<p>Reiteration of locations such as St Pauls, Ravensworth and Hells Gate as zones of substantial cultural significance and places where burials are known and are to be expected.</p> <p>Need to recognise native vegetation communities along the road route as cultural places and information needs to be collected on these places and plants (eg. medicine plants etc.).</p>
Concerns	<p>Reiteration of grievance over mining of mound sites and incorporation of ancestral bones into and beneath local roads and highways. Two locations – Glenmere and Toogimbie – noted as two primary local examples of places where this extraction of ancestral material has occurred.</p> <p>Strong dissatisfaction voiced over past and ongoing impacts resulting from ancillary roadworks activities (stockpiles, heavy vehicle parking areas, compounds, laydowns etc.) otherwise not noted or taken into account during and after cultural heritage impact assessments and statements. Sensitive zones adjacent to but just outside the immediate road corridor being impacted. A cited example included Keri Keri where burials and mound sites occur.</p>
Other notes	<p>Much discussion relating to roadworks and Aboriginal employment opportunities.</p> <p>Strongly held views that the ultimate authority regarding local Aboriginal heritage (occurrence, interpretation, values and management) lies with local Aboriginal communities. HLALC are promoting their group as possessing all necessary expertise in these fields and this includes archaeological practice and various field methodologies – an offer made for Lantern to provide training opportunities in archaeology to Aboriginal community members was not positively received.</p> <p>Views expressed that all roadworks - preliminary assessment and ongoing throughout the whole process - be undertaken in close consultation with the local Aboriginal community. This includes: Consultation at all stages of the process. HLALC voiced the view that only they have the knowledge of a process that will result in zero cultural heritage impacts occurring.</p> <p>A cultural heritage induction process run by the local Aboriginal community (in this case HLALC?) be established and that attendance be required for road workers at all levels (from management and engineering all the way down to on the ground workers). This should be done for all LALC zones to allow for regional and local variation in cultural heritage manifestation.</p>

Aboriginal monitoring be undertaken at every level of the roadwork program that involves ground disturbance.

A cultural heritage code of conduct be established for all ongoing and future road projects, with special focus on 'on the ground' worker awareness.

At close, Jamie Wood proposed that Lantern Heritage and HLALC/community work together to prepare a cultural heritage plan focused specifically on local road management and works.

Contact: Tara Woods is happy to act as an initial contact within the HLALC in terms of establishing information exchange and organising any other interactions.

8 SUMMARY AND ANALYSIS OF BACKGROUND INFORMATION

Analysis of the background information presented in sections 3, 4 and 5 allows an assessment of the cultural heritage values within the study area to be made. Through consideration of information from ethnographic/historic sources, landscape description, archaeological context and Aboriginal community consultation we can develop an insight into how the landscape of the study area was used and what kinds of events took place in the past. This section aims to bring together this variety of information to develop an understanding of the cultural landscape of the study area.

Over the last few decades, archaeological investigations within the region recorded physical evidence of Aboriginal land use activities as site types including more commonly occurring sites such as scarred or culturally modified trees, artefact scatters, hearths, earth mounds, shell middens and burial sites. Less common sites include ceremonial and Dreaming sites, resource and gathering sites, conflict sites, habitation structures, ochre or stone quarries, grinding grooves, stone arrangements and significant waterholes.

Intact archaeological deposits are likely to be found in many landscapes throughout the study area. However, the preservation of these deposits is impacted by environmental factors such as historical or modern land use (sand extraction, irrigation etc), flood zones, vegetation types, and soil characteristics and stability. For example, soil landscapes subject to high levels of erosional or fluvial activity are less likely to retain Aboriginal objects. In contrast, areas where sediment builds up are likely to contain Aboriginal objects that are no longer in their original location.

Disturbance from land cleaning, farming activities and road construction may have removed evidence of many site types within the Sturt Highway project area. For example, the clay heat retainers and mounded form of hearths and ovens may have been removed through these activities. In some cases, the Sturt Highway corridor has provided a corridor of land where remnant native vegetation remains and protects culturally modified trees.

Throughout the study area archaeological surveys and excavations have confirmed the presence of a variety of archaeological site types, and consultation has identified many important places in the landscape. These places include resource gathering locations, massacre sites, burials, 'songlines' and archaeological sites. Aboriginal community consultation confirmed that the study area is rich in Aboriginal cultural heritage values. At this stage of the investigation, the focus of Aboriginal community consultation is on establishing rapport with community so that a greater depth of knowledge sharing can occur at a later time. Ongoing consultation with community is one way to ensure that this rapport is sustained through the life of the project. Another is when the cultural heritage values shared about the Sturt Highway project area are developed into a resource that communities can share rather than staying locked into a report.

9 PRELIMINARY CULTURAL HERITAGE VALUES AND STATEMENT OF SIGNIFICANCE

This section details a preliminary assessment of all cultural heritage values within the Sturt Highway study area. It has been compiled in accordance with the processes outlined in the Burra Charter (AICOMOS 2013a). Each of the sub-sections below provides an overview of how different cultural heritage values are defined in the *Burra Charter*, followed by discussion of how these values apply to the study area and the site assessed during field survey. This is followed by preliminary desktop statements of significance for the part of the site where impacts are anticipated.

9.1 Social or Cultural Values

Within the Burra Charter Practice Note on *Understanding and Assessing Cultural Significance* (AICOMOS 2013b: 4) Social Value is defined as follows:

Social value refers to the associations that a place has for a particular community or cultural group and the social or cultural meanings that it holds for them.

Within the context of assessing Aboriginal cultural heritage, spiritual values are often closely tied to social values. Within the Burra Charter Practice Note on *Understanding and Assessing Cultural Significance* (AICOMOS 2013b: 4) Spiritual Value is defined as follows:

Spiritual value refers to the intangible values and meanings embodied in or evoked by a place which give it importance in the spiritual identity, or the traditional knowledge, art and practices of a cultural group. Spiritual value may also be reflected in the intensity of aesthetic and emotional responses or community associations, and be expressed through cultural practices and related places.

The qualities of the place may inspire a strong and/or spontaneous emotional or metaphysical response in people, expanding their understanding of their place, purpose and obligations in the world, particularly in relation to the spiritual realm.

The term spiritual value was recognised as a separate value in the Burra Charter, 1999. It is still included in the definition of social value in the Commonwealth and most state jurisdictions. Spiritual values may be interdependent on the social values and physical properties of a place.

All sites hold cultural value to the local Aboriginal communities. However, the cultural and social value of the recorded sites can only be determined by Aboriginal people. Through the community consultation meetings it was clear that all tangible sites and intangible locations hold value.

In particular, community consultation showed that scarred trees hold cultural value to Aboriginal communities along the Sturt Highway project area as a tangible connection to a traditional lifestyle. These sites should be avoided by impacts.

9.2 Historic Values

Within the Burra Charter Practice Note on *Understanding and Assessing Cultural Significance* (AICOMOS 2013b: 3) Historic Value is defined as follows:

Historic value is intended to encompass all aspects of history—for example, the history of aesthetics, art and architecture, science, spirituality and society. It therefore often underlies other values. A place may have historic value because it has influenced, or has been influenced by, an historic event, phase, movement or activity, person or group of people. It

may be the site of an important event. For any place the significance will be greater where the evidence of the association or event survives at the place, or where the setting is substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of such change or absence of evidence.

While there are no historic sites associated with Aboriginal cultural heritage within the Sturt Highway project area, there are a number of sites within the broader area. These sites such as Warangesda Mission, have high levels of significance to the community members associated with these areas.

9.3 Scientific/Archaeological Values

Within the Burra Charter Practice Note on *Understanding and Assessing Cultural Significance* (AICOMOS 2013b: 3-4) Scientific Value is defined as follows:

Scientific value refers to the information content of a place and its ability to reveal more about an aspect of the past through examination or investigation of the place, including the use of archaeological techniques. The relative scientific value of a place is likely to depend on the importance of the information or data involved, on its rarity, quality or representativeness, and its potential to contribute further important information about the place itself or a type or class of place or to address important research questions. To establish potential, it may be necessary to carry out some form of testing or sampling. For example, in the case of an archaeological site, this could be established by a test excavation.

While the majority of sites previously recorded within the project area are scarred trees, it is likely that isolated finds and artefact scatters are likely to be many times more prevalent than those of scarred trees. This is based on the pattern of Aboriginal occupation across all landscapes in Australia where stone artefact site types outnumber any other site type. The low number of stone artefact sites recorded within the project area are most likely a reflection of a lack of pedestrian survey within the project area and a focus on highly visible site types such as scarred trees.

While the current condition of scarred trees is not part of this assessment, trees that are healthy and in good condition will have a high level of integrity. Scarred trees face many natural and human created threats to their survival such as death and decay and land clearing. This indicates that the remaining scarred trees have high value as examples of a traditional Aboriginal cultural feature that is being diminished.

While there are a limited number of shell middens and burials recorded within the Sturt Highway project area, these sites are highly significant for many reasons. Within the study area, these site types are relatively rare and have high research potential to provide information on lifestyle, diet, dating and burial practices.

Overall, the research potential of the sites located within the Sturt Highway project area is generally unable to be determined via the current desktop assessment. The potential for archaeological deposits would be best determined by field assessment.

9.4 Aesthetic Values

Within the Burra Charter Practice Note on *Understanding and Assessing Cultural Significance* (AICOMOS 2013b: 3) Aesthetic Value is defined as follows:

Aesthetic value refers to the sensory and perceptual experience of a place—that is, how we respond to visual and non-visual aspects such as sounds, smells and other factors having a strong impact on human thoughts, feelings and attitudes. Aesthetic qualities may include the

concept of beauty and formal aesthetic ideals. Expressions of aesthetics are culturally influenced.

There are limited aesthetic values associated with the archaeological site recorded within the project area. The location of some sites adjacent to watercourses provide aesthetic qualities through the natural beauty of the riverine environment. It could be argued that the location of sites adjacent to and within the Sturt Highway road corridor detracts from the aesthetic values of sites.

9.5 Preliminary statement of Significance

The following preliminary statement of significance has been compiled on the basis of the Aboriginal consultation undertaken for this report, together with desktop research. A future field inspection of each site would provide a comprehensive statement of significance.

Overall the sites recorded within the Sturt Highway road corridor are considered to be representative of a wider landscape and therefore their archaeological or scientific value is considered to be moderate. Some sites are assessed to have low or high archaeological significance and this is based on the frequency or rarity of these sites. The heritage significance of each site within the study area is summarised in Table 10.

Table 10: Statement of significance

AHIMS #	Site name	Feature/s	Heritage significance
Section 1: Wagga Wagga to Narrandera			
49-6-0037	Kindra 1	Modified Tree (Carved or Scarred)	moderate
49-6-0038	Sandigo 1	Modified Tree (Carved or Scarred)	moderate
49-6-0039	Sandigo 2	Modified Tree (Carved or Scarred)	moderate
49-6-0047	Galore TSR Scar Tree 5	Modified Tree (Carved or Scarred)	moderate
49-6-0048	Galore TSR Scar Tree 6	Modified Tree (Carved or Scarred)	moderate
49-6-0065	Galore TSR Scar Tree 4	Modified Tree (Carved or Scarred)	moderate
55-3-0057	Woodend TSR Scar Tree 1	Modified Tree (Carved or Scarred)	moderate
55-3-0058	Woodend TSR Scar Tree 2	Modified Tree (Carved or Scarred)	moderate
56-1-0083	WW113	Modified Tree (Carved or Scarred)	moderate
56-1-0092	WW 114	Modified Tree (Carved or Scarred)	moderate
56-1-0094	WW 111	Modified Tree (Carved or Scarred)	moderate
56-1-0132	Berry Jerry Ring Tree	Modified Tree (Carved or Scarred)	moderate
56-1-0200	Yarra 15	Modified Tree (Carved or Scarred)	moderate
56-1-0201	Vincent 1	Artefact	Low
56-1-0272	Gorman Gadi	Modified Tree (Carved or Scarred)/ Aboriginal Ceremony and Dreaming	Very high
56-1-0273	Collin E 1	Modified Tree (Carved or Scarred)	moderate
56-1-0277	Collin E 5	Modified Tree (Carved or Scarred)	moderate
56-1-0283	Sawpit 1	Modified Tree (Carved or Scarred)	moderate
56-1-0284	Sawpit 2	Modified Tree (Carved or Scarred)	moderate
56-1-0488	Olympic Highway Ashmont 1	Modified Tree (Carved or Scarred)	moderate
56-1-0546	Tank Junction TSR 3	Modified Tree (Carved or Scarred)	moderate
56-4-0036	WP4	Artefact	Low

AHIMS #	Site name	Feature/s	Heritage significance
Section 2: Narrandera to Hay			
48-3-0110	Gin Site Artefact Scatter	Artefact	Low to moderate
48-3-0122	RivCott3	Potential Archaeological Deposit (PAD)	Low to moderate
48-3-0235	HY-ST-002	Modified Tree (Carved or Scarred)	Moderate
48-3-0236	HY-IF-002	Artefact	Low
48-3-0237	DP-IF-003	Artefact	Low
48-3-0238	DP-IF-004	Artefact	Low
48-5-0430	HY-IF-001	Artefact	Low
48-5-0431	HY-ST-001	Modified Tree (Carved or Scarred)	moderate
48-6-0158	DP-AS-001	Artefact	Low to moderate
48-6-0159	DP-IF-002	Artefact	Low
49-4-0088	Murrumbidgee Valley National Park 3	Burial/ Aboriginal ceremony and dreaming/ modified Tree (Carved or Scarred)	Very high
49-4-0208	Yarrada modified tree g	Modified Tree (Carved or Scarred)	Moderate
49-4-0217	DP-ST-001	Modified Tree (Carved or Scarred)	moderate
49-4-0218	DP-IF-005	Artefact	Low
49-4-0219	DP-ST-002	Modified Tree (Carved or Scarred)	moderate
49-4-0220	DP-ST-004	Modified Tree (Carved or Scarred)	moderate
49-4-0221	DP-ST-005	Modified Tree (Carved or Scarred)	moderate
49-4-0222	DP-ST-006	Modified Tree (Carved or Scarred)	moderate
49-5-0213	Sturt Hwy Waddi modified tree	Modified Tree (Carved or Scarred)	moderate
Section 3: Hay to Balranald			
47-6-0022	Yanga Creek #2;	Modified Tree (Carved or Scarred)	Moderate
47-6-0024	Yanga Creek 1;YC-1;	Earth Mound/ shell/ artefact	High
47-6-0025	Yanga Creek Midden 2;YCM-2;	Earth Mound/ shell/ artefact	High
47-6-0026	Yanga Creek Scarred Tree-4;YCST-4;	Modified Tree (Carved or Scarred)	moderate
47-6-0027	YC1;Yanga Creek;	Modified Tree (Carved or Scarred)	moderate
47-6-0028	YC2;Yanga Creek;	Modified Tree (Carved or Scarred)	moderate
47-6-0030	YC 3;Yanga Creek;	Modified Tree (Carved or Scarred)	moderate
47-6-0169	Horse 15	Modified Tree (Carved or Scarred)	moderate
47-6-0170	Horse 16	Modified Tree (Carved or Scarred)	moderate
47-6-0171	Horse 17	Modified Tree (Carved or Scarred)	moderate
47-6-0172	Horse 18	Modified Tree (Carved or Scarred)	moderate
47-6-0173	Horse 19	Modified Tree (Carved or Scarred)	moderate

AHIMS #	Site name	Feature/s	Heritage significance
47-6-0174	Horse 20	Modified Tree (Carved or Scarred)	moderate
47-6-0175	Horse 21	Modified Tree (Carved or Scarred)	moderate
47-6-0176	Horse 22	Modified Tree (Carved or Scarred)	moderate
47-6-0195	Horse 25	Modified Tree (Carved or Scarred)	moderate
47-6-0196	Horse 26	Modified Tree (Carved or Scarred)	moderate
47-6-0197	Horse 27	Modified Tree (Carved or Scarred)	moderate
47-6-0198	Horse 28	Modified Tree (Carved or Scarred)	moderate
47-6-0199	Horse 29	Modified Tree (Carved or Scarred)	moderate
47-6-0200	Horse 30	Modified Tree (Carved or Scarred)	moderate
47-6-0201	Horse 31	Modified Tree (Carved or Scarred)	moderate
47-6-0202	Horse 32	Modified Tree (Carved or Scarred)	moderate
47-6-0203	Horse 33	Modified Tree (Carved or Scarred)	moderate
47-6-0204	Horse 34	Modified Tree (Carved or Scarred)	moderate
47-6-0205	Horse 35	Modified Tree (Carved or Scarred)	moderate
47-6-0206	Horse 36	Modified Tree (Carved or Scarred)	moderate
47-6-0207	Horse 37	Modified Tree (Carved or Scarred)	moderate
47-6-0208	Horse 38	Modified Tree (Carved or Scarred)	moderate
47-6-0209	Horse 39	Modified Tree (Carved or Scarred)	moderate
47-6-0210	Horse 40	Modified Tree (Carved or Scarred)	moderate
47-6-0274	Horse 50	Modified Tree (Carved or Scarred)	moderate
47-6-0275	Horse 51	Modified Tree (Carved or Scarred)	moderate
47-6-0276	Horse 52	Modified Tree (Carved or Scarred)	moderate
47-6-0278	Horse 54	Modified Tree (Carved or Scarred)	moderate
47-6-0279	Horse 55	Modified Tree (Carved or Scarred)	moderate
47-6-0748	WA-ST4 (West Abercrombie Scarred Tree 4)	Modified Tree (Carved or Scarred)	moderate
48-1-0019	Waimea Downs 5	Burial	Very high
48-4-0465	KE-IF-001	Artefact	Low
48-4-0466	KE-AS-001	Artefact	Low to moderate
48-4-0467	KE-IF-002	Artefact	Low
48-4-0468	KE-IF-003	Artefact	Low
48-4-0469	KE-IF-006	Artefact	Low
48-5-0426	KE-IF-004	Artefact	Low
Section 4: Balranald to Euston			
47-4-0023	Dry Lake Midden 1	Ceremonial Ring (Stone or Earth)/ hearth/ shell	Very high
47-4-0019	Dry Lake north 01	Shell	Moderate to high







AHIMS #	Site name	Feature/s	Heritage significance
Section 5: Euston to Buronga			
46-3-0019	Mallee Cliffs Site 4;	Hearth/ shell/ artefact	High
46-3-0081	Bowen Park_1;	Artefact/ shell	Moderate to high
47-4-0009	three;	Modified Tree (Carved or Scarred)	Moderate to high

10 THE PROPOSED ACTIVITY



Following completion of a Route Safety Review of the Sturt Highway in September 2019, Transport identified a number of potential safety infrastructure improvements. The proposed improvements will be constructed along the Sturt Highway within five sections between Wagga Wagga and Buronga, excluding the towns of Narrandera, Hay, Balranald, Euston and Gol Gol. The proposed activities will take place within the Sturt Highway road corridor up to 10m from each side of the existing carriageway edge line.

10.1 Potential harm to Aboriginal objects

While sites recorded within the Sturt Highway road corridor are located within a highly disturbed area, the potential range of impacts from construction activities may include

-  Establishment of compounds, stockpile sites, laydown areas and exclusion zone fencing. Transport and stockpiling of materials may result in indirect impacts. These activities also have potential to directly impact and/or damage Aboriginal artefacts on the surface and within subsurface archaeological deposits.
-  Installation of erosion and sediment controls will be supported by posts driven directly into the ground. Driving these posts into the ground will generate ground disturbance, and as such has the potential to directly harm any Aboriginal objects that are present in those areas.
-  Relocation of utilities away from the project impact area. This will involve excavation of existing utilities and digging new trenches where they can be relocated. These activities have potential to disturb and/or damage Aboriginal artefacts at surface and within subsurface archaeological deposits.
-  Reinstatement of a hazard free roadside where possible by; removal of trees and maintenance of vegetation regrowth. Clearing has the potential to result in ground disturbance, and as such has the potential to directly harm (disturb or damage) any Aboriginal objects that are present in those areas.
-  Road edge repair and widening of road formation at various locations including the required ancillary works such as culvert and drainage structure widening. The proposed road forming methods involve ground disturbance and ground excavations that have the potential to directly harm any Aboriginal objects that may be present in those areas.
-  Flattening of batters where possible. These activities have potential to disturb and/or damage Aboriginal artefacts at surface and within subsurface archaeological deposits.

Reinstatement of road signage and guideposts will occur at various locations within the study area. These signs will be supported by single, double or triple posts. The posts will be installed in concrete measuring 250mm by 250mm drilled to 600mm depth. Excavating post holes for foundations generates ground disturbance, and as such has the potential to directly harm any Aboriginal objects that are present in those areas.

-  Site clean-up and removal of stockpiles and compound. The clean-up of stockpiles and compound areas may result in damage (e.g. crushing or surface abrasion) to Aboriginal objects, such as stone artefacts.
-  Removal of traffic controls and any erosion and sediment controls. The removal of these controls may result in damage (e.g. crushing or surface abrasion) to Aboriginal objects, such as stone artefacts.

10.2 Assessment of Harm

There are 87 AHIMS sites located within 100m of the Sturt Highway road corridor. As described above in section 10.1 there are various activities associated with the route safety review project that have the potential to result in direct and/or indirect harm to these sites.

Table 11 provides a summary of the anticipated impacts in terms of where sites are relative to the road reserve. This impact assessment considers all sites located within the road reserve according to AHIMS as well as sites recording within 100m of the Sturt Highway road corridor. Of these sites within 100m of the Sturt Highway road corridor, 52 are located within the road corridor with 13 sites located within the area of currently proposed works.

As discussed previously, it must be noted that the number of sites physically located within the road corridor may be significantly different to what is recorded on AHIMS. This is the result of errors in the translation of site coordinates from earlier mapping systems as well as the lack of spatial information relating to site boundaries. As such, Lantern is taking a conservative approach to considering the sites that may be impacted by the proposed works and including sites within 100m of proposed tree removal and road improvements.

While direct impacts may be anticipated to the 13 sites located within the current proposed scope of works, in most cases the degree of harm would be partial, and would result in a partial loss of value only.

Table 11: Summary of impact assessment.

AHIMS #	Site name	Feature/s	Proximity to Road reserve	Potential Impacts
Section 1: Wagga Wagga to Narrandera				
49-6-0037	Kindra 1	Modified Tree (Carved or Scarred)	Within reserve	Tree removal
49-6-0038	Sandigo 1	Modified Tree (Carved or Scarred)	Within reserve	Tree removal
49-6-0039	Sandigo 2	Modified Tree (Carved or Scarred)	Within reserve	Tree removal
49-6-0047	Galore TSR Scar Tree 5	Modified Tree (Carved or Scarred)	<100m	Road improvement and tree removal
49-6-0048	Galore TSR Scar Tree 6	Modified Tree (Carved or Scarred)	<100m	Road improvement and tree removal
49-6-0065	Galore TSR Scar Tree 4	Modified Tree (Carved or Scarred)	<100m	Road improvement
55-3-0057	Woodend TSR Scar Tree 1	Modified Tree (Carved or Scarred)	<100m	Tree removal
55-3-0058	Woodend TSR Scar Tree 2	Modified Tree (Carved or Scarred)	<100m	Tree removal
56-1-0083	WW113	Modified Tree (Carved or Scarred)	Within reserve	Road improvement and tree removal

AHIMS #	Site name	Feature/s	Proximity to Road reserve	Potential Impacts
56-1-0092	WW 114	Modified Tree (Carved or Scarred)	Within reserve	Road improvement
56-1-0094	WW 111	Modified Tree (Carved or Scarred)	Within reserve	Road improvement
56-1-0132	Berry Jerry Ring Tree	Modified Tree (Carved or Scarred)	Within reserve	Tree removal
56-1-0200	Yarra 15	Modified Tree (Carved or Scarred)	<100m	Road improvement
56-1-0201	Vincent 1	Artefact	<100m	Road improvement
56-1-0272	Gorman Gadi	Modified Tree (Carved or Scarred)/ Aboriginal Ceremony and Dreaming	<100m	Road improvement
56-1-0273	Collin E 1	Modified Tree (Carved or Scarred)	<100m	Tree removal
56-1-0277	Collin E 5	Modified Tree (Carved or Scarred)	<100m	Tree removal
56-1-0283	Sawpit 1	Modified Tree (Carved or Scarred)	<100m	Tree removal
56-1-0284	Sawpit 2	Modified Tree (Carved or Scarred)	<100m	Tree removal
56-1-0488	Olympic Highway Ashmont 1	Modified Tree (Carved or Scarred)	<100m	Tree removal
56-1-0546	Tank Junction TSR 3	Modified Tree (Carved or Scarred)	< 100m	Tree removal
56-4-0036	WP4	Artefact	<100m	Tree removal
Section 2: Narrandera to Hay				
48-3-0110	Gin Site Artefact Scatter	Artefact	<100m	Road improvement
48-3-0122	RivCott3	Potential Archaeological Deposit (PAD)	<100m	Road improvement
48-3-0235	HY-ST-002	Modified Tree (Carved or Scarred)	<100m	Tree removal
48-3-0236	HY-IF-002	Artefact	<100m	Tree removal
48-3-0237	DP-IF-003	Artefact	Within reserve	None proposed
48-3-0238	DP-IF-004	Artefact	Within reserve	None proposed
48-5-0430	HY-IF-001	Artefact	<100m	Tree removal
48-5-0431	HY-ST-001	Modified Tree (Carved or Scarred)	Within reserve	Tree removal
48-6-0158	DP-AS-001	Artefact	Within reserve	None proposed
48-6-0159	DP-IF-002	Artefact	Within reserve	None proposed

AHIMS #	Site name	Feature/s	Proximity to Road reserve	Potential Impacts
49-4-0088	Murrumbidgee Valley National Park 3	Burial/ Aboriginal ceremony and dreaming/ modified Tree (Carved or Scarred)	<100m	Tree removal
49-4-0208	Yarrada modified tree g	Modified Tree (Carved or Scarred)	<100m	Road improvement
49-4-0217	DP-ST-001	Modified Tree (Carved or Scarred)	Within reserve	Tree removal
49-4-0218	DP-IF-005	Artefact	<100m	Road improvement
49-4-0219	DP-ST-002	Modified Tree (Carved or Scarred)	<100m	Tree removal
49-4-0220	DP-ST-004	Modified Tree (Carved or Scarred)	<100m	Road improvement
49-4-0221	DP-ST-005	Modified Tree (Carved or Scarred)	<100m	Road improvement
49-4-0222	DP-ST-006	Modified Tree (Carved or Scarred)	<100m	Road improvement
49-5-0213	Sturt Hwy Waddi modified tree	Modified Tree (Carved or Scarred)	Within reserve	Tree removal
Section 3: Hay to Balranald				
47-6-0022	Yanga Creek #2;	Modified Tree (Carved or Scarred)	<100m	Tree removal
47-6-0024	Yanga Creek 1;YC-1;	Earth Mound/ shell/ artefact	<100m	Road improvement
47-6-0025	Yanga Creek Midden 2;YCM-2;	Earth Mound/ shell/ artefact	<100m	Road improvement
47-6-0026	Yanga Creek Scarred Tree-4;YCST-4;	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0027	YC1;Yanga Creek;	Modified Tree (Carved or Scarred)	<100m	Road improvement
47-6-0028	YC2;Yanga Creek;	Modified Tree (Carved or Scarred)	Within reserve	Road improvement
47-6-0030	YC 3;Yanga Creek;	Modified Tree (Carved or Scarred)	<100m	Road improvement
47-6-0169	Horse 15	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0170	Horse 16	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0171	Horse 17	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0172	Horse 18	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0173	Horse 19	Modified Tree (Carved or Scarred)	Within reserve	None proposed

AHIMS #	Site name	Feature/s	Proximity to Road reserve	Potential Impacts
47-6-0174	Horse 20	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0175	Horse 21	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0176	Horse 22	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0195	Horse 25	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0196	Horse 26	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0197	Horse 27	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0198	Horse 28	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0199	Horse 29	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0200	Horse 30	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0201	Horse 31	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0202	Horse 32	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0203	Horse 33	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0204	Horse 34	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0205	Horse 35	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0206	Horse 36	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0207	Horse 37	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0208	Horse 38	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0209	Horse 39	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0210	Horse 40	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0274	Horse 50	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0275	Horse 51	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0276	Horse 52	Modified Tree (Carved or Scarred)	Within reserve	None proposed

AHIMS #	Site name	Feature/s	Proximity to Road reserve	Potential Impacts
47-6-0278	Horse 54	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0279	Horse 55	Modified Tree (Carved or Scarred)	Within reserve	None proposed
47-6-0748	WA-ST4 (West Abercrombie Scarred Tree 4)	Modified Tree (Carved or Scarred)	<100m	Road improvement
48-1-0019	Waimea Downs 5	Burial	Within reserve	None proposed
48-4-0465	KE-IF-001	Artefact	Within reserve	None proposed
48-4-0466	KE-AS-001	Artefact	<100m	None proposed
48-4-0467	KE-IF-002	Artefact	Within reserve	None proposed
48-4-0468	KE-IF-003	Artefact	Within reserve	None proposed
48-4-0469	KE-IF-006	Artefact	Within reserve	Road improvement
48-5-0426	KE-IF-004	Artefact	<100m	None proposed
Section 4: Balranald to Euston				
47-4-0023	Dry Lake Midden 1	Ceremonial Ring (Stone or Earth)/ hearth/ shell	<100m	None proposed
47-4-0019	Dry Lake north 01	Shell	Within reserve	None proposed
Section 5: Euston to Buronga				
46-3-0019	Mallee Cliffs Site 4;	Hearth/ shell/ artefact	<100m	Tree removal
46-3-0081	Bowen Park_1;	Artefact/ shell	<100m	Tree removal
47-4-0009	three;	Modified Tree (Carved or Scarred)	within reserve	Road improvement

10.2.1 Direct harm

Direct harm may occur from the following activities associated with the Sturt Highway road safety project: vegetation clearance, site compound construction, temporary stockpiles, topsoil stripping for road expansion, and installation of posts to support signage.

10.2.2 Indirect harm

Indirect harm may occur from trampling by construction workers, or crushing impacts of construction vehicles.

10.2.3 Impacts on cultural heritage values

Impacts to the social and cultural values from the proposed Sturt Highway route safety upgrades will have a range of impacts. Aboriginal people retain strong cultural links to country and further

consultation is required to ensure that the proposed development will not result in any net increase to loss of cultural heritage significance.

This evaluation of the different levels of impact has direct relevance to the rationales supporting the management and mitigation measures proposed in Section 11 which aim to provide guidance on how to minimise potential impacts, and how to mitigate those impacts where possible.

11 ABORIGINAL CULTURAL HERITAGE CONSTRAINTS

In Australia, the principal document that provides guidance for the conservation and management of places of cultural significance is the *Burra Charter* (Australia ICOMOS 2013). The *Burra Charter* is based on the knowledge and experience of Australia ICOMOS members; it “advocates a cautious approach to change: do as much as necessary to care for the place and to make it useable, but otherwise change it as little as possible so that its cultural significance is retained” (Australia ICOMOS 2013: 1).

Obviously, it isn’t necessarily practicable to conserve all places of cultural heritage significance. This means that decisions need to be taken with regard to the heritage values of a given place, or item, the impacts that are proposed and the overall effects from such impacts on the cultural heritage within the study area, across the local region, as well as at state and national levels.

In the context of this desktop analysis of Aboriginal cultural heritage constraints, the approach has been to identify zones of predicted risk or sensitivity. These zones have been developed on the basis of a combination of quantitative and qualitative approaches to the data and mapping reviewed in this report.

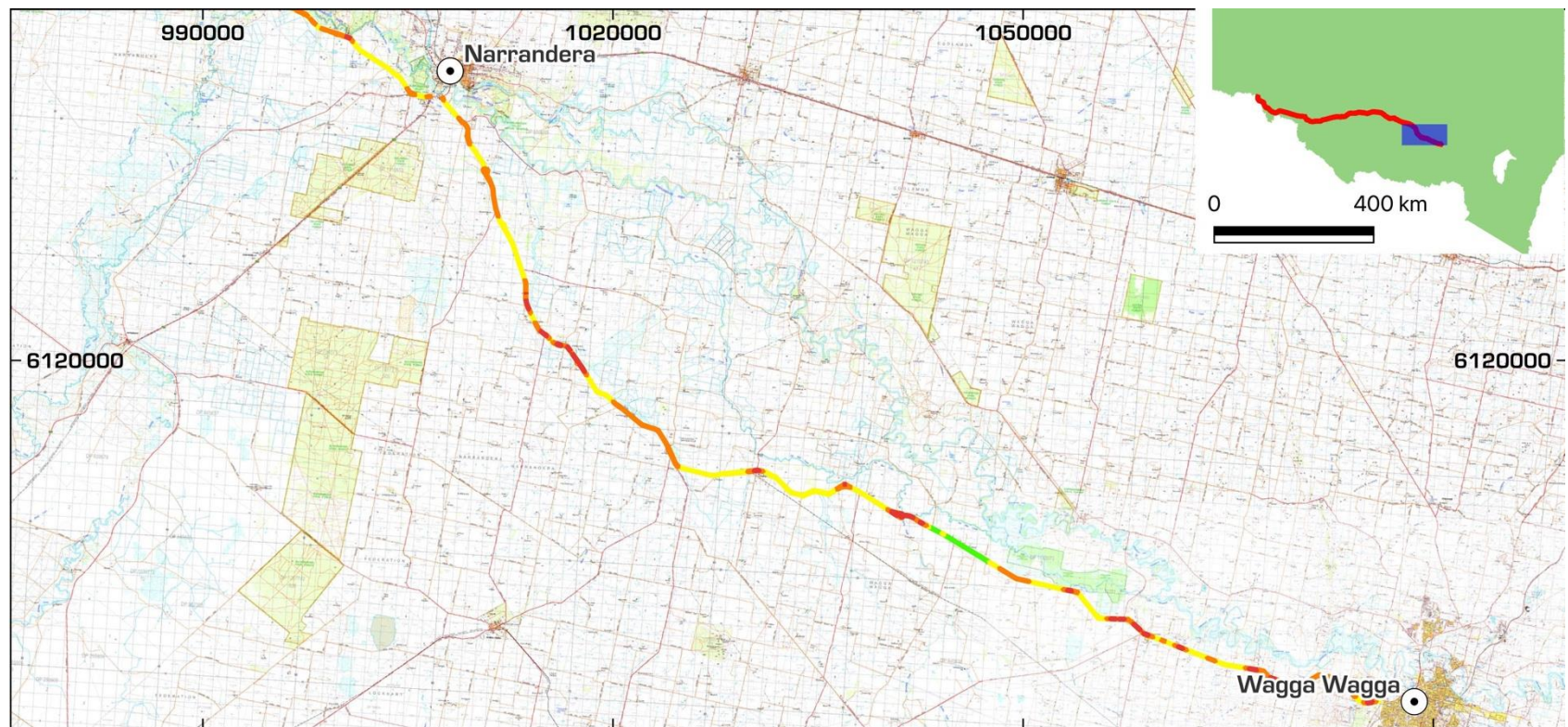
The first step in this process was to map zones based on set buffers around known site locations and major water courses. Figure 42 to Figure 47 (Appendix 4) illustrate four categories that predict broad areas of very high, high, moderate-high and low-moderate archaeological and cultural sensitivity produced through the abovementioned buffers. The buffers were set with a 200m radius around known site locations as an area of very high sensitivity and a 500m radius as an area of high sensitivity. These buffers have been set to account for factors such as inaccuracies in mapping of older site recordings, potential for sites to be more extensive than currently mapped, and potential for broader zones of intangible cultural significance associated with sites (e.g. the landscape setting of a site).

In addition to the buffers around known sites, buffers were set along major water courses. These buffers were set with 200m defining areas of predicted very high sensitivity, 500m defining areas of predicted high sensitivity, 1km defining areas of predicted moderate-high sensitivity, and 5km defining areas of predicted low-moderate sensitivity. These zones aim to account for the predicted likelihood of sites occurring in these sorts of landscape contexts (tangible cultural heritage), as well as the broader intangible social and cultural significance that is likely to be associated with water courses through this landscape.

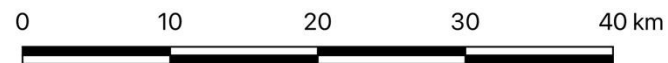
Additional areas of very high, high, moderate-high and low-moderate sensitivity along the Sturt Highway corridor were identified through a more qualitative interpretation of the geology and ASDST mapping together with the predictive modelling outlined in Section 6. In particular, the ASDST modelling for burials was used to identify areas of high to very high sensitivity, as this is a high risk site type that may also be associated with other site types, and there is increased potential for intangible cultural heritage values to be associated with such locations. Similarly, the ASDST modelling for other site types, together with geoarchaeological predictive modelling from the geology mapping was used to review and classify all areas along the Sturt Highway corridor beyond the 200m and 500m buffers around known sites and rivers.

The resultant mapping of cultural heritage constraints is presented below in Figure 48 to Figure 53.

The implication of the mapping of cultural heritage constraints is that further investigation in the form of comprehensive field survey and review of Aboriginal cultural heritage values is required across all areas of high and very high sensitivity prior to any impacts. This is necessary to confirm the status, nature, extent and significance of known sites and areas of predicted high to very high potential for Aboriginal cultural heritage constraints. Additionally, further investigations in the form of a sampling approach to landforms within areas of moderate-high sensitivity is recommended prior to any impacts. This approach is necessary in order to ground truth and further refine the modelling along the study area.



Sturt Highway ACH Sensitivity - Section 1

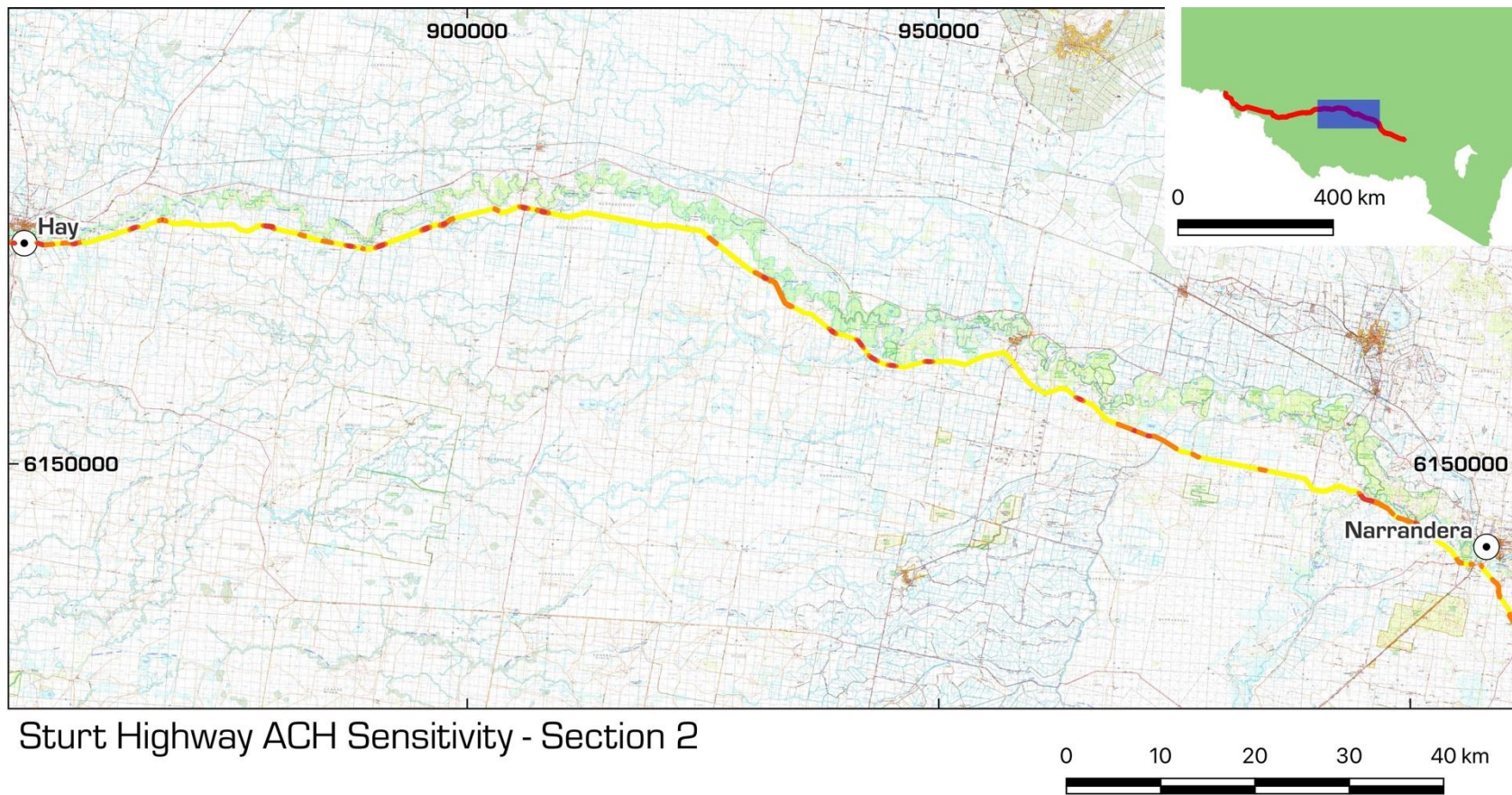


Legend

- Very High Sensitivity
- High Sensitivity
- Moderate-High Sensitivity
- Low-Moderate Sensitivity



Figure 42: Summary of levels of archaeological and cultural sensitivities within section 1 of Sturt Highway study area

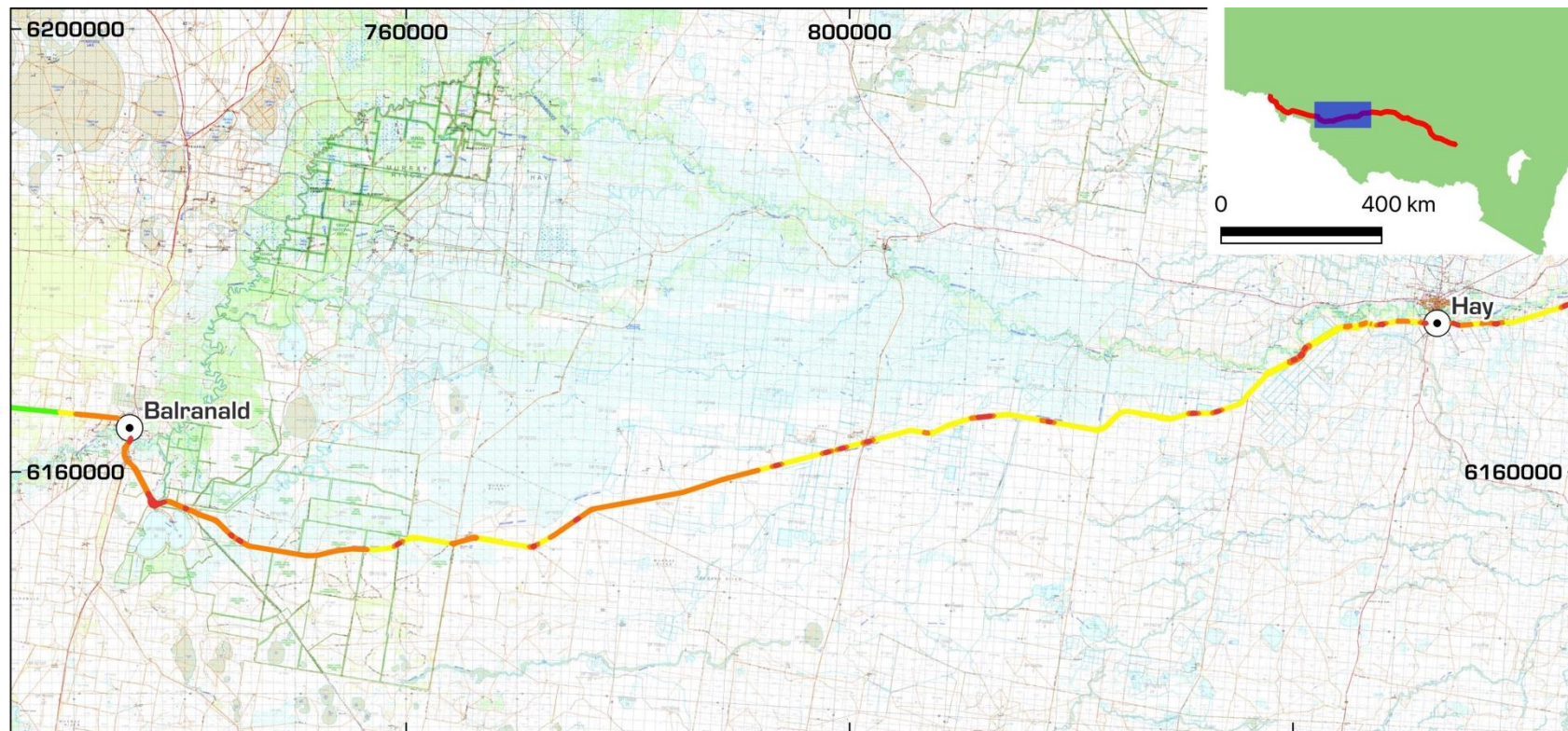


Legend

- Very High Sensitivity
- High Sensitivity
- Moderate-High Sensitivity
- Low-Moderate Sensitivity



Figure 43: Illustration of levels of archaeological and cultural sensitivities within section 2 of Sturt Highway study area



Sturt Highway AHIMS Sites - Section 3



Legend

- Very High Sensitivity
- High Sensitivity
- Moderate-High Sensitivity
- Low-Moderate Sensitivity



Figure 44: Illustration of levels of archaeological and cultural sensitivities within section 3 of Sturt Highway study area

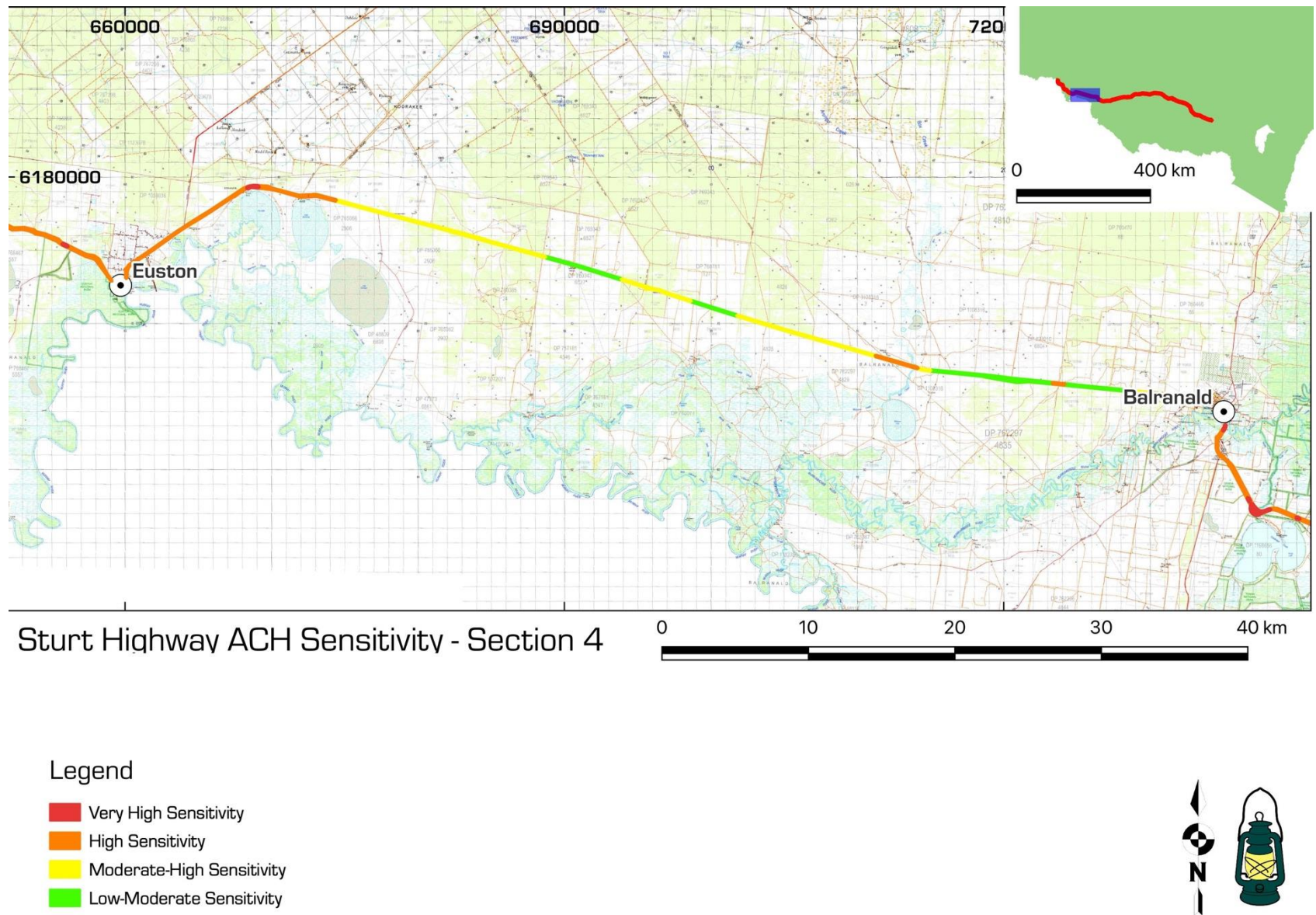


Figure 45: Illustration of levels of archaeological and cultural sensitivities within section 4 of Sturt Highway study area



Sturt Highway ACH Sensitivity - Section 5

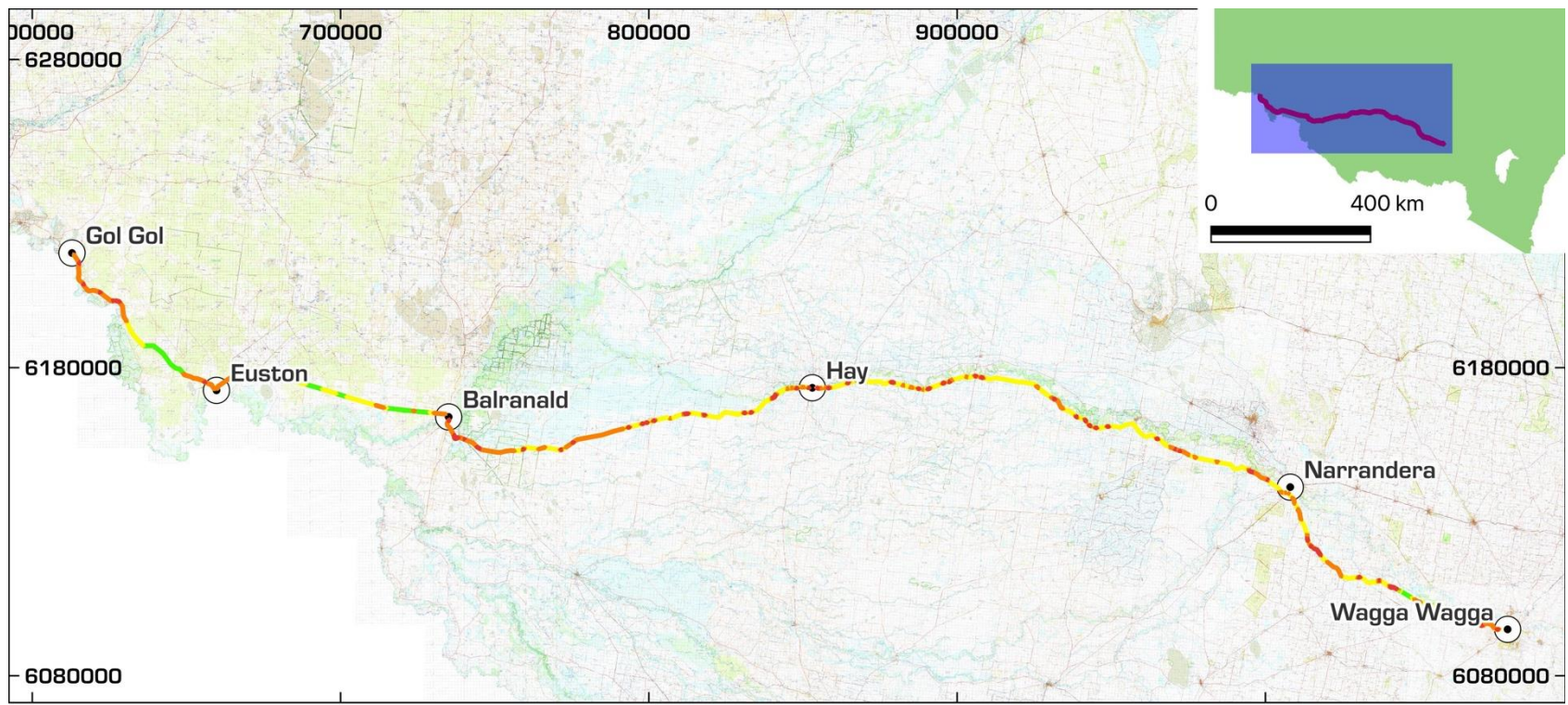


Legend

- Very High Sensitivity
- High Sensitivity
- Moderate-High Sensitivity
- Low-Moderate Sensitivity



Figure 46: Illustration of levels of archaeological and cultural sensitivities within section 5 of Sturt Highway study area



Sturt Highway ACH Sensitivity- Overview



Legend

- Very High Sensitivity
- High Sensitivity
- Moderate-High Sensitivity
- Low-Moderate Sensitivity



Figure 47: Illustration of levels of archaeological and cultural sensitivities along Sturt Highway study area

12 SUMMARY AND RECOMMENDATIONS

The Sturt Highway project traverses a 550km section of south western New South Wales across three distinct bioregions. Aboriginal communities within the study area have strong, ongoing connections to this country. This project is in the preliminary stages of investigation and further archaeological investigation and community consultation is required. A level of goodwill and willingness to engage with Transport and Lantern Heritage has been expressed by the majority of Aboriginal communities within the study area. There is an opportunity to further this rapport through consistent and honest engagement with the community.

Desktop analysis has shown that a field assessment for the Sturt Highway project area is warranted prior to finalising design route options of the Sturt Highway Route Safety improvement works. As illustrated in Table 12 further investigation is recommended prior to any impacts for all sites recorded within 100m of the Sturt Highway Road corridor to confirm the status, location, condition, extent and cultural heritage significance. In addition, further investigation is recommended for all sections of road identified as have very high to high sensitivity in Figure 48 to Figure 53 prior to any impacts.

This report provides guidelines for the currently proposed works as well as an assessment of Aboriginal cultural heritage constraints for future upgrades to the Sturt Highway.

Table 12: Recommended action for sites recorded within the Sturt Highway study area

AHIMS #	Site name	Proximity to Road reserve	Potential Impacts	Recommended Action
Section 1: Wagga Wagga to Narrandera				
49-6-0037	Kindra 1	Within reserve	Tree removal	Ground truth prior to impacts
49-6-0038	Sandigo 1	Within reserve	Tree removal	Ground truth prior to impacts
49-6-0039	Sandigo 2	Within reserve	Tree removal	Ground truth prior to impacts
49-6-0047	Galore TSR Scar Tree 5	<100m	Road improvement and tree removal	Ground truth prior to impacts
49-6-0048	Galore TSR Scar Tree 6	<100m	Road improvement and tree removal	Ground truth prior to impacts
49-6-0065	Galore TSR Scar Tree 4	<100m	Road improvement	Ground truth prior to impacts
55-3-0057	Woodend TSR Scar Tree 1	<100m	Tree removal	Ground truth prior to impacts
55-3-0058	Woodend TSR Scar Tree 2	<100m	Tree removal	Ground truth prior to impacts
56-1-0083	WW113	Within reserve	Road improvement and tree removal	Ground truth prior to impacts
56-1-0092	WW 114	Within reserve	Road improvement	Ground truth prior to impacts
56-1-0094	WW 111	Within reserve	Road improvement	Ground truth prior to impacts
56-1-0132	Berry Jerry Ring Tree	Within reserve	Tree removal	Ground truth prior to impacts

AHIMS #	Site name	Proximity to Road reserve	Potential Impacts	Recommended Action
56-1-0200	Yarra 15	<100m	Road improvement	Ground truth prior to impacts
56-1-0201	Vincent 1	<100m	Road improvement	Ground truth prior to impacts
56-1-0272	Gorman Gadi	<100m	Road improvement	Ground truth prior to impacts
56-1-0273	Collin E 1	<100m	Tree removal	Ground truth prior to impacts
56-1-0277	Collin E 5	<100m	Tree removal	Ground truth prior to impacts
56-1-0283	Sawpit 1	<100m	Tree removal	Ground truth prior to impacts
56-1-0284	Sawpit 2	<100m	Tree removal	Ground truth prior to impacts
56-1-0488	Olympic Highway Ashmont 1	<100m	Tree removal	Ground truth prior to impacts
56-1-0546	Tank Junction TSR 3	< 100m	Tree removal	Ground truth prior to impacts
56-4-0036	WP4	<100m	Tree removal	Ground truth prior to impacts
Section 2: Narrandera to Hay				
48-3-0110	Gin Site Artefact Scatter	<100m	Road improvement	Ground truth prior to impacts
48-3-0122	RivCott3	<100m	Road improvement	Ground truth prior to impacts
48-3-0235	HY-ST-002	<100m	Tree removal	Ground truth prior to impacts
48-3-0236	HY-IF-002	<100m	Tree removal	Ground truth prior to impacts
48-3-0237	DP-IF-003	Within reserve	None proposed	Avoid impacts to site
48-3-0238	DP-IF-004	Within reserve	None proposed	Avoid impacts to site
48-5-0430	HY-IF-001	<100m	Tree removal	Ground truth prior to impacts
48-5-0431	HY-ST-001	Within reserve	Tree removal	Ground truth prior to impacts
48-6-0158	DP-AS-001	Within reserve	None proposed	Avoid impacts to site
48-6-0159	DP-IF-002	Within reserve	None proposed	Avoid impacts to site
49-4-0088	Murrumbidgee Valley National Park 3	<100m	Tree removal	Ground truth prior to impacts
49-4-0208	Yarrada modified tree g	<100m	Road improvement	Ground truth prior to impacts
49-4-0217	DP-ST-001	Within reserve	Tree removal	Ground truth prior to impacts
49-4-0218	DP-IF-005	<100m	Road improvement	Ground truth prior to impacts

AHIMS #	Site name	Proximity to Road reserve	Potential Impacts	Recommended Action
49-4-0219	DP-ST-002	<100m	Tree removal	Ground truth prior to impacts
49-4-0220	DP-ST-004	<100m	Road improvement	Ground truth prior to impacts
49-4-0221	DP-ST-005	<100m	Road improvement	Ground truth prior to impacts
49-4-0222	DP-ST-006	<100m	Road improvement	Ground truth prior to impacts
49-5-0213	Sturt Hwy Waddi modified tree	Within reserve	Tree removal	Ground truth prior to impacts
Section 3: Hay to Balranald				
47-6-0022	Yanga Creek #2;	<100m	Tree removal	Ground truth prior to impacts
47-6-0024	Yanga Creek 1;YC-1;	<100m	Road improvement	Ground truth prior to impacts
47-6-0025	Yanga Creek Midden 2;YCM-2;	<100m	Road improvement	Ground truth prior to impacts
47-6-0026	Yanga Creek Scarred Tree-4;YCST-4;	Within reserve	None proposed	Ground truth prior to impacts
47-6-0027	YC1;Yanga Creek;	<100m	Road improvement	Ground truth prior to impacts
47-6-0028	YC2;Yanga Creek;	Within reserve	Road improvement	Ground truth prior to impacts
47-6-0030	YC 3;Yanga Creek;	<100m	Road improvement	Ground truth prior to impacts
47-6-0169	Horse 15	Within reserve	None proposed	Avoid impacts to site
47-6-0170	Horse 16	Within reserve	None proposed	Avoid impacts to site
47-6-0171	Horse 17	Within reserve	None proposed	Avoid impacts to site
47-6-0172	Horse 18	Within reserve	None proposed	Avoid impacts to site
47-6-0173	Horse 19	Within reserve	None proposed	Avoid impacts to site
47-6-0174	Horse 20	Within reserve	None proposed	Avoid impacts to site
47-6-0175	Horse 21	Within reserve	None proposed	Avoid impacts to site
47-6-0176	Horse 22	Within reserve	None proposed	Avoid impacts to site
47-6-0195	Horse 25	Within reserve	None proposed	Avoid impacts to site
47-6-0196	Horse 26	Within reserve	None proposed	Avoid impacts to site
47-6-0197	Horse 27	Within reserve	None proposed	Avoid impacts to site
47-6-0198	Horse 28	Within reserve	None proposed	Avoid impacts to site
47-6-0199	Horse 29	Within reserve	None proposed	Avoid impacts to site
47-6-0200	Horse 30	Within reserve	None proposed	Avoid impacts to site
47-6-0201	Horse 31	Within reserve	None proposed	Avoid impacts to site
47-6-0202	Horse 32	Within reserve	None proposed	Avoid impacts to site
47-6-0203	Horse 33	Within reserve	None proposed	Avoid impacts to site

AHIMS #	Site name	Proximity to Road reserve	Potential Impacts	Recommended Action
47-6-0204	Horse 34	Within reserve	None proposed	Avoid impacts to site
47-6-0205	Horse 35	Within reserve	None proposed	Avoid impacts to site
47-6-0206	Horse 36	Within reserve	None proposed	Avoid impacts to site
47-6-0207	Horse 37	Within reserve	None proposed	Avoid impacts to site
47-6-0208	Horse 38	Within reserve	None proposed	Avoid impacts to site
47-6-0209	Horse 39	Within reserve	None proposed	Avoid impacts to site
47-6-0210	Horse 40	Within reserve	None proposed	Avoid impacts to site
47-6-0274	Horse 50	Within reserve	None proposed	Avoid impacts to site
47-6-0275	Horse 51	Within reserve	None proposed	Avoid impacts to site
47-6-0276	Horse 52	Within reserve	None proposed	Avoid impacts to site
47-6-0278	Horse 54	Within reserve	None proposed	Avoid impacts to site
47-6-0279	Horse 55	Within reserve	None proposed	Avoid impacts to site
47-6-0748	WA-ST4 (West Abercrombie Scarred Tree 4)	<100m	Road improvement	Ground truth prior to impacts
48-1-0019	Waimea Downs 5	Within reserve	None proposed	Avoid impacts to site
48-4-0465	KE-IF-001	Within reserve	None proposed	Avoid impacts to site
48-4-0466	KE-AS-001	<100m	None proposed	Avoid impacts to site
48-4-0467	KE-IF-002	Within reserve	None proposed	Avoid impacts to site
48-4-0468	KE-IF-003	Within reserve	None proposed	Avoid impacts to site
48-4-0469	KE-IF-006	Within reserve	Road improvement	Ground truth prior to impacts
48-5-0426	KE-IF-004	<100m	None proposed	Avoid impacts to site
Section 4: Balranald to Euston				
47-4-0023	Dry Lake Midden 1	<100m	None proposed	Avoid impacts to site
47-4-0019	Dry Lake north 01	Within reserve	None proposed	Avoid impacts to site
Section 5: Euston to Buronga				
46-3-0019	Mallee Cliffs Site 4;	<100m	Tree removal	Ground truth prior to impacts
46-3-0081	Bowen Park_1;	<100m	Tree removal	Ground truth prior to impacts
47-4-0009	three;	within reserve	Road improvement	Ground truth prior to impacts

12.1 Recommendations

On the basis of the desktop analysis and community consultation documented in this report, it is recommended that:

1. In order to continue the goodwill fostered during community consultation meetings this report should be circulated to RAPs for their comment.

2. Further investigation in the form of field survey is required to ground truth the 13 sites listed below. These sites are recorded within the Sturt Highway road corridor and are within the currently proposed scope of works for the Sturt Highway route safety review project.

AHIMS sites requiring ground truthing prior to impacts				
Section 1	Section 2	Section 3	Section 4	Section 5
49-6-0037	48-5-0431	47-6-0028	No sites	47-4-0009
49-6-0038	49-4-0217	48-4-0469		
49-6-0039	49-5-0213			
56-1-0083				
56-1-0092				
56-1-0094				
56-1-0132				

3. If sites listed above cannot be avoided, Transport must apply for an Aboriginal Heritage Impact Permit (AHIP) from Heritage NSW to impact these sites.
4. Further investigation in the form of targeted sample survey is required across the sections of the Sturt Highway assessed to have low-moderate to moderate-high sensitivity prior to any future impacts.
5. Areas of low-moderate significance should be subject to due diligence assessment and visual inspection, prior to impacts from any proposed works.
6. Field survey should be conducted in partnership with the local Aboriginal community to determine the cultural significance of the study area.
7. That prior to working in the study area, all Transport employees and contractors associated with the Sturt Highway route safety review project receive cultural heritage inductions delivered by either Transport staff trained in site identification or a member of the relevant Local Aboriginal Land Council.
8. Long term management plans be developed for future works and activities that may occur beyond current study corridor.

13 GLOSSARY

Aboriginal site	A place where Aboriginal activity has occurred and/or a place associated with Aboriginal tradition. Aboriginal sites include locations where archaeological evidence is present and/or places of intangible heritage value, where Aboriginal tradition or oral history indicate the place has meaning or significance to the Aboriginal community.
archaeological sensitivity	A location or landform where archaeological sites or deposits are likely to occur. Such locations may include areas of identified PAD or may correspond to areas for which insufficient information is available regarding the nature and integrity of deposits to identify clear areas of archaeological potential.
archaeological site	A place where physical evidence of human activity is present on the surface (e.g. artefacts, modified trees, middens, earthworks or other structural features) and/or within subsurface deposits.
archaeological deposit	A subsurface deposit containing artefacts or other evidence/features (e.g. fire places, middens or post holes) of human activity.
archaeological visibility	Usually expressed as a percentage, this refers to the extent to which the archaeological deposits, or PAD, are visible during survey.
artefact	An object made, modified or transported (manuport) by humans.
geomorphology	The study of the nature and origin of landforms – i.e. the ways in which the landscape was formed through processes of weathering and erosion.
historical site	A place where human activity has occurred and is associated with non-Aboriginal occupation. Such places may be archaeological sites with physical evidence of activity and/or locations associated with historical events. Historical sites that contain evidence of contemporaneous Aboriginal and non-Aboriginal activity are commonly referred to as post contact sites.
manuport	A natural object that has been removed from its original location by humans (e.g. a rock that has been transported to an area where it does not occur naturally).
midden	An area of refuse. Middens contain items created (e.g. stone artefacts, bottles or ceramics), or used (e.g. shell and bone from meals) by humans. Middens can occur on both Aboriginal and historical sites.
post contact site	A place containing evidence of contact between Aboriginal people and non-Aboriginal people (e.g. an Aboriginal site with artefacts of European manufacture, or European artefacts modified by Aboriginal people) and/or a place associated with interactions between Aboriginal and non-Aboriginal people (e.g. a massacre site).
potential archaeological deposit	PAD: An area or landform predicted to contain archaeological deposits.
scarred tree	A scarred tree, also referred to as a culturally modified tree, is a tree that shows evidence of human activity. This is usually evidenced in the form of a scar where bark has been removed (either an absence of bark or an area of regrowth bark). It may also include modifications to the heartwood (e.g. carving or axe marks).

Bark removal and tree carving was practiced by both Aboriginal and non-Aboriginal people. Usually the nature of the scar, the extent of regrowth and the broader context of the tree will provide clues to the origin of the scar (e.g. a surveyor's blaze versus bark removal for a shield or coolamon).

stone artefact A stone/rock, or piece thereof, that has been modified by humans. It generally refers to portable chipped/flaked, ground or pecked items (Clarkson and O'Connor 2013: 153).

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APPENDIX 1 – AHIMS & OTHER HERITAGE REGISTER SEARCHES

Search results from AHIMS database provided by David Gordon, Heritage NSW, as GIS file.

Section 1: Wagga Wagga to Narrandera

SITE_ID	SITE_NAME	FEATURE_TY
56-1-0122	Wollundry Tree	Modified Tree (Carved or Scarred)
56-1-0127	Kapooka Water Tank ST 1	Modified Tree (Carved or Scarred)
56-1-0129	Kapooka Pump Station ST 1	Modified Tree (Carved or Scarred)
56-1-0242	Collin 4	Modified Tree (Carved or Scarred)
56-1-0254	Collin 18	Modified Tree (Carved or Scarred)
56-1-0345	Wagga Wagga Pounds Flat TSR Scar Tree 3	Modified Tree (Carved or Scarred)
56-1-0352	Wagga Wagga Pounds Flat TSR Scar Tree 4	Modified Tree (Carved or Scarred)
56-1-0393	Rodhams Rd 1	Modified Tree (Carved or Scarred)
49-6-0046	Galore TSR Scar Tree 3	Modified Tree (Carved or Scarred)
55-3-0055	Woodend TSR Scar Tree 9	Modified Tree (Carved or Scarred)
55-3-0056	Woodend TSR Scar Tree 10	Modified Tree (Carved or Scarred)
55-3-0066	Woodend TSR Scar Tree 07	Modified Tree (Carved or Scarred)
56-1-0571	Lloyd 529137	Artefact
56-1-0579	L-IF-3	Artefact
56-1-0608	Dunns road ring tree 1	Modified Tree (Carved or Scarred)
56-1-0614	Pomingalarna Park ST-01 (PP ST-01)	Modified Tree (Carved or Scarred)
56-1-0617	Pomingalarna Park CA-01 (PP CA-01)	Aboriginal Resource and Gathering
56-1-0048	LN 2	Artefact
56-1-0096	L-IF-1	Artefact
56-1-0101	L-ST-4	Modified Tree (Carved or Scarred)
56-1-0121	Kapooka Bridge Scarred Tree 1	Modified Tree (Carved or Scarred)
56-1-0124	TARCOOLA QUARRY ISOLATED FIND 1	Artefact
56-1-0132	Berry Jerry Ring Tree	Modified Tree (Carved or Scarred)
56-1-0250	Collin 13	Modified Tree (Carved or Scarred)
56-1-0266	Collin 31	Modified Tree (Carved or Scarred)
56-1-0267	Collin 32	Modified Tree (Carved or Scarred)
56-1-0268	Collin 33	Modified Tree (Carved or Scarred)
56-1-0274	Collin E 2	Modified Tree (Carved or Scarred)
56-1-0277	Collin E 5	Modified Tree (Carved or Scarred)
56-1-0347	Wagga Wagga Pounds Flat TSR Fire Scar 2	Modified Tree (Carved or Scarred)
56-1-0353	Wagga Wagga Pounds Flat TSR Scar Tree 2	Modified Tree (Carved or Scarred)
56-1-0374	Gabuga Water Tank 3	Modified Tree (Carved or Scarred)
56-1-0377	Gabuga Water Tank 6	Modified Tree (Carved or Scarred)
56-1-0378	Gabuga Tank 2	Modified Tree (Carved or Scarred)
56-1-0385	Gabuga Tank 20	Aboriginal Resource and Gathering
56-1-0387	Gabuga Tank 13	Modified Tree (Carved or Scarred)
56-2-0124	TQ-IF1	Artefact
49-6-0047	Galore TSR Scar Tree 5	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
49-6-0050	Galore TSR Scar Tree 8	Modified Tree (Carved or Scarred)
49-6-0053	Galore TSR Scar Tree 11	Modified Tree (Carved or Scarred)
49-6-0054	Galore TSR Scar Tree 12	Modified Tree (Carved or Scarred)
49-6-0059	Galore TSR Scar Tree 17	Modified Tree (Carved or Scarred)
55-3-0052	Woodend TSR Scar Tree 13	Modified Tree (Carved or Scarred)
55-3-0059	Woodend TSR Scar Tree 3	Modified Tree (Carved or Scarred)
55-3-0067	Woodend TSR Scar Tree 08	Modified Tree (Carved or Scarred)
56-1-0436	Willan's Hill IF1	Artefact
49-6-0117	Kywong 018	Modified Tree (Carved or Scarred)
49-6-0026	Poisoned Water Hole Creek;	Modified Tree (Carved or Scarred)
55-3-0002	Bundabah;Old Mans Creek;	Earth Mound
56-1-0049	LN 3	Artefact
56-1-0112	Wagga Research Centre double Scar Tree	Modified Tree (Carved or Scarred)
56-4-0036	WP4	Artefact
56-1-0197	Yarra 12	Modified Tree (Carved or Scarred)
56-1-0243	Collin 5	Modified Tree (Carved or Scarred)
56-1-0246	Collin 9	Modified Tree (Carved or Scarred)
56-1-0252	Collin 16	Modified Tree (Carved or Scarred)
56-1-0253	Collin 17	Modified Tree (Carved or Scarred)
56-1-0265	Collin 30	Modified Tree (Carved or Scarred)
56-1-0272	Gorman Gadi	Aboriginal Ceremony and Dreaming
56-1-0278	Collin E 6	Modified Tree (Carved or Scarred)
56-1-0282	Collin E 10	Modified Tree (Carved or Scarred)
56-1-0350	Wagga Wagga Pounds Flat TSR Scar Tree 5	Modified Tree (Carved or Scarred)
56-1-0373	Gabuga Water Tank 1	Modified Tree (Carved or Scarred)
56-1-0392	Gabuga Tank 18	Modified Tree (Carved or Scarred)
49-6-0052	Galore TSR Scar Tree 10	Modified Tree (Carved or Scarred)
55-3-0044	Woodend TSR Scar Tree 8	Modified Tree (Carved or Scarred)
55-3-0047	Woodend TSR Scar Tree 5	Modified Tree (Carved or Scarred)
49-6-0109	kywong 808	Artefact
49-6-0113	Kywong 831	Artefact
49-6-0116	Kywong 099	Artefact
49-6-0118	Kywong 434	Modified Tree (Carved or Scarred)
49-6-0123	Kywong 632	Artefact
56-1-0592	Kapooka PreSchool 527789	Modified Tree (Carved or Scarred)
49-6-0001	Narrandera;	Modified Tree (Carved or Scarred)
56-1-0098	L-ST-1	Modified Tree (Carved or Scarred)
49-6-0037	Kindra 1	Modified Tree (Carved or Scarred)
49-6-0039	Sandigo 2	Modified Tree (Carved or Scarred)
56-1-0199	Yarra 16	Artefact

SITE_ID	SITE_NAME	FEATURE_TY
56-1-0201	Vincent 1	Artefact
56-1-0241	Collin 3	Modified Tree (Carved or Scarred)
56-1-0245	Collin 8	Modified Tree (Carved or Scarred)
56-1-0251	Collin 7	Modified Tree (Carved or Scarred)
56-1-0255	Collin 19	Modified Tree (Carved or Scarred)
56-1-0275	Collin E 3	Modified Tree (Carved or Scarred)
56-1-0279	Collin E 7	Modified Tree (Carved or Scarred)
56-1-0281	Collin E 9	Modified Tree (Carved or Scarred)
56-1-0283	Sawpit 1	Modified Tree (Carved or Scarred)
56-1-0348	Wagga Wagga Pounds Flat TSR Scar Tree 7	Modified Tree (Carved or Scarred)
56-1-0349	Wagga Wagga Pounds Flat TSR Scar Tree 6	Modified Tree (Carved or Scarred)
56-1-0351	Wagga Wagga Pounds Flat TSR Fire Scar Tree 1	Modified Tree (Carved or Scarred)
56-1-0375	Gabuga Water Tank 4	Modified Tree (Carved or Scarred)
56-1-0376	Gabuga Water Tank 5	Modified Tree (Carved or Scarred)
56-1-0380	Gabuga Tank 8	Modified Tree (Carved or Scarred)
56-1-0383	Gabuga Tank 9	Modified Tree (Carved or Scarred)
49-6-0061	Galore TSR Scar Tree 19	Modified Tree (Carved or Scarred)
55-3-0045	Woodend TSR Scar Tree 7	Modified Tree (Carved or Scarred)
55-3-0049	Woodend TSR Hearth 1	Hearth
55-3-0057	Woodend TSR Scar Tree 1	Modified Tree (Carved or Scarred)
56-1-0488	Olympic Highway Ashmont 1	Modified Tree (Carved or Scarred)
49-6-0102	Kywong 526	Modified Tree (Carved or Scarred)
49-6-0110	Kywong 697	Modified Tree (Carved or Scarred)
49-6-0122	Kywong 035	Artefact
56-1-0544	Marrambidya Wagga 534384	Modified Tree (Carved or Scarred)
56-1-0570	Lloyd 528729	Modified Tree (Carved or Scarred)
49-6-0230	Avonlie Solar Farm IF 3	Artefact
56-1-0618	Pomingalarna Park ST-06 (PP ST-06)	Modified Tree (Carved or Scarred)
56-1-0047	LN 1	Artefact
56-1-0099	L-ST-2	Modified Tree (Carved or Scarred)
56-1-0194	Yarra 9	Modified Tree (Carved or Scarred)
56-1-0198	Yarra 13	Artefact
56-1-0271	Collin 15	Modified Tree (Carved or Scarred)
56-1-0273	Collin E 1	Modified Tree (Carved or Scarred)
56-1-0276	Collin E 4	Modified Tree (Carved or Scarred)
56-1-0284	Sawpit 2	Modified Tree (Carved or Scarred)
56-1-0285	Sawpit 3	Modified Tree (Carved or Scarred)
56-1-0286	Sawpit 4	Modified Tree (Carved or Scarred)
56-1-0287	Sawpit 5	Modified Tree (Carved or Scarred)
56-1-0288	Sawpit 7	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
56-1-0313	Flowerdale 3	Modified Tree (Carved or Scarred)
56-1-0379	Gabuga Tank 7	Modified Tree (Carved or Scarred)
56-1-0386	Mark Saddler Gabuga 1	Modified Tree (Carved or Scarred)
56-1-0391	Gabuga Tank 17	Modified Tree (Carved or Scarred)
49-6-0055	Galore TSR Scar Tree 13	Modified Tree (Carved or Scarred)
49-6-0060	Galore TSR Scar Tree 18	Modified Tree (Carved or Scarred)
49-6-0065	Galore TSR Scar Tree 4	Modified Tree (Carved or Scarred)
55-3-0053	Woodend TSR Scar Tree 12	Modified Tree (Carved or Scarred)
55-3-0063	Woodend TSR Scar Tree 05	Modified Tree (Carved or Scarred)
56-1-0496	Gabuga Overpass Scar 1	Modified Tree (Carved or Scarred)
49-6-0094	Kywong 4949	Modified Tree (Carved or Scarred)
56-1-0546	Tank Junction TSR 3	Modified Tree (Carved or Scarred)
49-6-0228	Avonlie Solar Farm IF63	Artefact
56-1-0015	WW14;West Pomingalarna 3;	Artefact
56-1-0083	WW113	Modified Tree (Carved or Scarred)
56-1-0200	Yarra 15	Modified Tree (Carved or Scarred)
56-1-0249	Collin 12	Modified Tree (Carved or Scarred)
56-1-0280	Collin E 8	Modified Tree (Carved or Scarred)
56-1-0307	Sawpit 6	Artefact
56-1-0354	Wagga Wagga Pound Flat Scar Tree 1	Modified Tree (Carved or Scarred)
56-1-0388	Gabuga Tank 14	Modified Tree (Carved or Scarred)
56-1-0390	Gabuga Tank 16	Modified Tree (Carved or Scarred)
49-6-0044	Galore TSR Scar Tree 1	Modified Tree (Carved or Scarred)
49-6-0045	Galore TSR Scar Tree 2	Modified Tree (Carved or Scarred)
49-6-0057	Galore TSR Scar Tree 15	Modified Tree (Carved or Scarred)
49-6-0058	Galore TSR Scar Tree 16	Modified Tree (Carved or Scarred)
55-3-0042	Lenehans TSR Scar Tree 2	Modified Tree (Carved or Scarred)
55-3-0043	Lenehans TSR Scar Tree 3	Modified Tree (Carved or Scarred)
55-3-0050	Woodend TSR Scar Tree 16	Modified Tree (Carved or Scarred)
55-3-0058	Woodend TSR Scar Tree 2	Modified Tree (Carved or Scarred)
55-3-0062	Woodend TSR Hearth clay ball 2	Hearth
55-3-0064	Woodend TSR Scar Tree 04	Modified Tree (Carved or Scarred)
56-1-0438	Beaver Island Creek 1	Modified Tree (Carved or Scarred)
49-6-0104	Kywong 972	Artefact
49-6-0105	Kywong 246	Artefact
49-6-0108	Kywong 467	Artefact
56-1-0573	Lloyd 529096	Modified Tree (Carved or Scarred)
49-6-0236	Sandigo 466669	Modified Tree (Carved or Scarred)
56-1-0050	LN 4	Artefact
56-1-0052	Lloyd Neighbourhood 1	Artefact

SITE_ID	SITE_NAME	FEATURE_TY
56-1-0100	L-ST-3	Modified Tree (Carved or Scarred)
56-1-0126	Boor 1	Artefact
49-6-0038	Sandigo 1	Modified Tree (Carved or Scarred)
56-1-0196	Yarra 11	Modified Tree (Carved or Scarred)
56-1-0244	Collin 6	Modified Tree (Carved or Scarred)
56-1-0247	Collin 10	Modified Tree (Carved or Scarred)
56-1-0248	Collin 11	Aboriginal Resource and Gathering
56-1-0289	Sawpit 8	Modified Tree (Carved or Scarred)
56-1-0312	Flowerdale 2	Modified Tree (Carved or Scarred)
56-1-0381	Gabuga Tank 10	Modified Tree (Carved or Scarred)
56-1-0426	Murrumbidya Wetlands 1	Modified Tree (Carved or Scarred)
56-1-0430	Rodhams Rd 2	Modified Tree (Carved or Scarred)
49-6-0048	Galore TSR Scar Tree 6	Modified Tree (Carved or Scarred)
49-6-0049	Galore TSR Scar Tree 7	Modified Tree (Carved or Scarred)
49-6-0056	Galore TSR Scar Tree 14	Modified Tree (Carved or Scarred)
49-6-0064	Lenehans TSR Scar Tree 1	Modified Tree (Carved or Scarred)
55-3-0051	Woodend TSR Scar Tree 15	Modified Tree (Carved or Scarred)
55-3-0054	Woodend TSR Scar Tree 11	Modified Tree (Carved or Scarred)
49-6-0101	Kywong 604	Artefact
49-6-0107	Kywong 417	Artefact
49-6-0112	Kywong 978	Modified Tree (Carved or Scarred)
49-6-0121	Kywong 727	Artefact
49-6-0229	Avonlie Solar Farm IF62	Artefact
56-1-0580	L-AFT-1	Artefact
56-1-0612	Pomingalarna Park ST-03 (PP ST-03)	Modified Tree (Carved or Scarred)
56-1-0013	PWWIF10	Artefact
56-1-0017	WW12;West Pomingalarna 1;	Artefact
56-1-0082	WW112	Modified Tree (Carved or Scarred)
56-1-0088	WW129	Modified Tree (Carved or Scarred)
56-1-0092	WW 114	Modified Tree (Carved or Scarred)
56-1-0094	WW 111	Modified Tree (Carved or Scarred)
56-1-0195	Yarra 10	Modified Tree (Carved or Scarred)
56-1-0269	Collin 35	Modified Tree (Carved or Scarred)
56-1-0270	Collin 36	Modified Tree (Carved or Scarred)
56-1-0382	Gabuga Tank 11	Modified Tree (Carved or Scarred)
56-1-0389	Gabuga Tank 15	Modified Tree (Carved or Scarred)
49-6-0051	Galore TSR Scar Tree 9	Modified Tree (Carved or Scarred)
55-3-0046	Woodend TSR Scar Tree 6	Modified Tree (Carved or Scarred)
55-3-0048	Woodend TSR Scar Tree 4	Modified Tree (Carved or Scarred)
55-3-0065	Woodend TSR Scar Tree 06	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
49-6-0093	Kywong 4984	Modified Tree (Carved or Scarred)
49-6-0103	Kywong 577	Artefact
49-6-0106	Kywong 331	Artefact
49-6-0111	Kywong 015	Artefact
49-6-0120	Kywong 394	Artefact
56-1-0569	Lloyd 528899	Artefact
56-1-0610	Pomingalarna Park ST-05 (PP ST-05)	Modified Tree (Carved or Scarred)
49-6-0030	Poisoned Waterholes Creek Massacre	Conflict
56-1-0016	VV13;West Pomingalarna 2;	Artefact
56-1-0051	LN 5	Modified Tree (Carved or Scarred)
56-1-0090	Wollundry	Modified Tree (Carved or Scarred)

Section 2: Narrandera to Hay

SITE_ID	SITE_NAME	FEATURE_TY
48-5-0110	Barman Reserve 1	Modified Tree (Carved or Scarred)
48-5-0111	Barman Reserve 2	Earth Mound
48-5-0118	Barman Reserve 9	Earth Mound
49-5-0108	CUBA 2	Modified Tree (Carved or Scarred)
49-5-0117	Murrumbidgee Valley NP 1001	Shell
48-5-0210	Bushy Bend/Sandy Point 4.	Modified Tree (Carved or Scarred)
49-5-0213	Sturt Hwy Waddi modified tree	Modified Tree (Carved or Scarred)
48-3-0235	HY-ST-002	Modified Tree (Carved or Scarred)
48-3-0027	Cooley Point Lagoon 7;Cooley Point Lagoon Reserve;	Earth Mound
49-5-0005	Tom Bullen Swamp 13;	Modified Tree (Carved or Scarred)
49-5-0006	Tom Bullen Swamp 12;	Modified Tree (Carved or Scarred)
49-5-0017	Tom Bullen Swamp 3;	Artefact
49-5-0025	Tom Bullen Swamp;	Burial
49-5-0096	TIBBO GRAVEL PIT 8	Modified Tree (Carved or Scarred)
49-5-0100	Tubbo Gravel Pit 9	Modified Tree (Carved or Scarred)
49-6-0002	Open;Weir Park;	Earth Mound
49-4-0088	Murrumbidgee Valley National Park 3	Modified Tree (Carved or Scarred)
48-5-0134	Hay State Forest 111	Modified Tree (Carved or Scarred)
48-3-0119	CPL116	Aboriginal Resource and Gathering
49-5-0116	Murrumbidgee Nat Park Scar 4	Modified Tree (Carved or Scarred)
49-5-0120	Graham' Grave CJL	Modified Tree (Carved or Scarred)
48-5-0192	Hay Bridge Ring tree 1	Modified Tree (Carved or Scarred)
48-5-0211	Bushy Bend/Sandy Point 3.	Modified Tree (Carved or Scarred)
49-5-0146	Innisvale lane Eurolie via Leeton	Modified Tree (Carved or Scarred)
48-5-0431	HY-ST-001	Modified Tree (Carved or Scarred)
48-3-0238	DP-IF-004	Artefact

SITE_ID	SITE_NAME	FEATURE_TY
49-4-0220	DP-ST-004	Modified Tree (Carved or Scarred)
48-3-0002	Carrathool Canoe;Darlington Pt;	Modified Tree (Carved or Scarred)
48-3-0032	Cooley Point Lagoon 13;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0033	Cooley Point Lagoon 13;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0038	Cooley Point Lagoon 18;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0061	Cooley Point Lagoon 41;Cooley Point Lagoon Reserve;	Modified Tree (Carved or Scarred)
48-3-0062	Cooley Point Lagoon 42;Cooley Point Lagoon Reserve;	Earth Mound
48-5-0027	Winilba	Modified Tree (Carved or Scarred)
49-5-0055	Canoe Tree;Yanco Weir;	Modified Tree (Carved or Scarred)
49-6-0026	Poisoned Water Hole Creek;	Modified Tree (Carved or Scarred)
48-5-0104	Winilbe Stn Scarred Tree 3	Modified Tree (Carved or Scarred)
49-4-0109	DPSub ST14	Modified Tree (Carved or Scarred)
49-4-0217	DP-ST-001	Modified Tree (Carved or Scarred)
48-3-0237	DP-IF-003	Artefact
48-3-0031	Cooley Point Lagoon 11;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0034	Cooley Point Lagoon 14;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0037	Cooley Point Lagoon 17;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0044	Cooley Point Lagoon 24;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0059	Cooley Point Lagoon 39;Cooley Point Lagoon Reserve;	Earth Mound
49-5-0015	Tom Bullen Swamp 2;	Modified Tree (Carved or Scarred)
49-5-0088	Tobbo Gravel Pitt 2	Modified Tree (Carved or Scarred)
49-6-0001	Narrandera;	Modified Tree (Carved or Scarred)
48-5-0124	Hay State Forest 100	Conflict
49-4-0094	Murrumbidgee Valley National Park 9	Modified Tree (Carved or Scarred)
49-4-0104	DPSub ST19	Modified Tree (Carved or Scarred)
49-4-0105	DPSub ST18	Modified Tree (Carved or Scarred)
49-4-0107	DPSub ST16	Modified Tree (Carved or Scarred)
48-5-0132	Hay State Forest 106	Earth Mound
48-5-0208	Sandy Point 3.	Modified Tree (Carved or Scarred)
48-5-0209	Sandy Point 4	Modified Tree (Carved or Scarred)
48-5-0212	Bushy Bend-Sandy Point 2	Modified Tree (Carved or Scarred)
48-5-0430	HY-IF-001	Artefact
49-4-0218	DP-IF-005	Artefact
49-4-0222	DP-ST-006	Modified Tree (Carved or Scarred)
48-3-0039	Cooley Point Lagoon 19;Cooley Point Lagoon Reserve;	Earth Mound
49-5-0008	Tom Bullen Swamp 10;	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
49-5-0090	Tubbo Gravel Pitt 3	Modified Tree (Carved or Scarred)
48-5-0112	Barman Reserve 3	Earth Mound
48-5-0113	Barman Reserve 4	Earth Mound
48-5-0114	Barman Reserve 5	Earth Mound
48-5-0115	Barman Reserve 6	Earth Mound
48-5-0117	Barman Reserve 8	Earth Mound
48-3-0110	Gin Site Artefact Scatter	Artefact
49-5-0111	Cuba N/P 1	Modified Tree (Carved or Scarred)
49-4-0099	SPSub ST24	Modified Tree (Carved or Scarred)
49-4-0101	DPSub ST22	Modified Tree (Carved or Scarred)
49-4-0102	DPSub ST21	Modified Tree (Carved or Scarred)
49-4-0106	DPSub ST17	Modified Tree (Carved or Scarred)
49-4-0108	DPSub ST15	Modified Tree (Carved or Scarred)
49-4-0110	DPSub ST13	Modified Tree (Carved or Scarred)
48-3-0122	RivCott3	Potential Archaeological Deposit (PAD)
49-5-0121	Murrumbidgee Valley NP canoe tree 1	Modified Tree (Carved or Scarred)
48-6-0157	DP-IF-001	Artefact
48-6-0159	DP-IF-002	Artefact
49-4-0219	DP-ST-002	Modified Tree (Carved or Scarred)
49-4-0221	DP-ST-005	Modified Tree (Carved or Scarred)
48-3-0030	Cooley Point Lagoon 10;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0035	Cooley Point Lagoon 15;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0049	Cooley Point Lagoon 29;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0060	Cooley Point Lagoon 40;Cooley Point Lagoon Reserve;	Modified Tree (Carved or Scarred)
48-5-0046	Brandon's bend scarred tree 3	Modified Tree (Carved or Scarred)
48-5-0047	Brandon's bend scarred tree 4	Modified Tree (Carved or Scarred)
49-5-0054	Euroley Canoe Tree;Leeton;	Modified Tree (Carved or Scarred)
49-5-0087	Gudgel Creek;Irrigation Way;	Modified Tree (Carved or Scarred)
49-5-0092	Tubbo Gravel Pitt 5	Modified Tree (Carved or Scarred)
48-5-0119	Barman Reserve 10	Earth Mound
48-5-0121	Barman Reserve 12	Modified Tree (Carved or Scarred)
48-5-0123	Barman Reserve 14	Modified Tree (Carved or Scarred)
48-5-0125	Hay state forest 102	Modified Tree (Carved or Scarred)
49-5-0110	Cuba N/P	Modified Tree (Carved or Scarred)
49-4-0089	Murrumbidgee Valley National Park 4	Modified Tree (Carved or Scarred)
49-4-0092	Murrumbidgee Valley National Park 7	Modified Tree (Carved or Scarred)
49-4-0096	Murrumbidgee Valley National Park 11	Modified Tree (Carved or Scarred)
49-4-0100	DPSub ST23	Modified Tree (Carved or Scarred)
49-4-0103	DPSub ST20	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
49-5-0118	murrumbidgee valley grahams grave gt	Artefact
48-5-0191	Hay Bridge Canoe tree 1	Modified Tree (Carved or Scarred)
48-3-0042	Cooley Point Lagoon 22;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0046	Cooley Point Lagoon 26;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0047	Cooley Point Lagoon 27;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0057	Cooley Point Lagoon 37;Cooley Point Lagoon Reserve;	Modified Tree (Carved or Scarred)
48-5-0045	Brandon's bend Scarred Tree 2	Modified Tree (Carved or Scarred)
49-4-0009	Waddi;Darlington Point;	Modified Tree (Carved or Scarred)
48-5-0070	Sandy Point 1	Aboriginal Resource and Gathering
48-5-0102	Winilbe Stn Scarred Tree 1	Modified Tree (Carved or Scarred)
48-5-0103	Winilbe Stn Scarred Tree 2	Modified Tree (Carved or Scarred)
48-5-0120	Barman Reserve 11	Earth Mound
49-5-0107	Murrumbidgee valley NP Cuba	Modified Tree (Carved or Scarred)
49-4-0091	Murrumbidgee Valley National Park 6	Modified Tree (Carved or Scarred)
49-4-0093	Murrumbidgee Valley National Park 8	Modified Tree (Carved or Scarred)
49-4-0097	Cararbury TSR	Modified Tree (Carved or Scarred)
48-5-0128	Hay State Forest 101	Shell
48-5-0133	Hay State Forest 110	Modified Tree (Carved or Scarred)
49-5-0119	Murrumbidgee Valley NP scar tree 2	Modified Tree (Carved or Scarred)
49-4-0130	Bird Cage Rest Area	Artefact
49-4-0131	DPCOS ST6	Modified Tree (Carved or Scarred)
49-4-0207	Yarrada modified tree h	Modified Tree (Carved or Scarred)
48-6-0158	DP-AS-001	Artefact
48-3-0236	HY-IF-002	Artefact
48-3-0029	Cooley Point Lagoon 9;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0040	Cooley Point Lagoon 20;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0041	Cooley Point Lagoon 21;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0048	Cooley Point Lagoon 28;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0050	Cooley Point Lagoon 30;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0058	Cooley Point Lagoon 38;Cooley Point Lagoon Reserve;	Modified Tree (Carved or Scarred)
48-5-0026	Winilba	Modified Tree (Carved or Scarred)
48-5-0048	Brandon's bend scarred tree 5	Modified Tree (Carved or Scarred)
49-5-0007	Tom Bullen Swamp 11;	Modified Tree (Carved or Scarred)
49-5-0018	Tom Bullen swamp 17;	Artefact
49-5-0091	Tubbo Gravel Pitt 4	Modified Tree (Carved or Scarred)
48-5-0116	Barman Reserve 7	Earth Mound
48-5-0122	Barman Reserve 13	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
49-5-0106	Cuba	Modified Tree (Carved or Scarred)
49-5-0109	Murray Valley NP / Kooba	Modified Tree (Carved or Scarred)
49-4-0090	Murrumbidgee Valley National Park 5	Modified Tree (Carved or Scarred)
49-4-0095	Murrumbidgee Valley National Park 10	Modified Tree (Carved or Scarred)
49-5-0115	Murrumbidgee Nat Park 1	Modified Tree (Carved or Scarred)
48-5-0205	Bushy Bend-Sandy Point 5	Modified Tree (Carved or Scarred)
48-5-0206	Bushy Bend-Sandy Point 6	Modified Tree (Carved or Scarred)
48-5-0207	Sandy Point 2.	Modified Tree (Carved or Scarred)
49-4-0208	Yarrada modified tree g	Modified Tree (Carved or Scarred)
49-4-0214	Yarrada modified tree	Modified Tree (Carved or Scarred)
48-3-0036	Cooley Point Lagoon 16;Cooley Point Lagoon Reserve;	Modified Tree (Carved or Scarred)
48-3-0043	Cooley Point Lagoon 23;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0045	Cooley Point Lagoon 25;Cooley Point Lagoon Reserve;	Earth Mound
48-3-0063	Cooley Point Lagoon 43;Cooley Point Lagoon Reserve;	Modified Tree (Carved or Scarred)
48-5-0003	Hay	Artefact
49-5-0003	Tom Bullen Swamp 15;	Modified Tree (Carved or Scarred)
49-5-0004	Tom Bullen Swamp 14;	Modified Tree (Carved or Scarred)
49-5-0039	Tubbo;	Modified Tree (Carved or Scarred)
49-5-0059	Tubbo;Bareena Creek No. O-Y4;	Artefact
49-5-0089	Tubbo Gravel Pitt 1	Modified Tree (Carved or Scarred)
49-5-0093	Tubbo Gravel Pitt 6	Modified Tree (Carved or Scarred)
49-5-0094	Tubbo Gravel Pitt 7	Modified Tree (Carved or Scarred)
49-6-0030	Poisoned Waterholes Creek Massacre	Conflict

Section 3: Hay to Balranald

SITE_ID	SITE_NAME	FEATURE_TY
47-6-0748	WA-ST4 (West Abercrombie Scarred Tree 4)	Modified Tree (Carved or Scarred)
48-5-0210	Bushy Bend/ Sandy Point 4.	Modified Tree (Carved or Scarred)
48-4-0413	Glenmea 010	Artefact
48-4-0422	Glenmea 055	Artefact
48-5-0239	Pevensy 021	Artefact
48-4-0468	KE-IF-003	Artefact
48-5-0428	KE-ST-002	Modified Tree (Carved or Scarred)
48-5-0429	KE-IF-005	Artefact
47-6-0027	YC1;Yanga Creek;	Modified Tree (Carved or Scarred)
47-6-0051	balranald levee 7	Shell
47-6-0052	police paddocks 3	Modified Tree (Carved or Scarred)
47-6-0107	Horse 5	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
47-6-0115	Horse 11	Burial
47-6-0116	Cultivation Bridge 1	Modified Tree (Carved or Scarred)
47-6-0120	Yanga lake-1	Modified Tree (Carved or Scarred)
47-6-0176	Horse 22	Modified Tree (Carved or Scarred)
47-6-0196	Horse 26	Modified Tree (Carved or Scarred)
47-6-0201	Horse 31	Modified Tree (Carved or Scarred)
47-6-0274	Horse 50	Modified Tree (Carved or Scarred)
47-6-0281	Horse 57	Modified Tree (Carved or Scarred)
47-6-0284	Horse 60	Modified Tree (Carved or Scarred)
47-6-0291	Horse 67	Modified Tree (Carved or Scarred)
47-6-0298	Horse 74	Modified Tree (Carved or Scarred)
47-6-0301	Horse 77	Modified Tree (Carved or Scarred)
47-6-0314	East Breeding	Hearth
47-6-0317	10 Mile 1	Hearth
47-6-0320	South Breeding 1	Burial
47-6-0325	10 Mile 3	Hearth
47-6-0329	Yanga lake 2	Modified Tree (Carved or Scarred)
47-6-0332	Yanga lake 5	Modified Tree (Carved or Scarred)
47-6-0335	Yanga lake 8	Modified Tree (Carved or Scarred)
47-6-0350	Yanga lake 24	Modified Tree (Carved or Scarred)
47-6-0376	Yanga Lake 48	Modified Tree (Carved or Scarred)
47-6-0390	North Impima 8	Hearth
48-4-0094	Waimea Downs 4	Burial
48-5-0017	North Bank Murrumbidgee;	Earth Mound
48-5-0050	Hay TSR 1	Modified Tree (Carved or Scarred)
48-5-0134	Hay State Forest 111	Modified Tree (Carved or Scarred)
47-6-0757	WA-OS8 (West Abercrombie Open Site 8)	Artefact
47-6-0768	WA-OS15 (West Abercrombie Open Site 15)	Artefact
47-6-0771	WA-OS32 (West Abercrombie Open Site 32)	Artefact
48-5-0192	Hay Bridge Ring tree 1	Modified Tree (Carved or Scarred)
48-5-0211	Bushy Bend/ Sandy Point 3.	Modified Tree (Carved or Scarred)
47-6-0846	Yanga-AWEP-OS2 (YA-AWEP-OS2)	Artefact
48-4-0403	Glenmea 019	Artefact
48-4-0412	Glenmea 011	Artefact
48-4-0415	Glenmea 009	Artefact
48-5-0237	Pevensey 019	Hearth
47-6-0018	Holmdale 2;	Burial
47-6-0022	Yanga Creek #2;	Modified Tree (Carved or Scarred)
47-6-0104	Horse 2	Modified Tree (Carved or Scarred)
47-6-0117	Horse 12	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
47-6-0124	Yanga lake-5	Modified Tree (Carved or Scarred)
47-6-0170	Horse 16	Modified Tree (Carved or Scarred)
47-6-0195	Horse 25	Modified Tree (Carved or Scarred)
47-6-0198	Horse 28	Modified Tree (Carved or Scarred)
47-6-0207	Horse 37	Modified Tree (Carved or Scarred)
47-6-0211	Horse 41	Modified Tree (Carved or Scarred)
47-6-0283	Horse 59	Modified Tree (Carved or Scarred)
47-6-0290	Horse 66	Modified Tree (Carved or Scarred)
47-6-0292	Horse 68	Modified Tree (Carved or Scarred)
47-6-0293	Horse 69	Modified Tree (Carved or Scarred)
47-6-0297	Horse 73	Modified Tree (Carved or Scarred)
47-6-0339	Yanga lake 12	Modified Tree (Carved or Scarred)
47-6-0346	Yanga lake 19	Modified Tree (Carved or Scarred)
47-6-0349	Yanga lake 22	Modified Tree (Carved or Scarred)
48-4-0042	TOOG 50;TOOGIMBIE;	Artefact
47-6-0608	Balranald Common Canoe Tree 1	Modified Tree (Carved or Scarred)
48-5-0135	MUNG1501	Hearth
48-4-0409	Glenmea 014	Artefact
48-4-0424	Glenmea 002	Hearth
48-4-0447	Shear Outback 1	Artefact
47-6-0002	Balranald Mission Cemetery and Island	Aboriginal Ceremony and Dreaming
47-6-0021	Yanga Creek #3;	Modified Tree (Carved or Scarred)
47-6-0047	balranald levee 6	Shell
47-6-0103	Horse 1	Modified Tree (Carved or Scarred)
47-6-0108	Horse6	Modified Tree (Carved or Scarred)
47-6-0121	Yanga lake-2	Modified Tree (Carved or Scarred)
47-6-0122	Yanga lak-3	Modified Tree (Carved or Scarred)
47-6-0204	Horse 34	Modified Tree (Carved or Scarred)
47-6-0209	Horse 39	Modified Tree (Carved or Scarred)
47-6-0278	Horse 54	Modified Tree (Carved or Scarred)
47-6-0294	Horse 70	Modified Tree (Carved or Scarred)
47-6-0343	Yanga lake 16	Modified Tree (Carved or Scarred)
47-6-0345	Yanga lake 18	Modified Tree (Carved or Scarred)
48-5-0012	South Bank Murrumbidgee;Mungadal;	Modified Tree (Carved or Scarred)
48-5-0124	Hay State Forest 100	Conflict
48-5-0132	Hay State Forest 106	Earth Mound
48-4-0187	Newmarket Mound 2	Artefact
48-5-0208	Sandy Point 3.	Modified Tree (Carved or Scarred)
48-5-0209	Sandy Point 4	Modified Tree (Carved or Scarred)
48-5-0212	Bushy Bend-Sandy Point 2	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
48-4-0405	Glenmea 018	Hearth
48-4-0406	Glenmea 017	Artefact
48-4-0414	Glenmea 008	Burial
48-5-0240	Pevensy 022	Hearth
48-4-0433	Glenmea 037	Burial
48-4-0448	Shear Outback 3	Artefact
48-4-0467	KE-IF-002	Artefact
47-6-0016	Muhti Muhti Reserve Midden;	Earth Mound
47-6-0025	Yanga Creek Midden 2;YCM-2;	Earth Mound
47-6-0050	balranald levee 8	Modified Tree (Carved or Scarred)
47-6-0058	Yanga creek mound 1	Earth Mound
47-6-0109	Horse 7	Modified Tree (Carved or Scarred)
47-6-0174	Horse 20	Modified Tree (Carved or Scarred)
47-6-0212	Horse 42	Modified Tree (Carved or Scarred)
47-6-0213	Horse 43	Modified Tree (Carved or Scarred)
47-6-0277	Horse 53	Modified Tree (Carved or Scarred)
47-6-0286	Horse 62	Modified Tree (Carved or Scarred)
47-6-0296	Horse 72	Modified Tree (Carved or Scarred)
47-6-0300	Horse 76	Modified Tree (Carved or Scarred)
47-6-0322	East Breeding 3	Burial
47-6-0333	Yanga lake 6	Modified Tree (Carved or Scarred)
47-6-0338	Yanga lake 11	Modified Tree (Carved or Scarred)
47-6-0341	Yanga lake 14	Modified Tree (Carved or Scarred)
47-6-0347	Yanga lake 20	Modified Tree (Carved or Scarred)
47-6-0348	Yanga lake 21	Modified Tree (Carved or Scarred)
47-6-0362	Yanga Lake 38	Modified Tree (Carved or Scarred)
48-4-0073	Pethers 1;Ravensworth;	Earth Mound
48-5-0019	Benduck;	Earth Mound
48-4-0194	Berawinnia 1	Artefact
47-6-0756	WA-OS6 (West Abercrombie Open Site 6)	Earth Mound
47-6-0759	WA-OS7 (West Abercrombie Open Site 7)	Burial
48-5-0230	Pevensy 018	Hearth
48-5-0238	Pevensy 020	Hearth
48-4-0466	KE-AS-001	Artefact
47-6-0003	Balranald Dippo Ceremonial Ground	Ceremonial Ring (Stone or Earth)
47-6-0038	YANGA CREEK POISON TREES	Modified Tree (Carved or Scarred)
47-6-0053	police paddocks 2	Modified Tree (Carved or Scarred)
47-6-0112	hhims - old car	Artefact
47-6-0114	Horse 10	Modified Tree (Carved or Scarred)
47-6-0119	Horse 14	Burial

SITE_ID	SITE_NAME	FEATURE_TY
47-6-0169	Horse 15	Modified Tree (Carved or Scarred)
47-6-0177	Horse 23	Hearth
47-6-0200	Horse 30	Modified Tree (Carved or Scarred)
47-6-0210	Horse 40	Modified Tree (Carved or Scarred)
47-6-0214	Horse 44	Modified Tree (Carved or Scarred)
47-6-0275	Horse 51	Modified Tree (Carved or Scarred)
47-6-0276	Horse 52	Modified Tree (Carved or Scarred)
47-6-0280	Horse 56	Modified Tree (Carved or Scarred)
47-6-0285	Horse 61	Modified Tree (Carved or Scarred)
47-6-0313	South Breeding	Hearth
47-6-0315	10 Mile	Burial
47-6-0318	South Breeding 2	Hearth
47-6-0319	South Breeding 3	Hearth
47-6-0328	Yanga lake 1	Shell
47-6-0337	Yanga lake 10	Modified Tree (Carved or Scarred)
47-6-0361	Yanga Lake 37	Modified Tree (Carved or Scarred)
47-6-0377	Yanga Lake 49	Modified Tree (Carved or Scarred)
47-6-0391	North Impima 9	Hearth
48-5-0125	Hay state forest 102	Modified Tree (Carved or Scarred)
48-5-0191	Hay Bridge Canoe tree 1	Modified Tree (Carved or Scarred)
47-6-0810	Yanga – AWEP – Open Site 11 (YA-AWEP-OS11)	Hearth
48-5-0227	Pevensey 002	Artefact
48-4-0421	Glenmea 001	Artefact
48-4-0428	Glenmea 038	Artefact
48-4-0432	Glenmea 036	Artefact
48-4-0449	Shear Outback 2	Artefact
47-6-0008	Balranald Mission	Earth Mound
47-6-0023	Yanga Creek #1;	Modified Tree (Carved or Scarred)
47-6-0044	balranald levee 5	Modified Tree (Carved or Scarred)
47-6-0105	Horse 3	Modified Tree (Carved or Scarred)
47-6-0106	Horse 4	Modified Tree (Carved or Scarred)
47-6-0118	Horse 13	Modified Tree (Carved or Scarred)
47-6-0172	Horse 18	Modified Tree (Carved or Scarred)
47-6-0178	Horse 24	Hearth
47-6-0197	Horse 27	Modified Tree (Carved or Scarred)
47-6-0202	Horse 32	Modified Tree (Carved or Scarred)
47-6-0205	Horse 35	Modified Tree (Carved or Scarred)
47-6-0273	Horse 49	Modified Tree (Carved or Scarred)
47-6-0279	Horse 55	Modified Tree (Carved or Scarred)
47-6-0289	Horse 65	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
47-6-0295	Horse 71	Modified Tree (Carved or Scarred)
47-6-0324	Ten Mile 1	Burial
47-6-0336	Yanga lake 9	Modified Tree (Carved or Scarred)
47-6-0363	Yanga Lake 39	Modified Tree (Carved or Scarred)
48-1-0020	Waimea Downs 2	Burial
48-5-0051	Hay TSR 2	Modified Tree (Carved or Scarred)
48-5-0052	Hay TSR 3	Modified Tree (Carved or Scarred)
48-5-0070	Sandy Point 1	Aboriginal Resource and Gathering
48-5-0128	Hay State Forest 101	Shell
48-5-0133	Hay State Forest 110	Modified Tree (Carved or Scarred)
47-6-0755	WA-OS5 (West Abercrombie Open Site 5)	Artefact
48-4-0425	Glenmea 003	Artefact
48-4-0434	Glenmea 039	Artefact
52-5-0870	Hay Isolated 1	Artefact
48-4-0465	KE-IF-001	Artefact
48-5-0426	KE-IF-004	Artefact
48-5-0427	KE-ST-001	Modified Tree (Carved or Scarred)
47-6-0026	Yanga Creek Scarred Tree-4;YCST-4;	Modified Tree (Carved or Scarred)
47-6-0030	YC 3;Yanga Creek;	Modified Tree (Carved or Scarred)
47-6-0110	hhims yanga rubbish dump	Artefact
47-6-0123	Yanga lake-4	Modified Tree (Carved or Scarred)
47-6-0175	Horse 21	Modified Tree (Carved or Scarred)
47-6-0199	Horse 29	Modified Tree (Carved or Scarred)
47-6-0206	Horse 36	Modified Tree (Carved or Scarred)
47-6-0208	Horse 38	Modified Tree (Carved or Scarred)
47-6-0215	Horse 45	Modified Tree (Carved or Scarred)
47-6-0282	Horse 58	Modified Tree (Carved or Scarred)
47-6-0288	Horse 64	Modified Tree (Carved or Scarred)
47-6-0302	Horse 78	Modified Tree (Carved or Scarred)
47-6-0331	Yanga lake 4	Modified Tree (Carved or Scarred)
47-6-0340	Yanga lake 13	Modified Tree (Carved or Scarred)
47-6-0342	Yanga lake 15	Modified Tree (Carved or Scarred)
47-6-0344	Yanga lake 17	Modified Tree (Carved or Scarred)
48-4-0083	WAIMEA DOWNS	Burial
48-5-0205	Bushy Bend-Sandy Point 5	Modified Tree (Carved or Scarred)
48-5-0206	Bushy Bend-Sandy Point 6	Modified Tree (Carved or Scarred)
48-4-0388	South Farm 019	Artefact
48-4-0407	Glenmea 016	Artefact
48-4-0469	KE-IF-006	Artefact
47-6-0015	Police Paddock Scarred Tree;	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
47-6-0017	Holmdale 1;	Burial
47-6-0024	Yanga Creek 1;YC-1;	Earth Mound
47-6-0028	YC2;Yanga Creek;	Modified Tree (Carved or Scarred)
47-6-0111	Horse 8	Modified Tree (Carved or Scarred)
47-6-0113	Horse 9	Modified Tree (Carved or Scarred)
47-6-0171	Horse 17	Modified Tree (Carved or Scarred)
47-6-0173	Horse 19	Modified Tree (Carved or Scarred)
47-6-0203	Horse 33	Modified Tree (Carved or Scarred)
47-6-0287	Horse 63	Modified Tree (Carved or Scarred)
47-6-0299	Horse 75	Modified Tree (Carved or Scarred)
47-6-0316	East Breeding 1	Hearth
47-6-0321	East Breeding 4	Burial
47-6-0323	East Breeding2	Burial
47-6-0330	Yanga lake 3	Modified Tree (Carved or Scarred)
47-6-0334	Yanga lake 7	Modified Tree (Carved or Scarred)
47-6-0364	Yanga Lake 40	Modified Tree (Carved or Scarred)
47-6-0365	Yanga Lake 41	Modified Tree (Carved or Scarred)
47-6-0370	Yanga Lake 45	Modified Tree (Carved or Scarred)
47-6-0378	Yanga Lake 50	Modified Tree (Carved or Scarred)
47-6-0379	Yanga Lake 51	Modified Tree (Carved or Scarred)
48-1-0019	Waimea Downs 5	Burial
48-4-0027	TOOG 25-27, 49;TOOGIMBIE;	Artefact
48-4-0084	Waimea Downs3	Earth Mound
48-5-0003	Hay	Artefact

Section 4: Balranald to Euston

SITE_ID	SITE_NAME	FEATURE_TY
47-4-0172	Euston Regional Park 6	Modified Tree (Carved or Scarred)
47-4-0173	Euston Regional Park 7	Modified Tree (Carved or Scarred)
47-4-0324	Euston Floodplain 1	Artefact
47-6-0051	balranald levee 7	Shell
47-6-0052	police paddocks 3	Modified Tree (Carved or Scarred)
47-4-0328	Lake Benanee	Burial
47-5-0003	Balranald;	Modified Tree (Carved or Scarred)
47-4-0149	Lake Benanee 19	Artefact
47-6-0608	Balranald Common Canoe Tree 1	Modified Tree (Carved or Scarred)
47-4-0015	Euston Club 3	Modified Tree (Carved or Scarred)
47-6-0002	Balranald Mission Cemetery and Island	Aboriginal Ceremony and Dreaming
47-6-0047	balranald levee 6	Shell
47-4-0174	Euston Regional Park 8	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
47-4-0325	Euston shield tree	Modified Tree (Carved or Scarred)
47-4-0329	Lake Benanee Scatter 1	Artefact
47-4-0003	Lake Benanee;Robinvale;	Burial
47-4-0019	Dry Lake north 01	Shell
47-4-0021	Lake Benanee Burials 6	Burial
47-6-0016	Muhti Muhti Reserve Midden;	Earth Mound
47-6-0050	balranald levee 8	Modified Tree (Carved or Scarred)
47-6-0058	Yanga creek mound 1	Earth Mound
47-4-0166	Euston Regional Park	Modified Tree (Carved or Scarred)
47-5-0007	Transmission Line 2	Artefact
47-4-0016	Showground Scarred Tree	Modified Tree (Carved or Scarred)
47-6-0053	police paddocks 2	Modified Tree (Carved or Scarred)
47-4-0327	Euston shell midden	Shell
47-6-0008	Balranald Mission	Earth Mound
47-6-0044	balranald levee 5	Modified Tree (Carved or Scarred)
47-4-0176	Euston Regional Park 10	Modified Tree (Carved or Scarred)
47-4-0331	BU-IF-001	Artefact
47-4-0012	Lake Benanee Burial 3;	Burial
47-4-0020	Lake Benanee Burials 4	Artefact
47-4-0022	Lake Benanee Burials 5	Artefact
47-4-0148	Lake Benanee 18	Artefact
47-4-0175	Euston Regional Park 9	Modified Tree (Carved or Scarred)
47-4-0178	Euston REgional Park 11	Modified Tree (Carved or Scarred)
47-4-0261	Euston Regional Park 119	Modified Tree (Carved or Scarred)
47-4-0326	Euston canoe tree	Modified Tree (Carved or Scarred)
47-4-0023	Dry Lake Midden 1	Ceremonial Ring (Stone or Earth)
47-6-0015	Police Paddock Scarred Tree;	Modified Tree (Carved or Scarred)
47-4-0031	Billa Downs 26	Habitation Structure

Section 5: Euston to Buronga

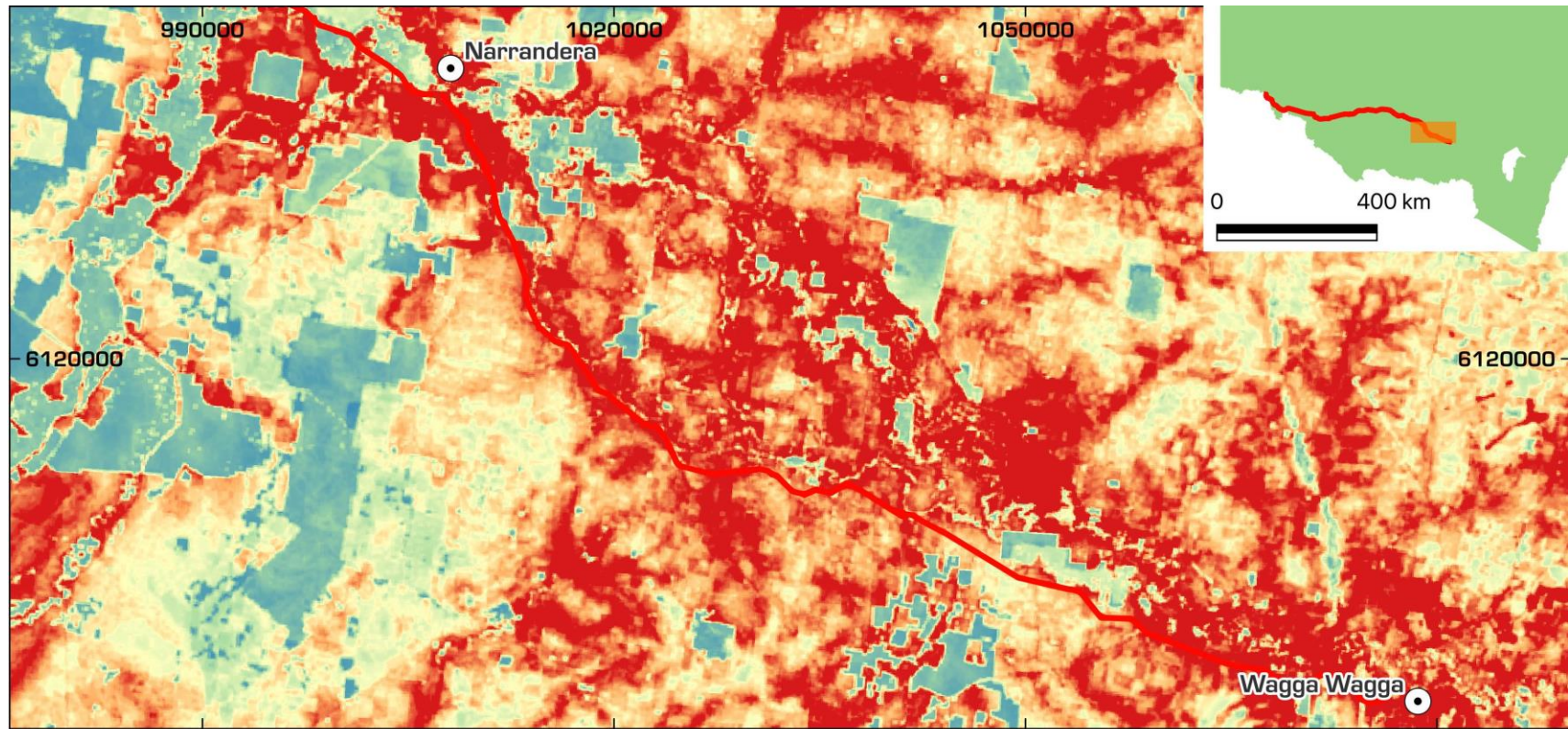
SITE_ID	SITE_NAME	FEATURE_TY
47-4-0172	Euston Regional Park 6	Modified Tree (Carved or Scarred)
47-4-0173	Euston Regional Park 7	Modified Tree (Carved or Scarred)
47-4-0324	Euston Floodplain 1	Artefact
47-6-0051	balranald levee 7	Shell
47-6-0052	police paddocks 3	Modified Tree (Carved or Scarred)
47-4-0328	Lake Benanee	Burial
47-5-0003	Balranald;	Modified Tree (Carved or Scarred)
47-4-0149	Lake Benanee 19	Artefact
47-6-0608	Balranald Common Canoe Tree 1	Modified Tree (Carved or Scarred)

SITE_ID	SITE_NAME	FEATURE_TY
47-4-0015	Euston Club 3	Modified Tree (Carved or Scarred)
47-6-0002	Balranald Mission Cemetery and Island	Aboriginal Ceremony and Dreaming
47-6-0047	balranald levee 6	Shell
47-4-0174	Euston Regional Park 8	Modified Tree (Carved or Scarred)
47-4-0325	Euston shield tree	Modified Tree (Carved or Scarred)
47-4-0329	Lake Benanee Scatter 1	Artefact
47-4-0003	Lake Benanee;Robinvale;	Burial
47-4-0019	Dry Lake north 01	Shell
47-4-0021	Lake Benanee Burials 6	Burial
47-6-0016	Muhti Muhti Reserve Midden;	Earth Mound
47-6-0050	balranald levee 8	Modified Tree (Carved or Scarred)
47-6-0058	Yanga creek mound 1	Earth Mound
47-4-0166	Euston Regional Park	Modified Tree (Carved or Scarred)
47-5-0007	Transmission Line 2	Artefact
47-4-0016	Showground Scarred Tree	Modified Tree (Carved or Scarred)
47-6-0053	police paddocks 2	Modified Tree (Carved or Scarred)
47-4-0327	Euston shell midden	Shell
47-6-0008	Balranald Mission	Earth Mound
47-6-0044	balranald levee 5	Modified Tree (Carved or Scarred)
47-4-0176	Euston Regional Park 10	Modified Tree (Carved or Scarred)
47-4-0331	BU-IF-001	Artefact
47-4-0012	Lake Benanee Burial 3;	Burial
47-4-0020	Lake Benanee Burials 4	Artefact
47-4-0022	Lake Benanee Burials 5	Artefact
47-4-0148	Lake Benanee 18	Artefact
47-4-0175	Euston Regional Park 9	Modified Tree (Carved or Scarred)
47-4-0178	Euston REgional Park 11	Modified Tree (Carved or Scarred)
47-4-0261	Euston Regional Park 119	Modified Tree (Carved or Scarred)
47-4-0326	Euston canoe tree	Modified Tree (Carved or Scarred)
47-4-0023	Dry Lake Midden 1	Ceremonial Ring (Stone or Earth)
47-6-0015	Police Paddock Scarred Tree;	Modified Tree (Carved or Scarred)
47-4-0031	Billa Downs 26	Habitation Structure

Search results from NSW State Heritage Inventory and Australian Heritage Register

Type of listing	Site name	Location	Site Type	Within study area
Aboriginal Place	Bomen Axe Quarry	Bomen Nsw 2650	Complex / Group	no
Aboriginal Place	Bomen Lagoon	North Wagga Wagga NSW 2650	Complex / Group	no
Aboriginal Place	Flowerdale Lagoon	Wagga Wagga NSW 2650	Complex / Group	no
Aboriginal Place	Wiradjuri Reserve and Gobba Beach	Wagga Wagga NSW 2650	Complex / Group	no
Aboriginal Place	Wollundry Lagoon and Tony Ireland Park	Wagga Wagga NSW 2650	Complex / Group	no
none	Koonadan	Leeton NSW 2705	Complex / Group	no
Aboriginal Place	Koonadan Aboriginal Place	Leeton NSW 2705	Archaeological-Terrestrial	no
LEP	Warangesda Aboriginal Mission and Station	Darlington Point NSW 2706	Landscape	no
SHR	Old Warrangesda Mission	Darlington Point NSW 2706	Complex / Group	no
LEP	Waddie Creek Scarred Trees	Darlington Point NSW 2706	Archaeological-Terrestrial	no
LEP	Nap Nap Burial Ground	Hay NSW 2711	Complex / Group	no
Aboriginal Place	Toogimbie Burial Ground	Maude NSW 2711	Complex / Group	no
Aboriginal Place	Algeboia earth mound	Mathoura NSW 2710	Complex / Group	no
Aboriginal Place	Dippo Ceremonial Ground	Balranald NSW 2715	Complex / Group	no
Aboriginal Place	Aboriginal Cemetery	Balranald NSW 2715	Archaeological-Terrestrial	no
LEP	Dippo Ceremonial Ground	Balranald NSW 2715	Archaeological-Terrestrial	no
LEP	Fish Traps	Murrumbidgee River, Balranald NSW 2715	Archaeological-Terrestrial	no
LEP	Mount Dispersion Massacre Site Aboriginal Place	Tapalin Mail Road Euston NSW 2737	Landscape	no
Aboriginal Place	Aboriginal Site	Dareton NSW 2717	Archaeological-Terrestrial	no
LEP	Willandra Lakes	120 Km North Of BALRANALD NSW 2715	Archaeological-Terrestrial	no
LEP	Willandra Lakes Region	Arumpo Mungo National Park Rd, Robinvale NSW	Cultural landscape	no
National Heritage Register	Willandra Lakes Region	Arumpo Mungo National Park Rd, Robinvale NSW	Outstanding cultural and natural universal values	no
World Heritage List	Willandra Lakes Region	Arumpo Mungo National Park Rd, Robinvale NSW	Outstanding cultural and natural universal values	no


APPENDIX 2 - PREDICTIVE MAPPING FROM ABORIGINAL SITE DECISION SUPPORT TOOL



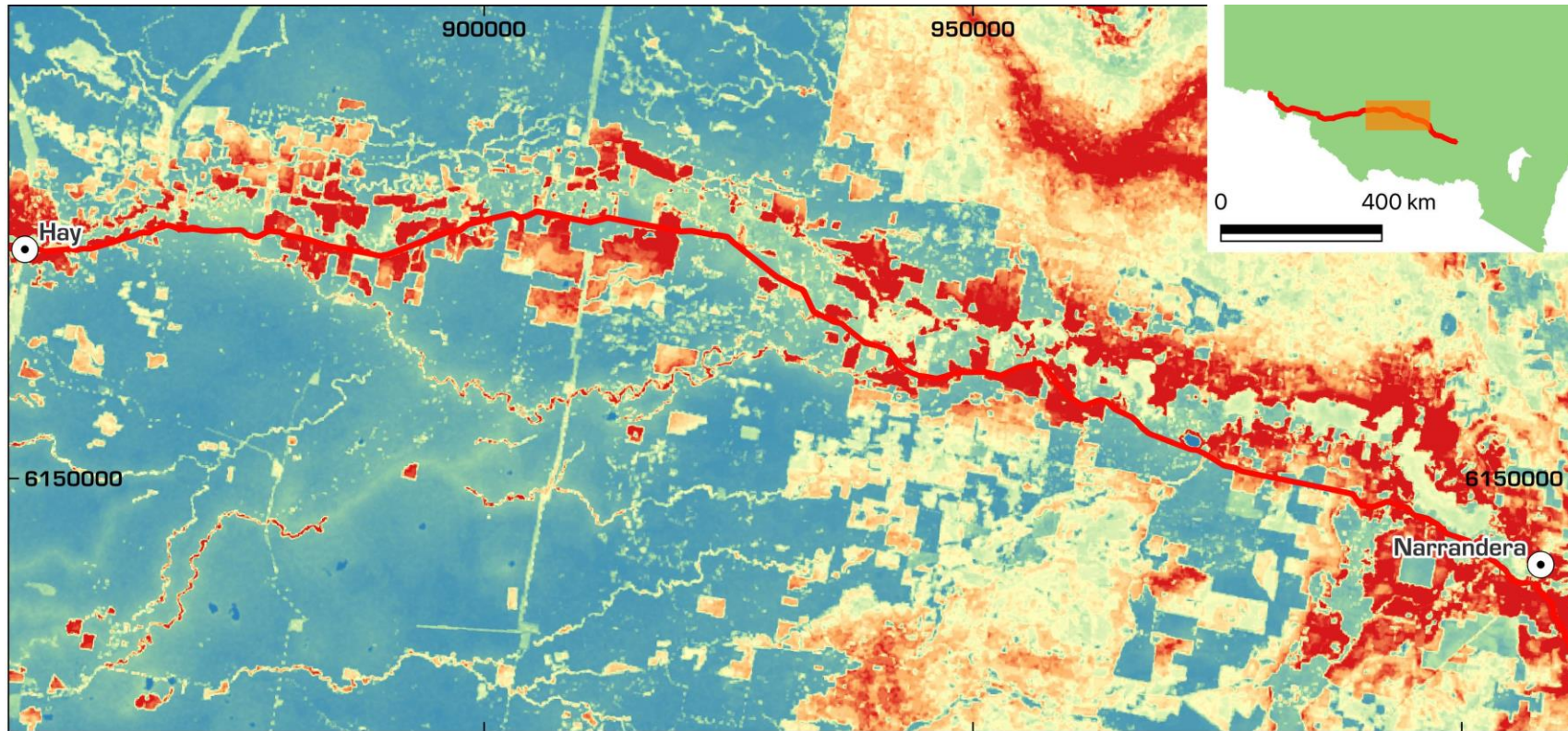
Sturt Highway Accumulated Impacts - Section 1



Legend

-  Study Area
- ASDST Modelling






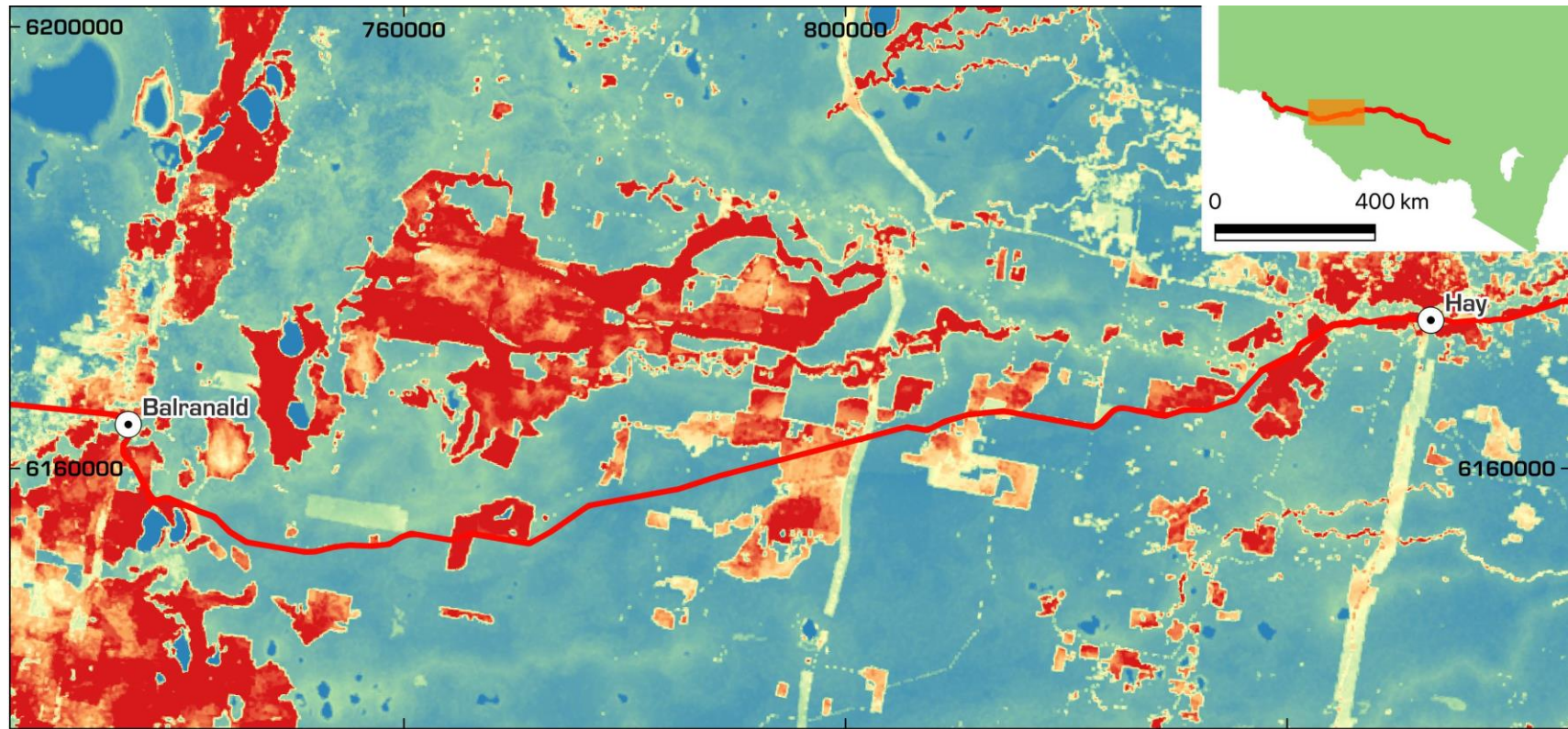
Sturt Highway Accumulated Impacts - Section 2



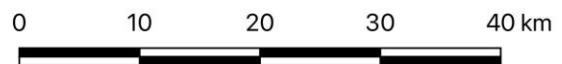
Legend

-  Study Area
- ASDST Modelling





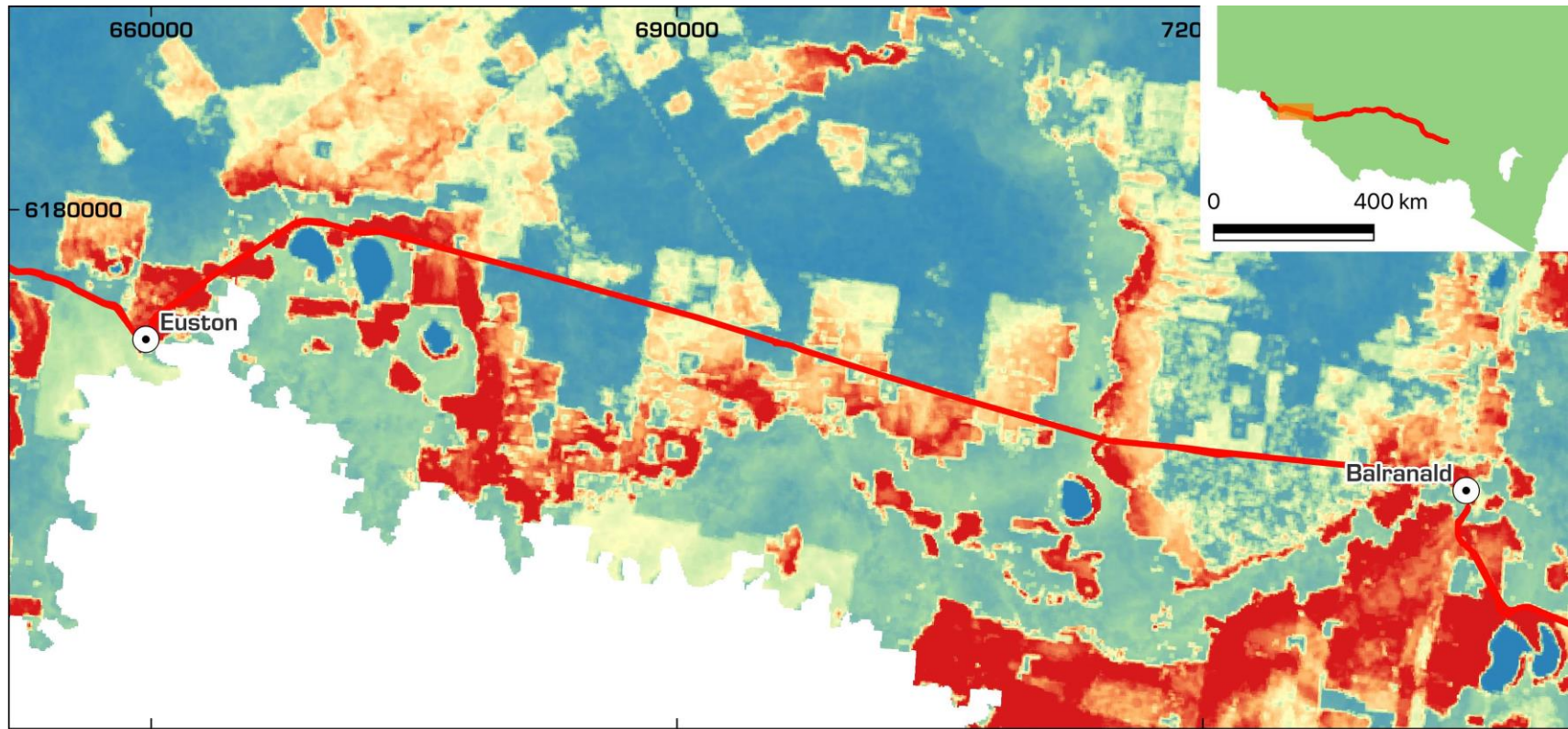
Sturt Highway Accumulated Impacts - Section 3



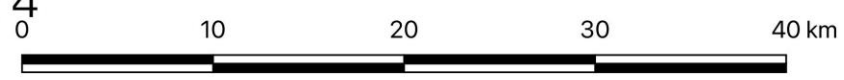
Legend

- Study Area
- ASDST Modelling






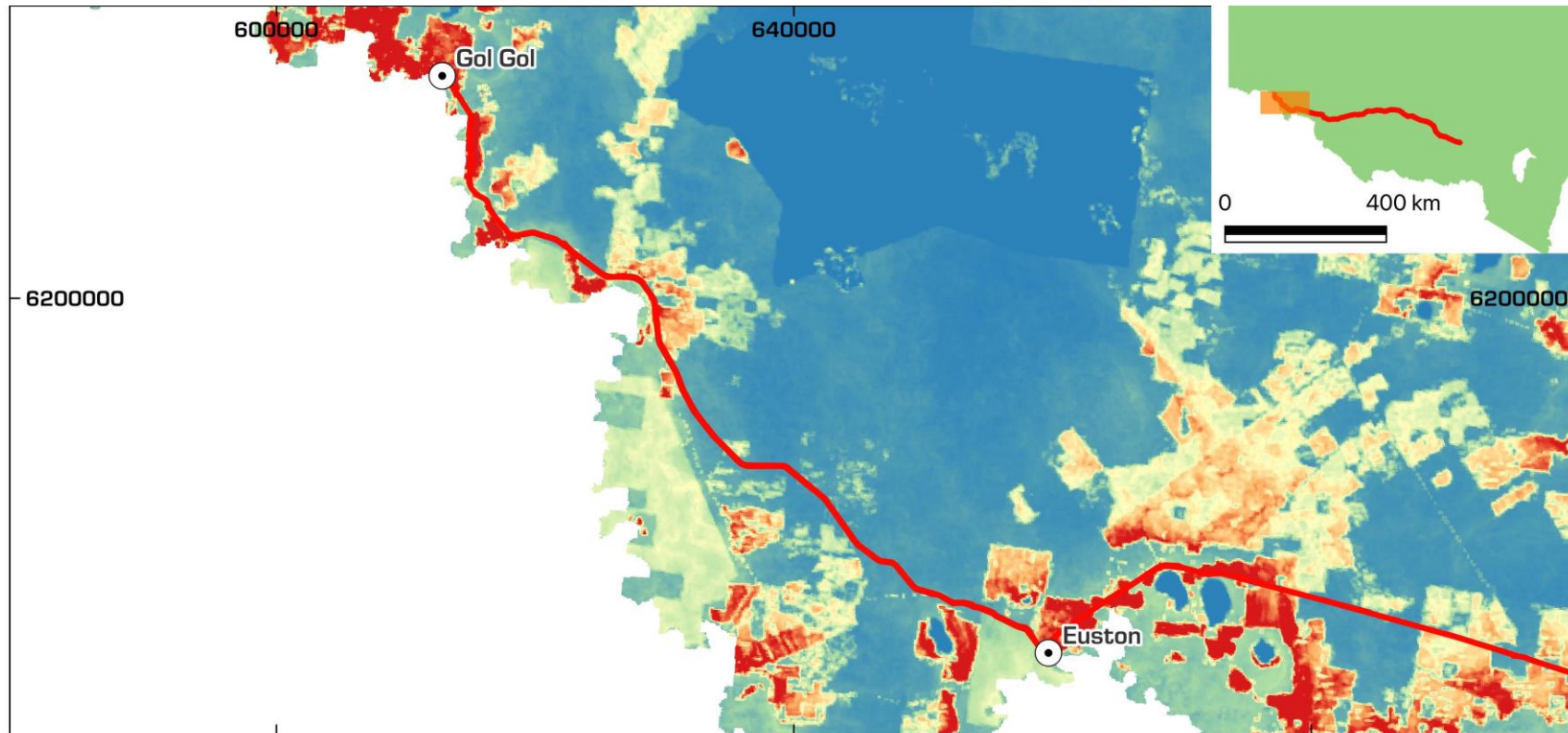
Sturt Highway Accumulated Impacts - Section 4



Legend

-  Study Area
- ASDST Modelling





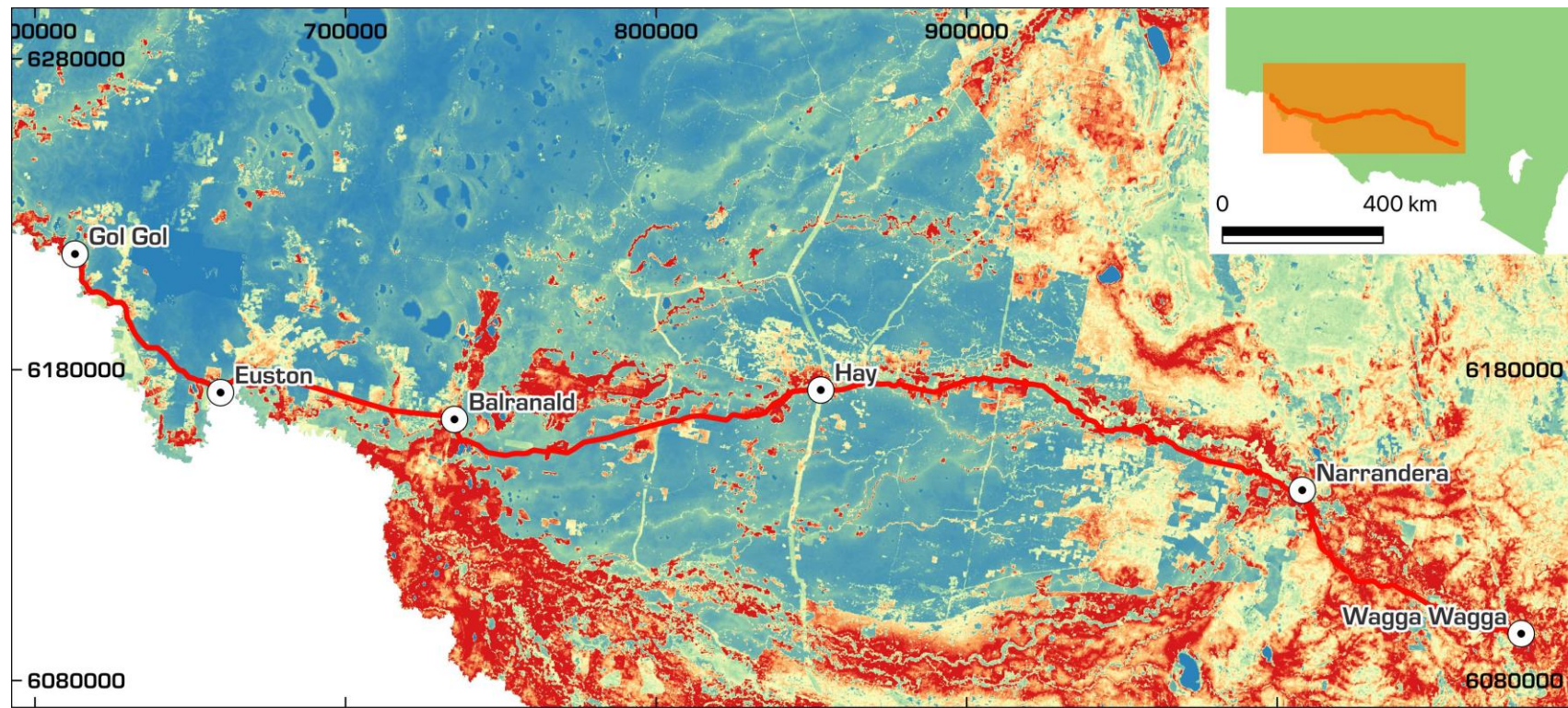
Sturt Highway Accumulated Impacts - Section 5



Legend

- Study Area
- ASDST Modelling



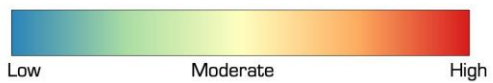


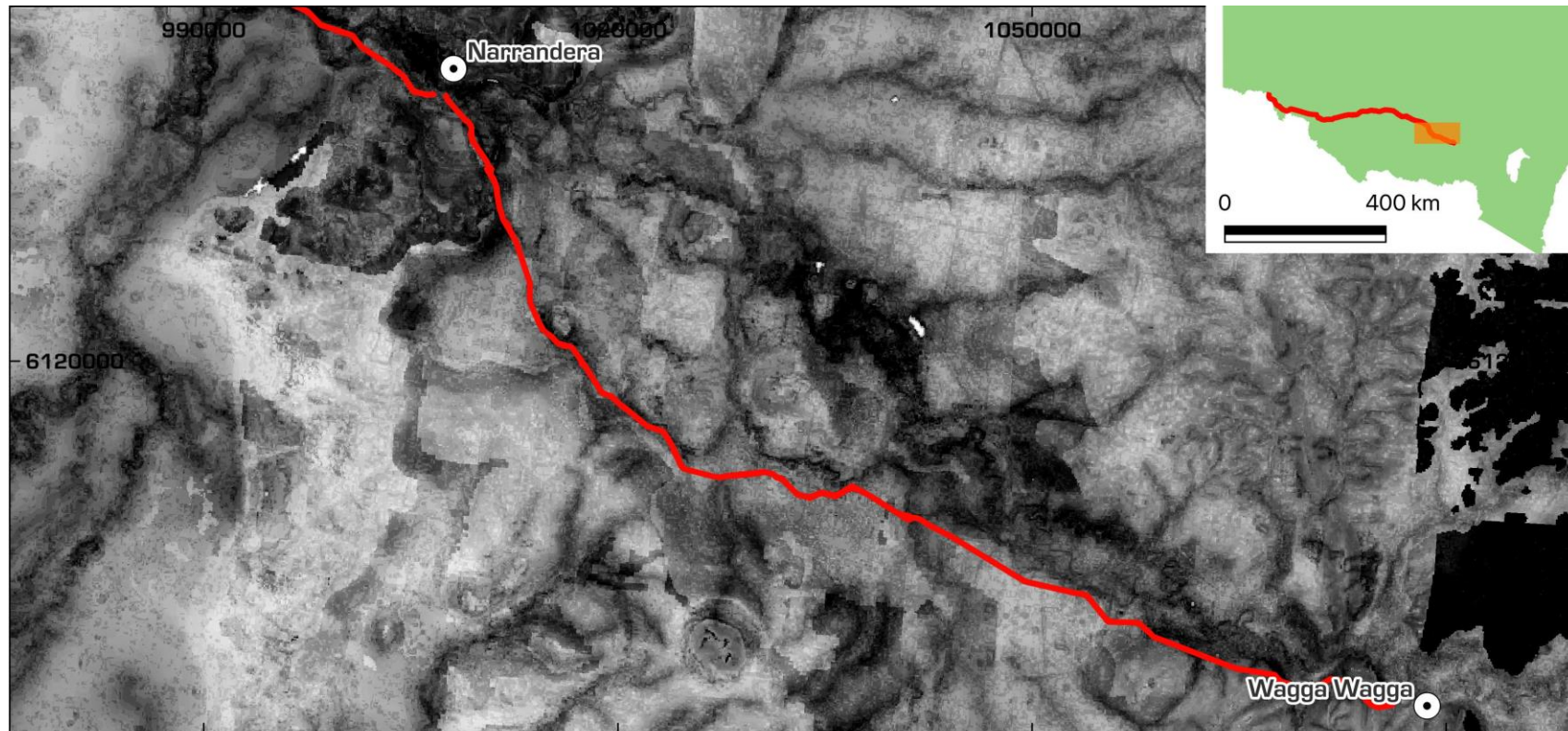
Sturt Highway Accumulated Impacts - Overview



Legend

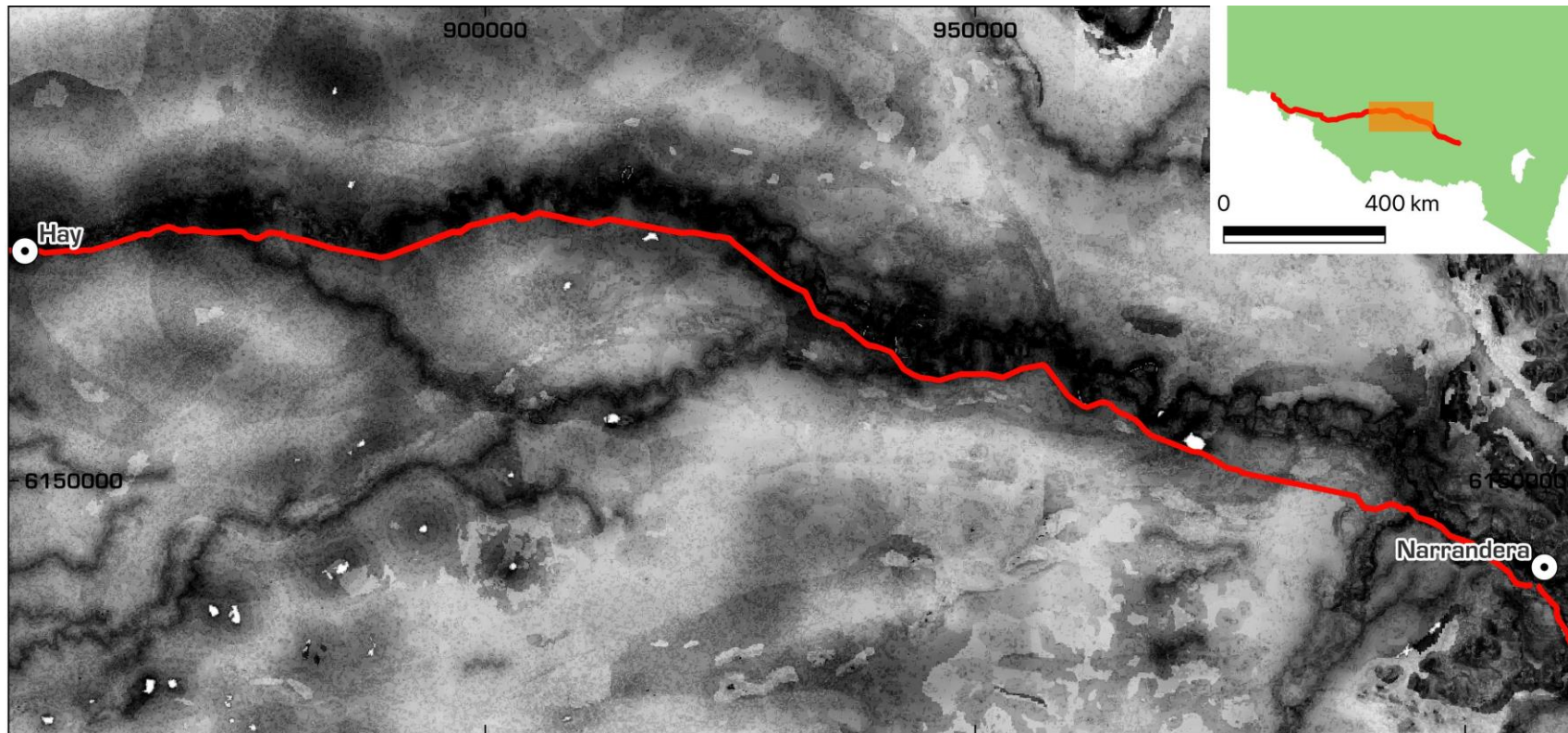
- Study Area
- ASDST Modelling






Sturt Highway ASDST All Features Combined - Section 1



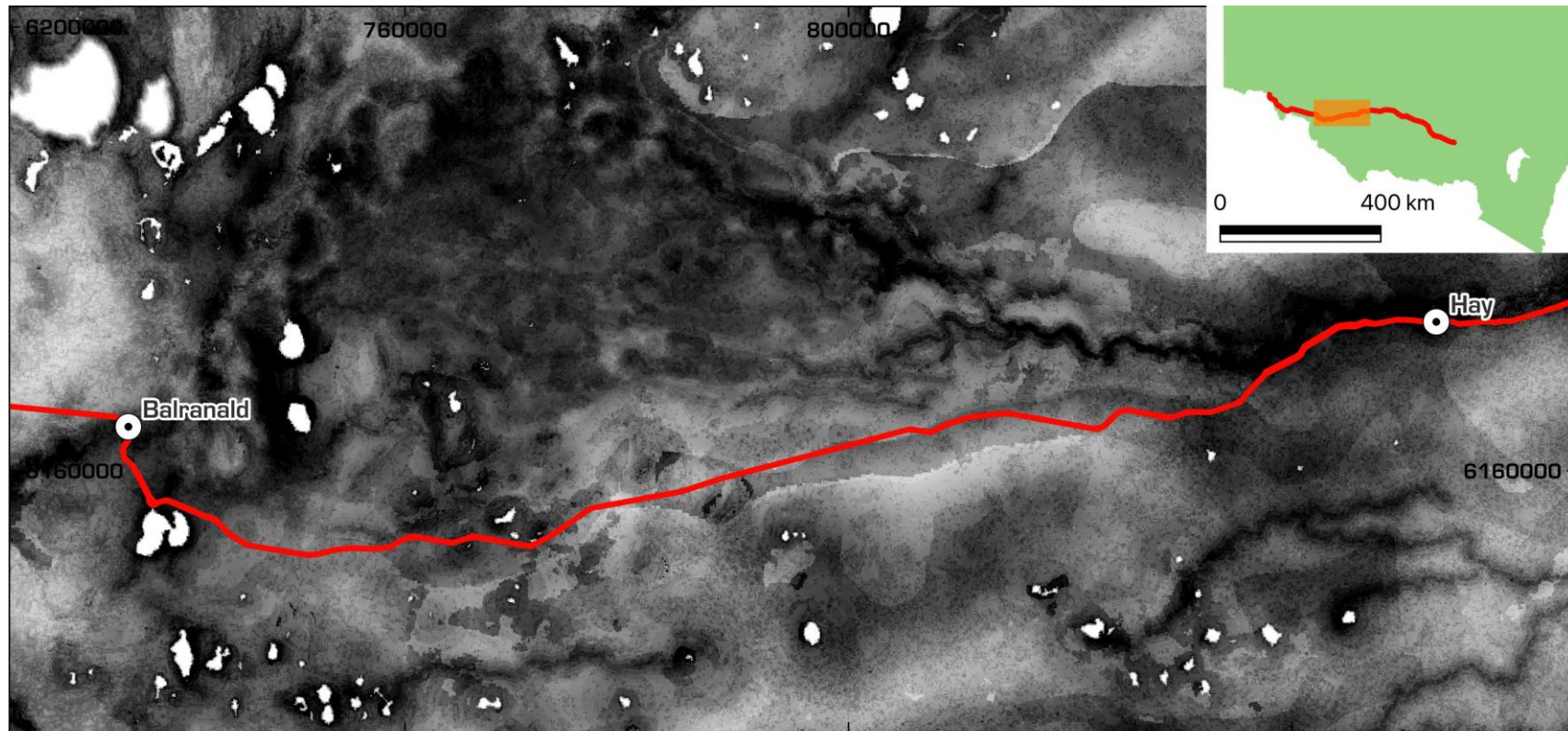


Sturt Highway ASDST All Features Combined - Section 2

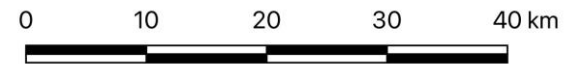
Legend

-  Study Area
- ASDST Modelling






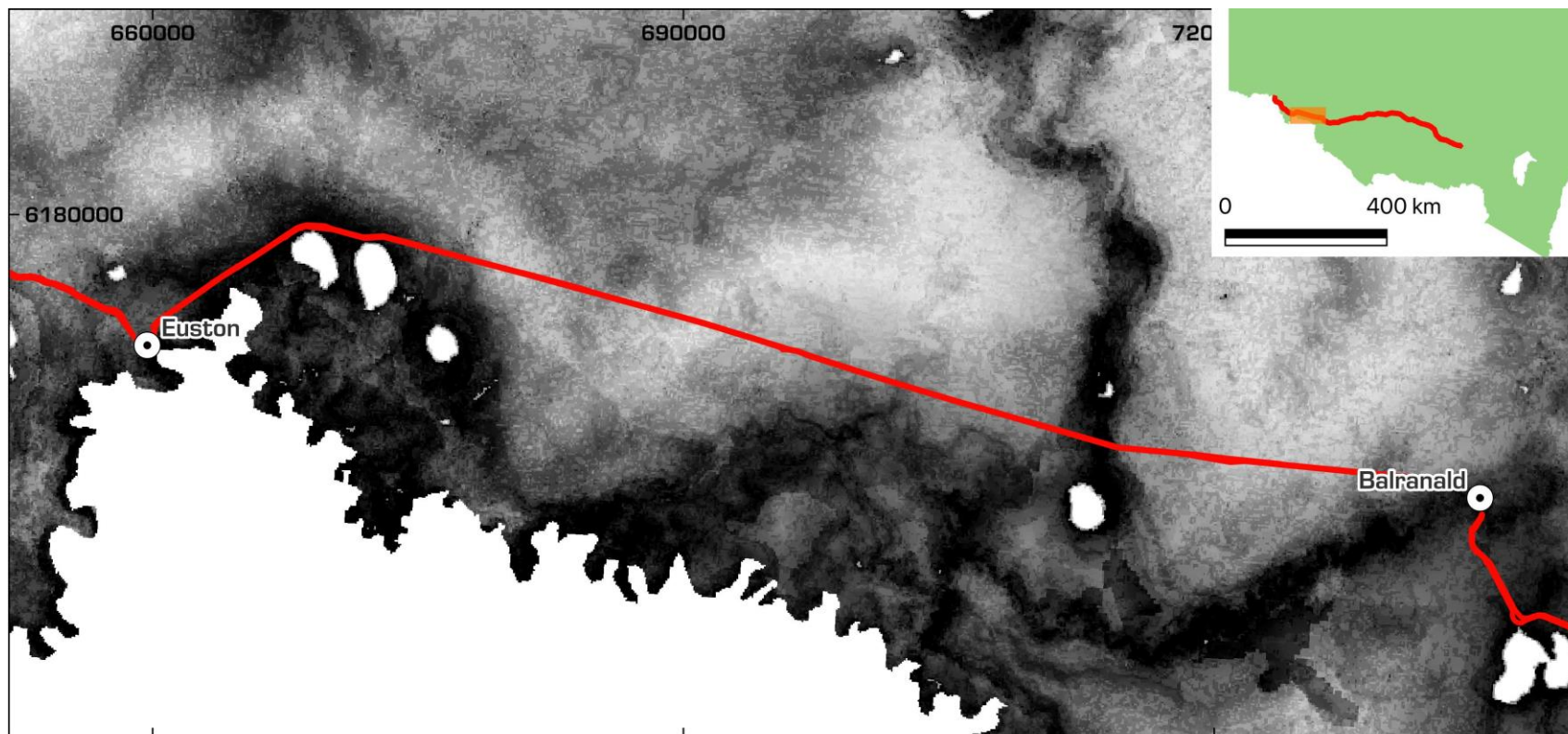
Sturt Highway ASDST All Features Combined - Section 3



Legend


-  Study Area
- ASDST Modelling



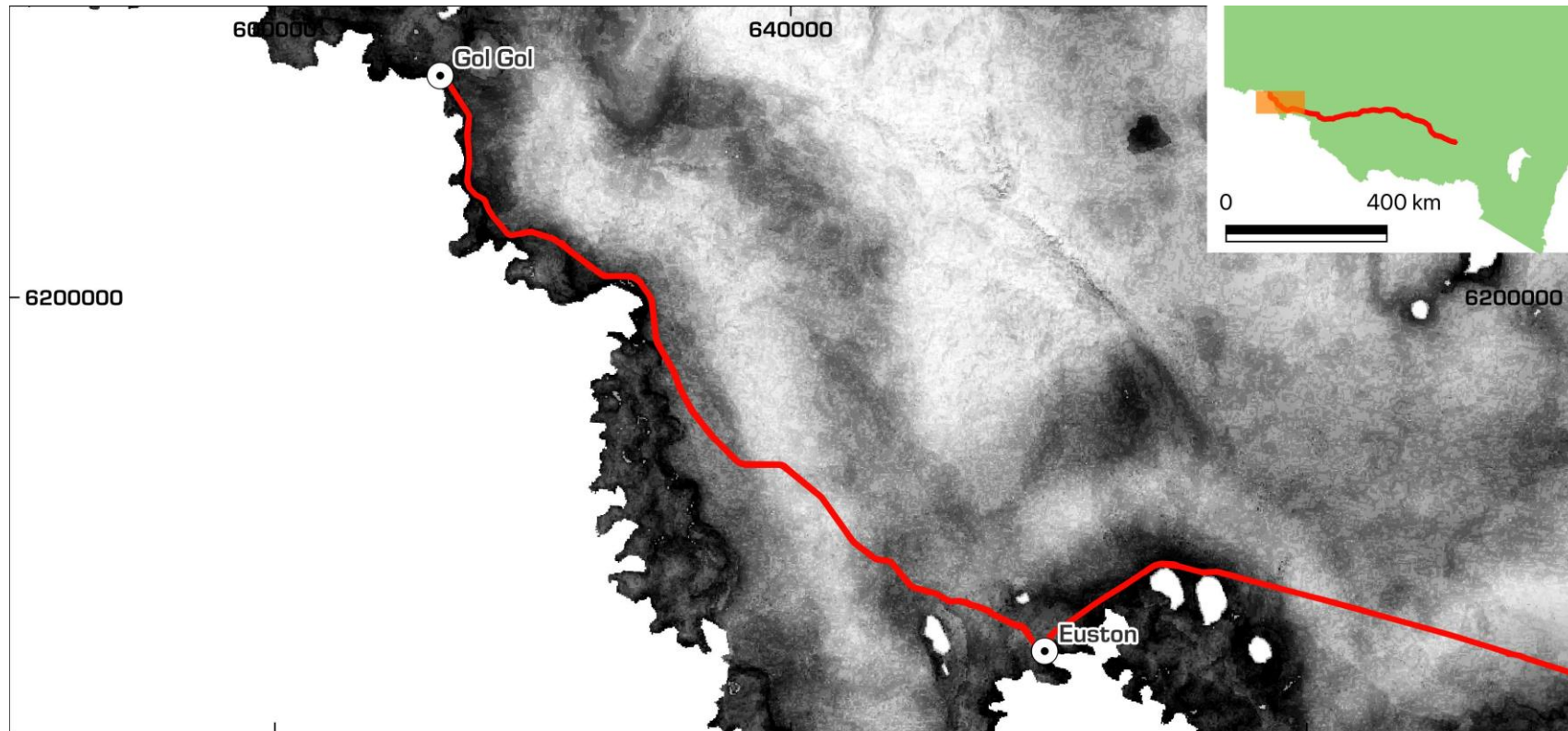


Sturt Highway ASDST All Features Combined - Section 4

Legend

-  Study Area
- ASDST Modelling






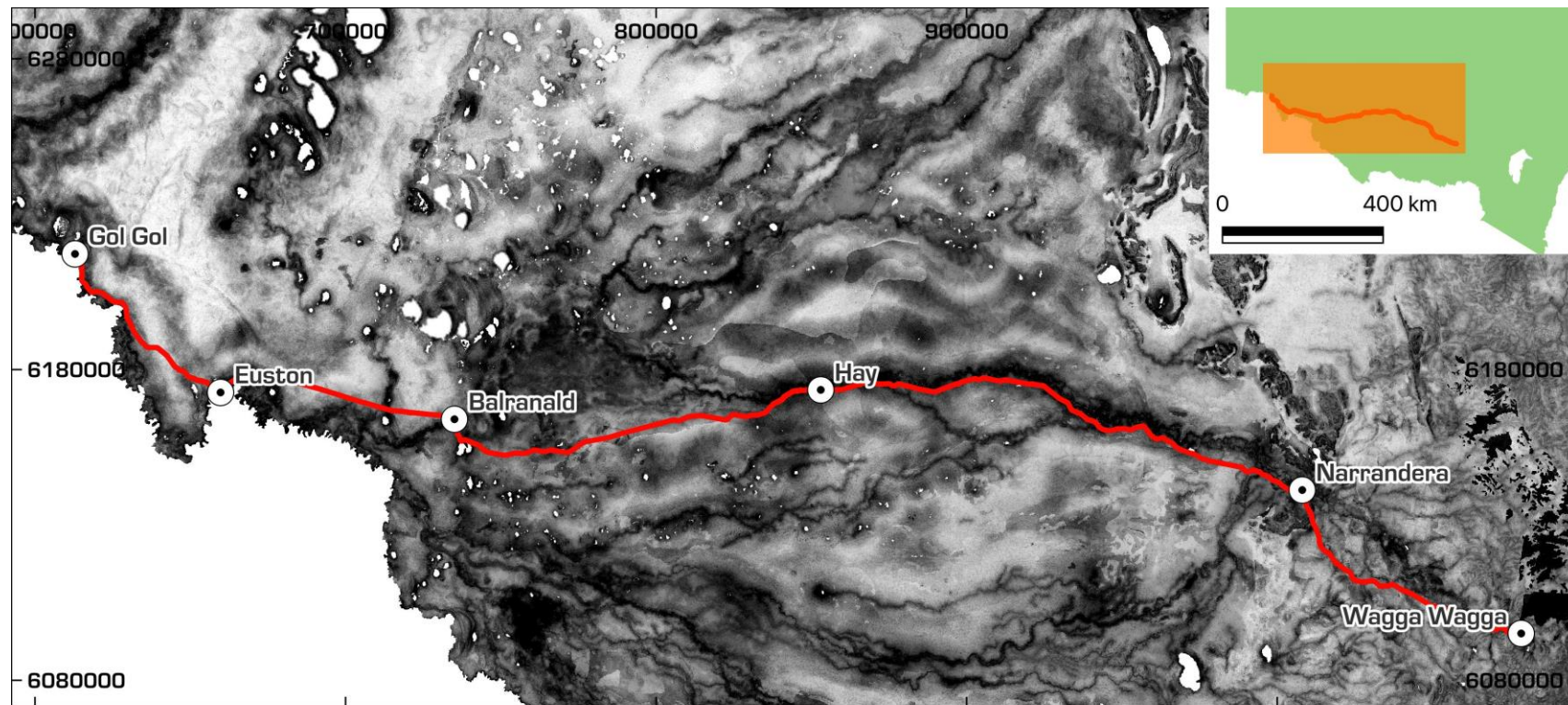
Sturt Highway ASDST All Features Combined - Section 5



Legend


-  Study Area
- ASDST Modelling



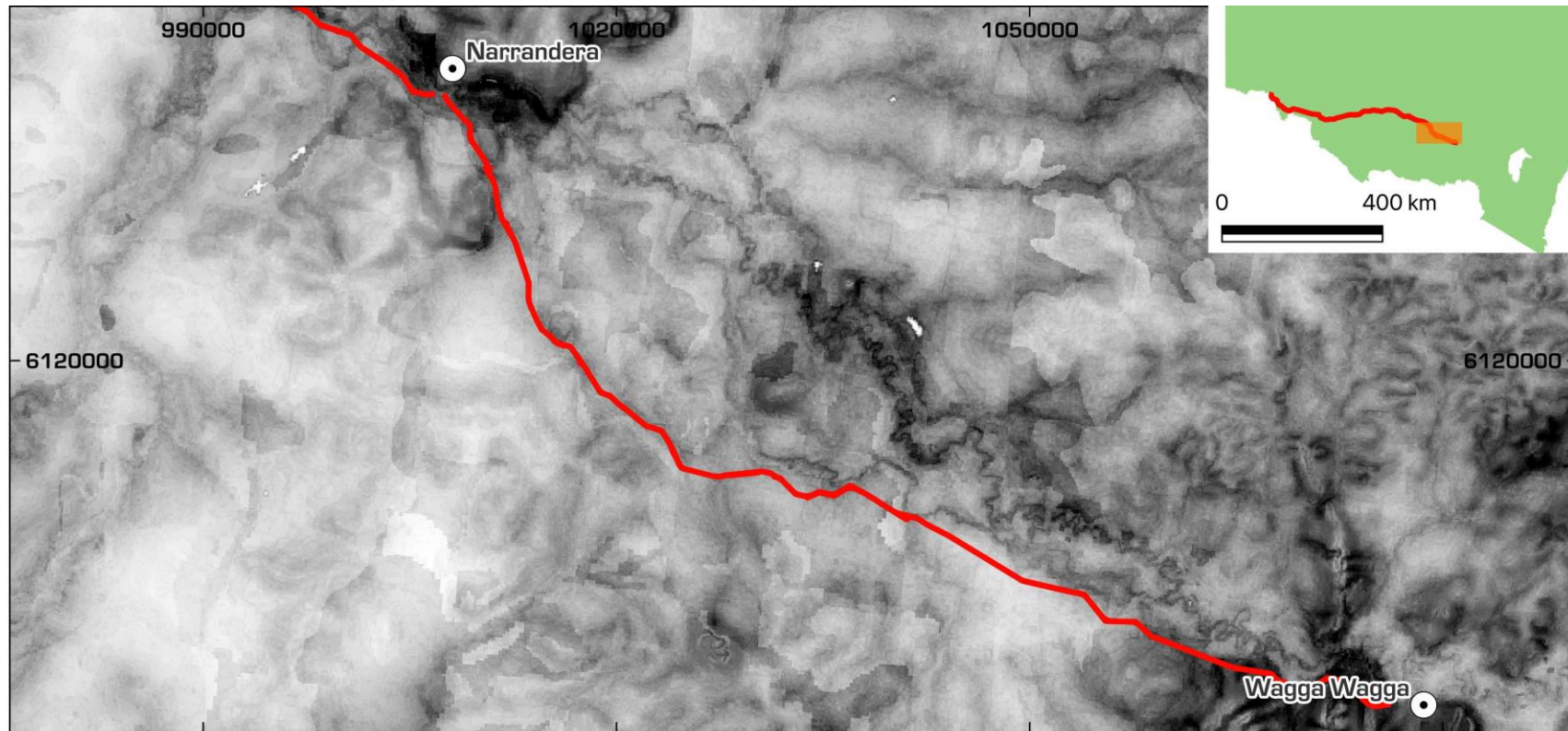


Sturt Highway ASDST All Features Combined - Overview

Legend

-  Study Area
- ASDST Modelling






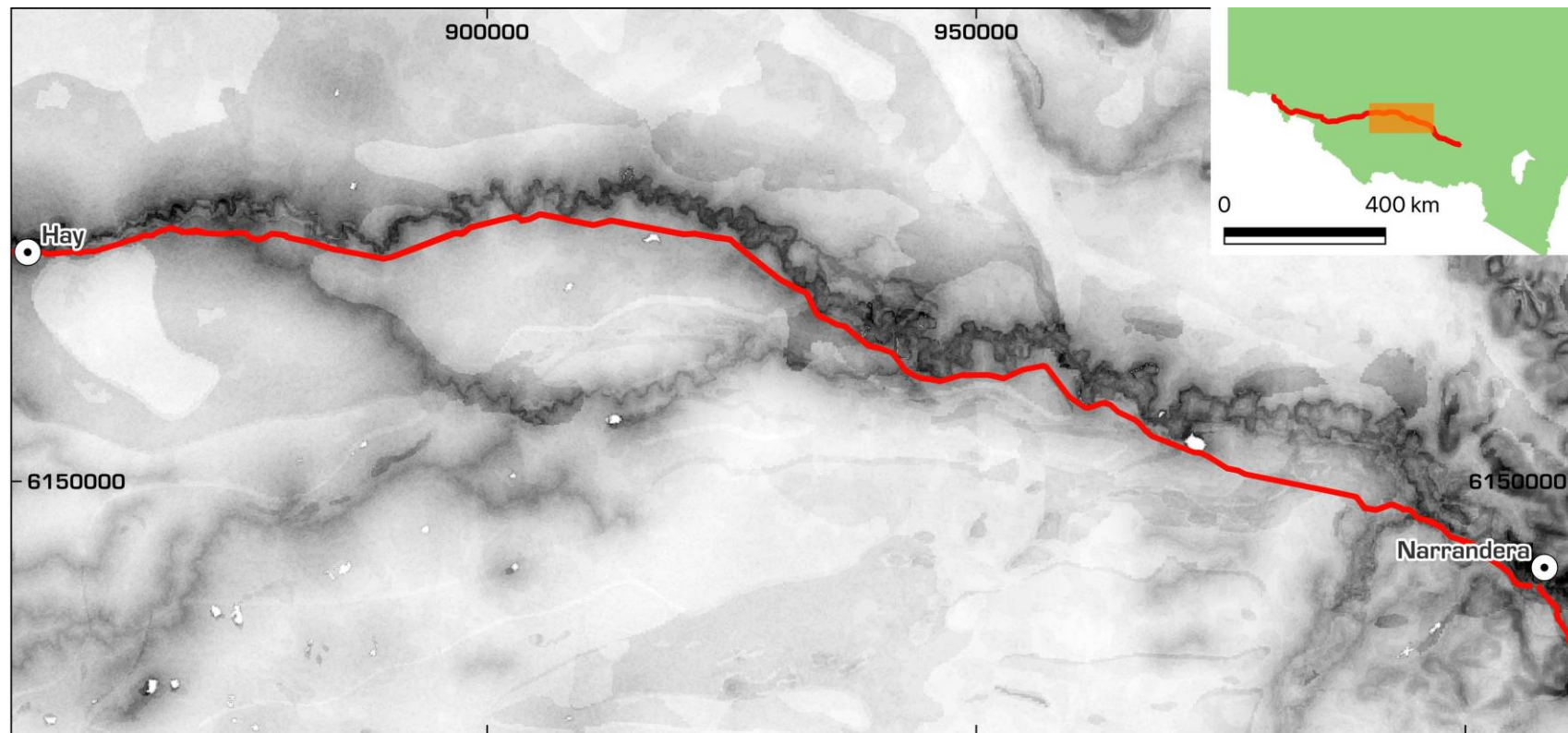
Sturt Highway ASDST Artefacts - Section 1



Legend

-  Study Area
- ASDST Modelling






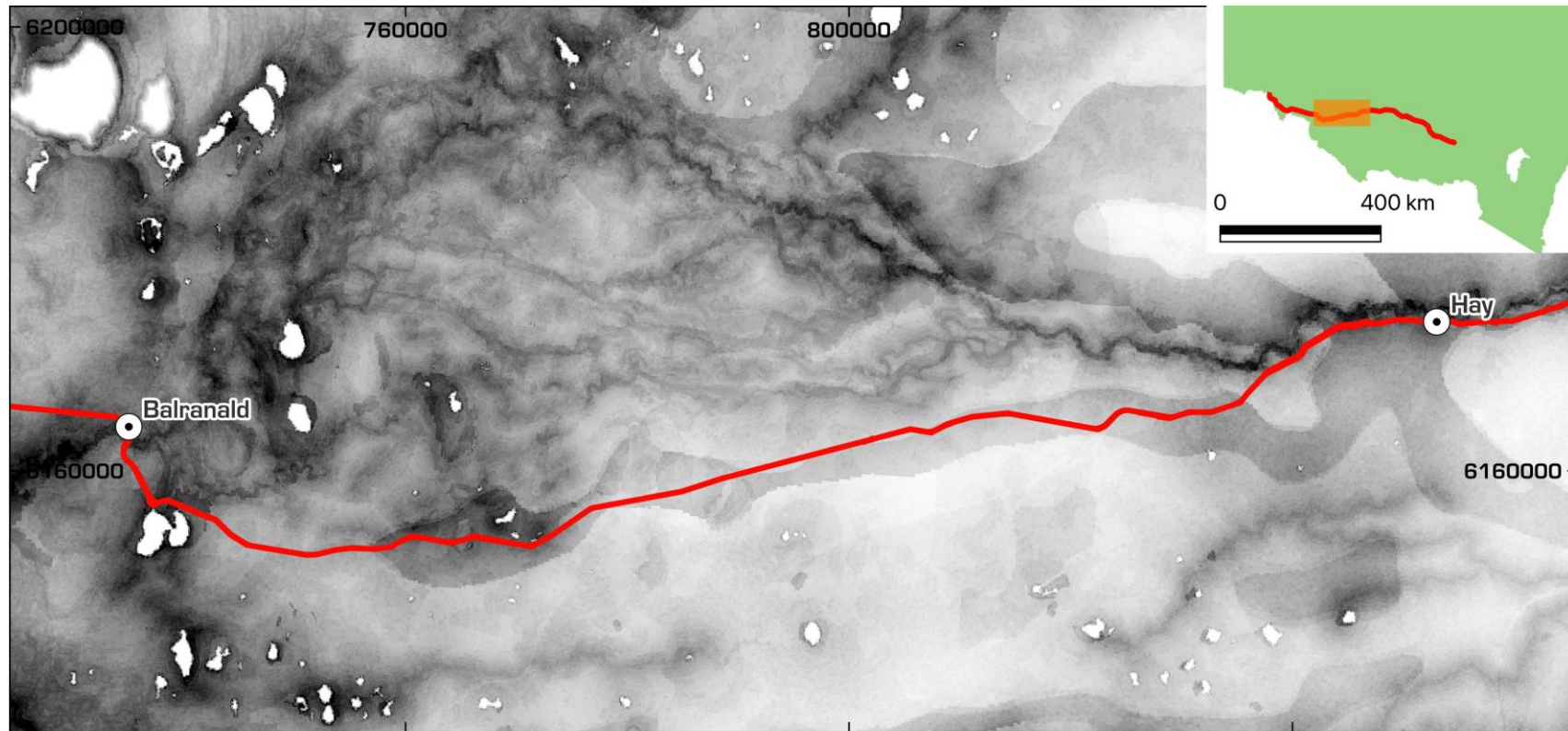
Sturt Highway ASDST Artefacts - Section 2



Legend

-  Study Area
- ASDST Modelling






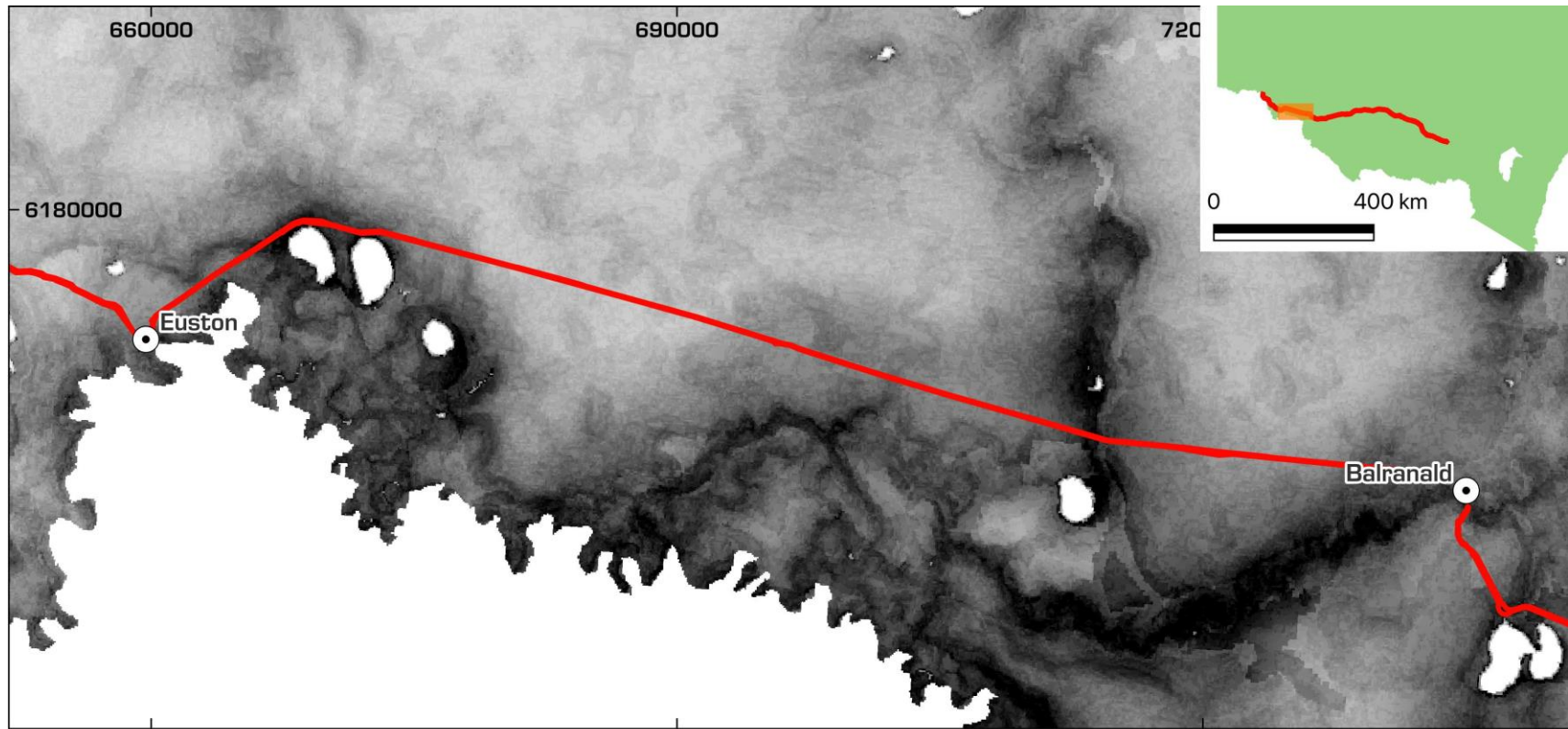
Sturt Highway ASDST Artefacts - Section 3



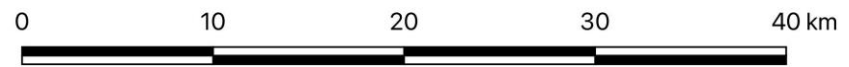
Legend

-  Study Area
- ASDST Modelling






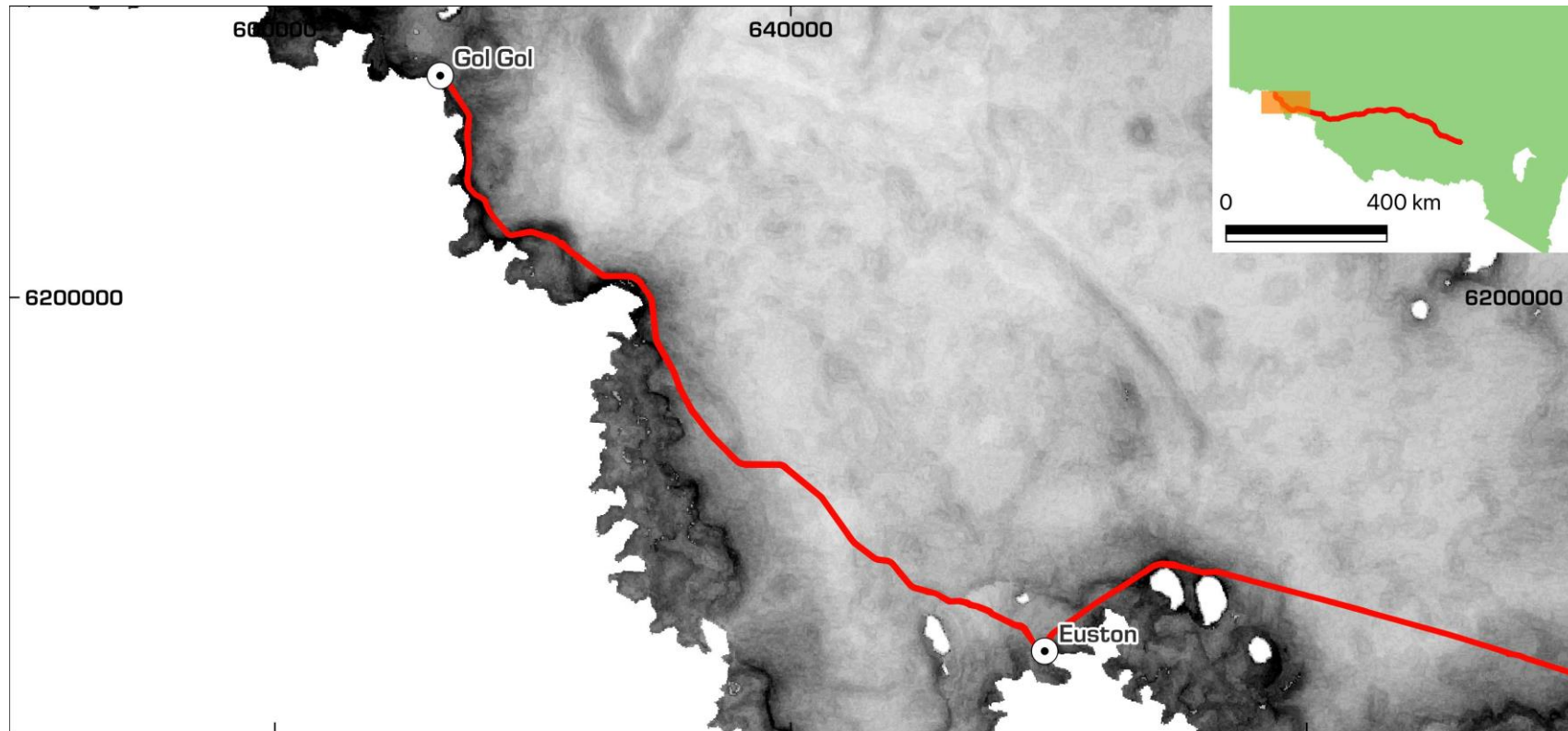
Sturt Highway ASDST Artefacts - Section 4



Legend


-  Study Area
- ASDST Modelling



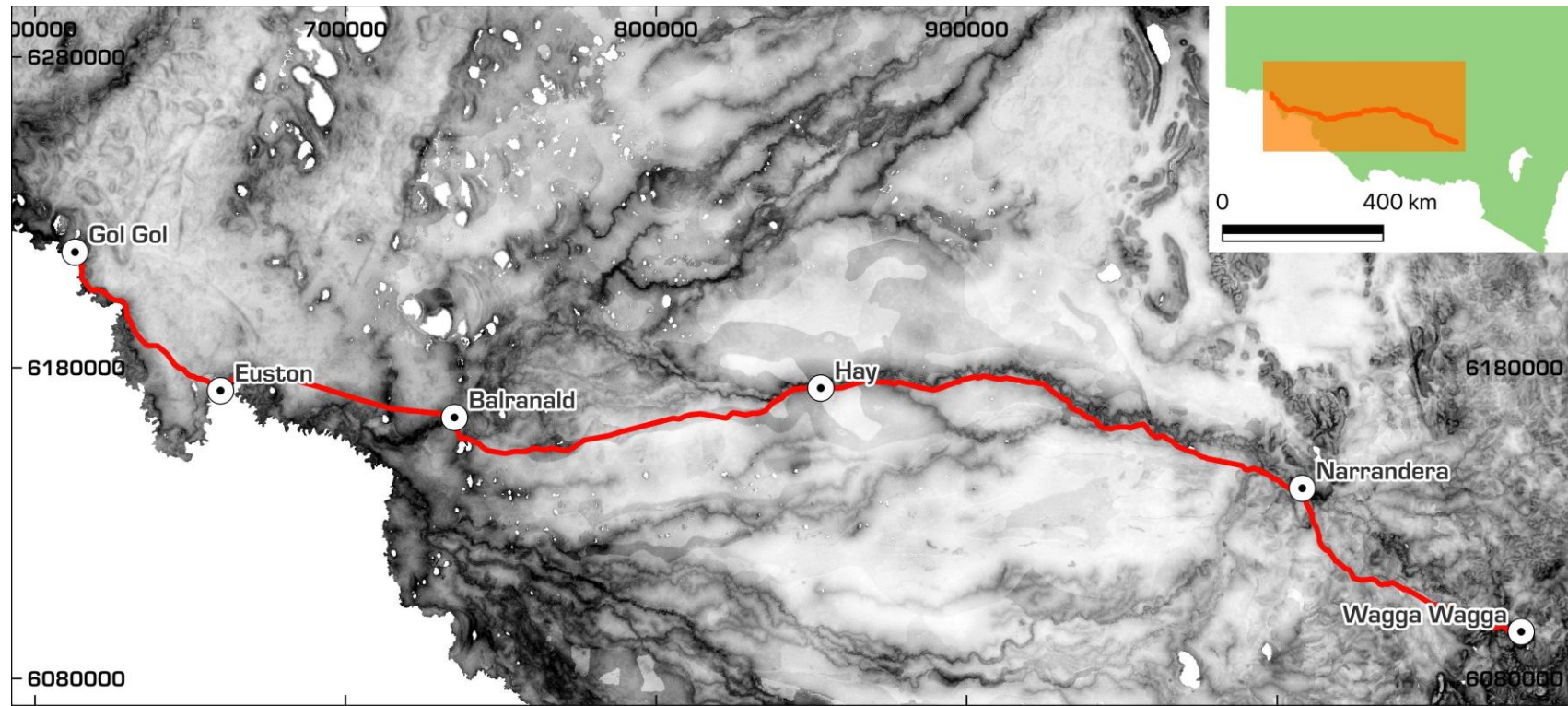


Sturt Highway ASDST Artefacts - Section 5

Legend

-  Study Area
- ASDST Modelling






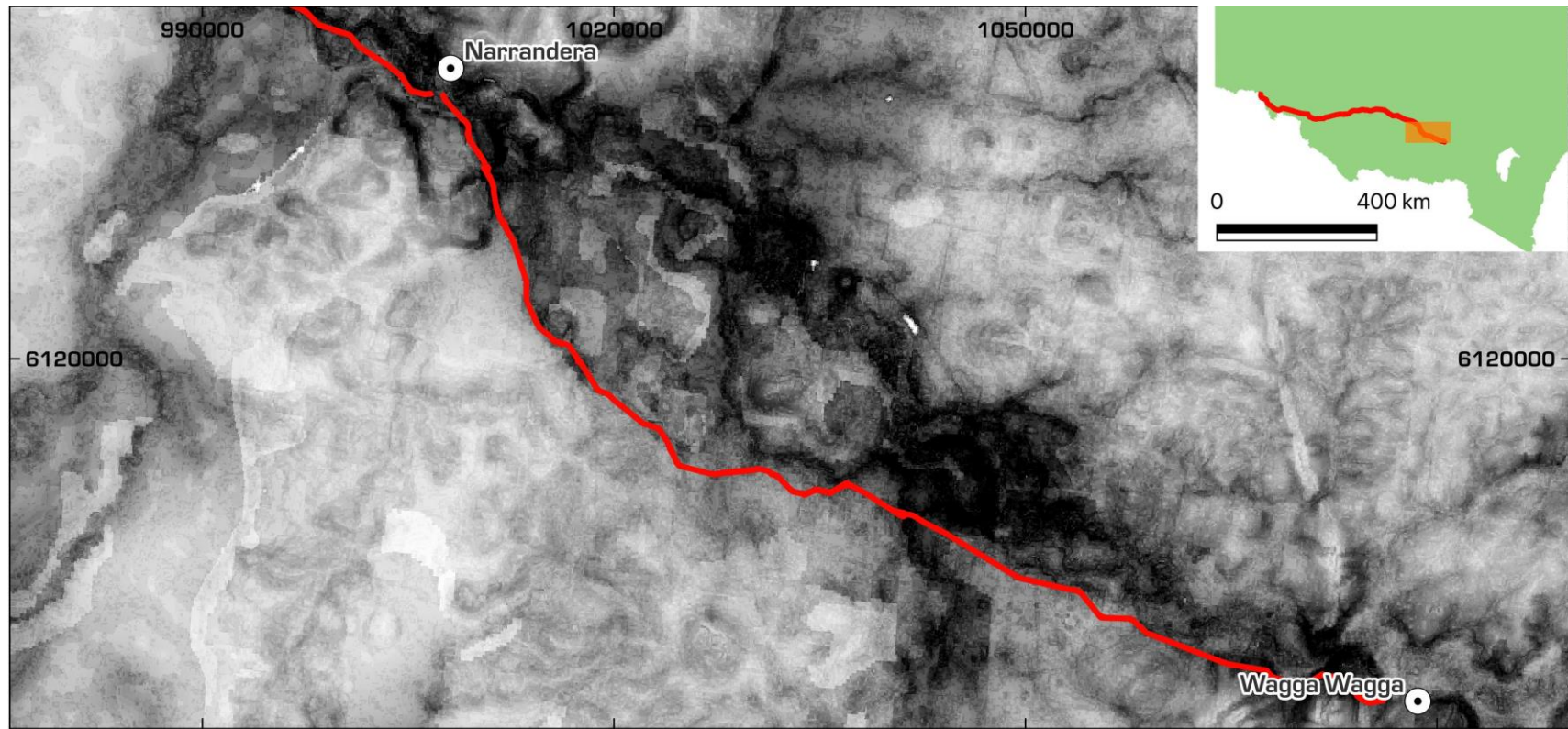
Sturt Highway ASDST Artefacts - Overview



Legend


-  Study Area
- ASDST Modelling



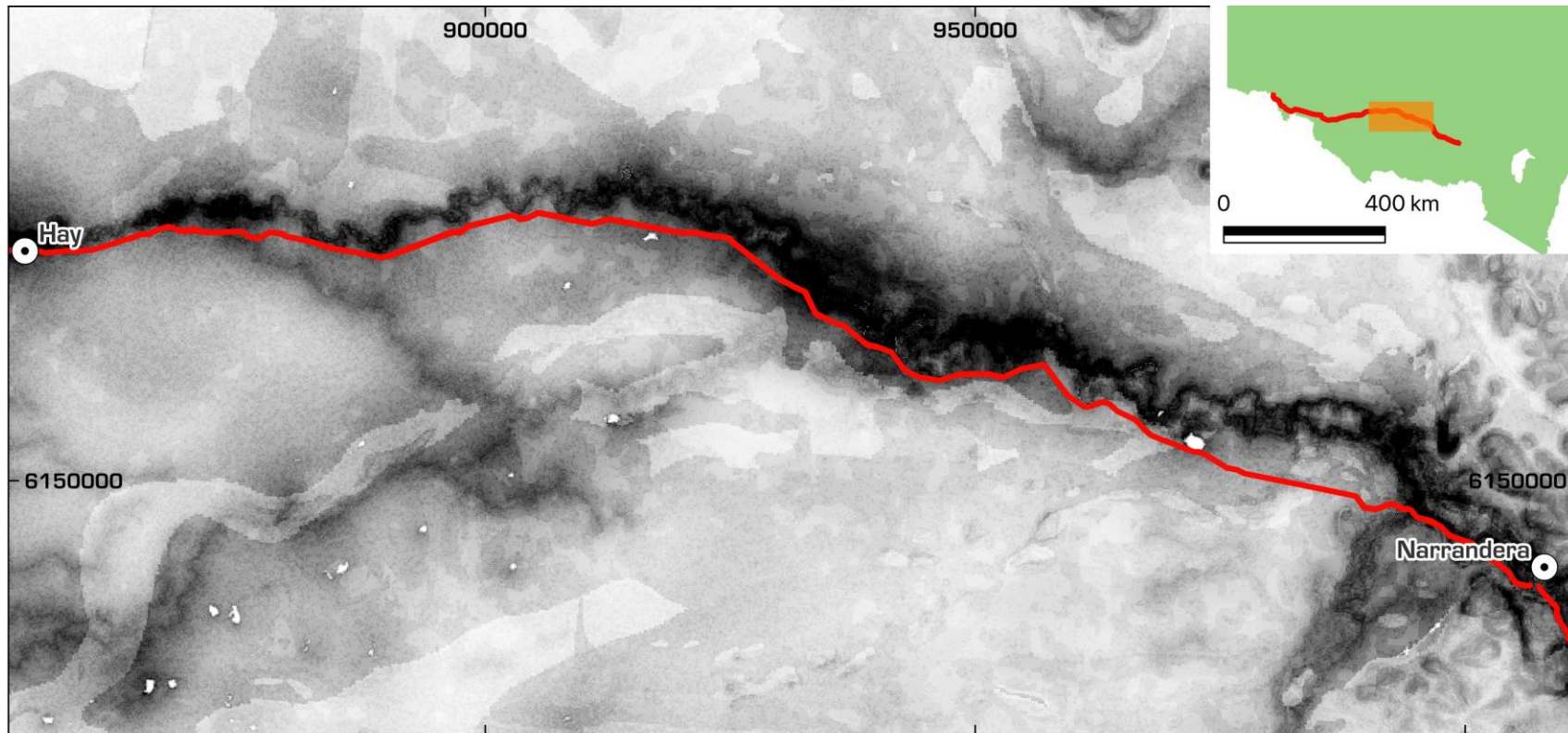


Sturt Highway ASDST Burials - Section 1

Legend


-  Study Area
- ASDST Modelling



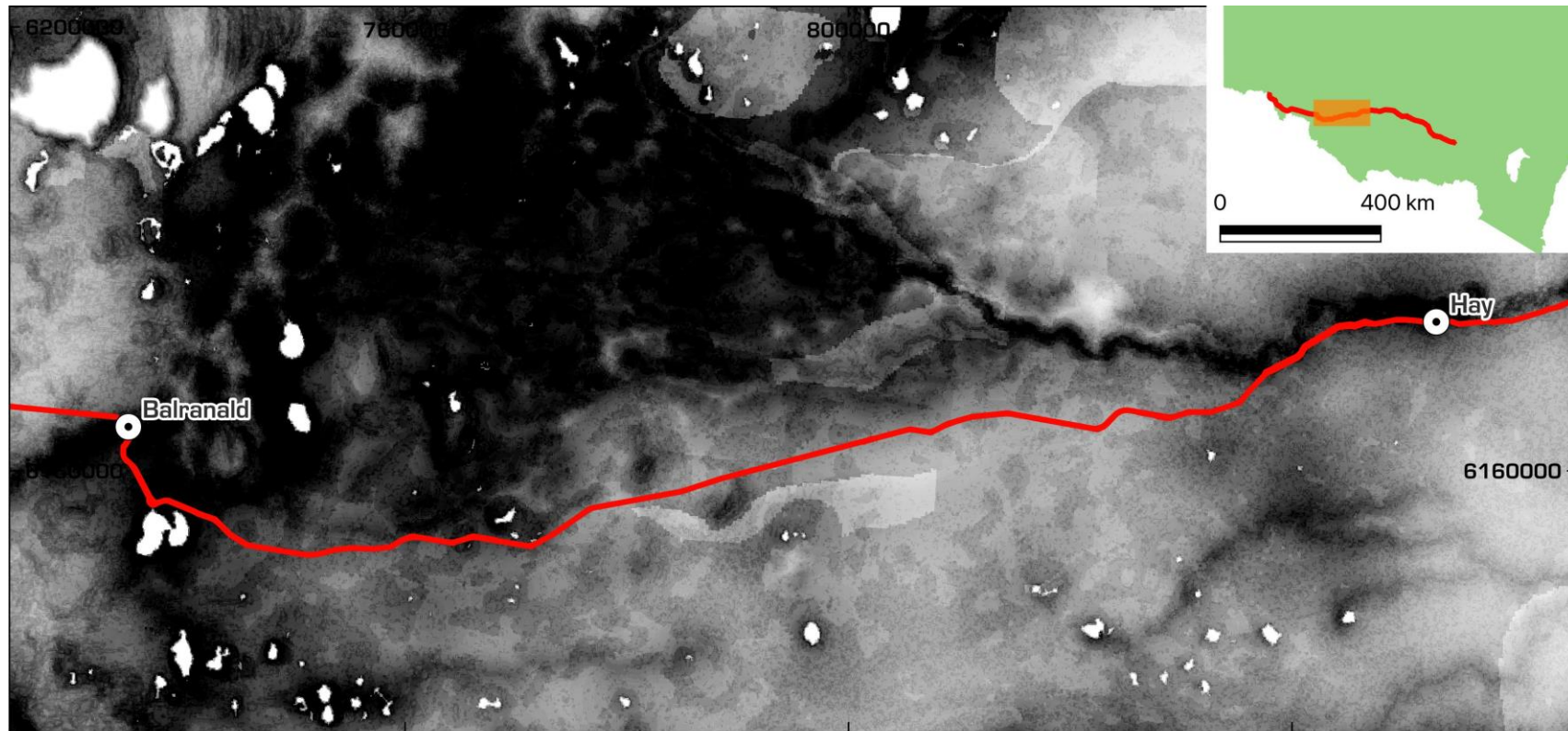


Sturt Highway ASDST Burials - Section 2

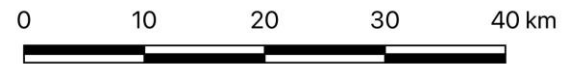
Legend

-  Study Area
- ASDST Modelling






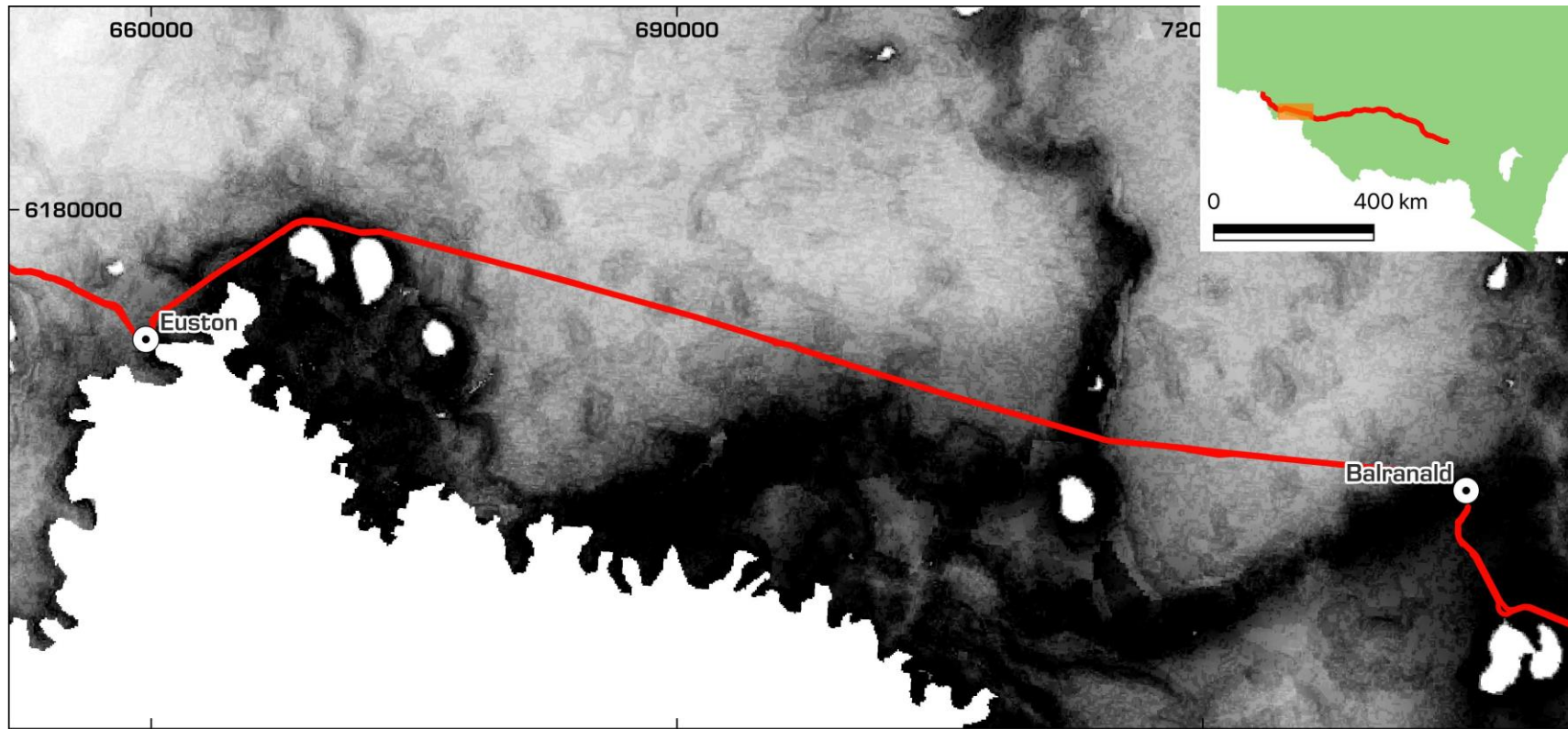
Sturt Highway ASDST Burials - Section 3



Legend


-  Study Area
- ASDST Modelling

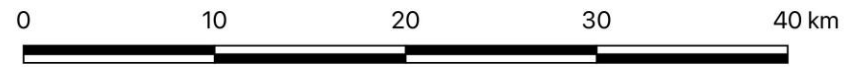


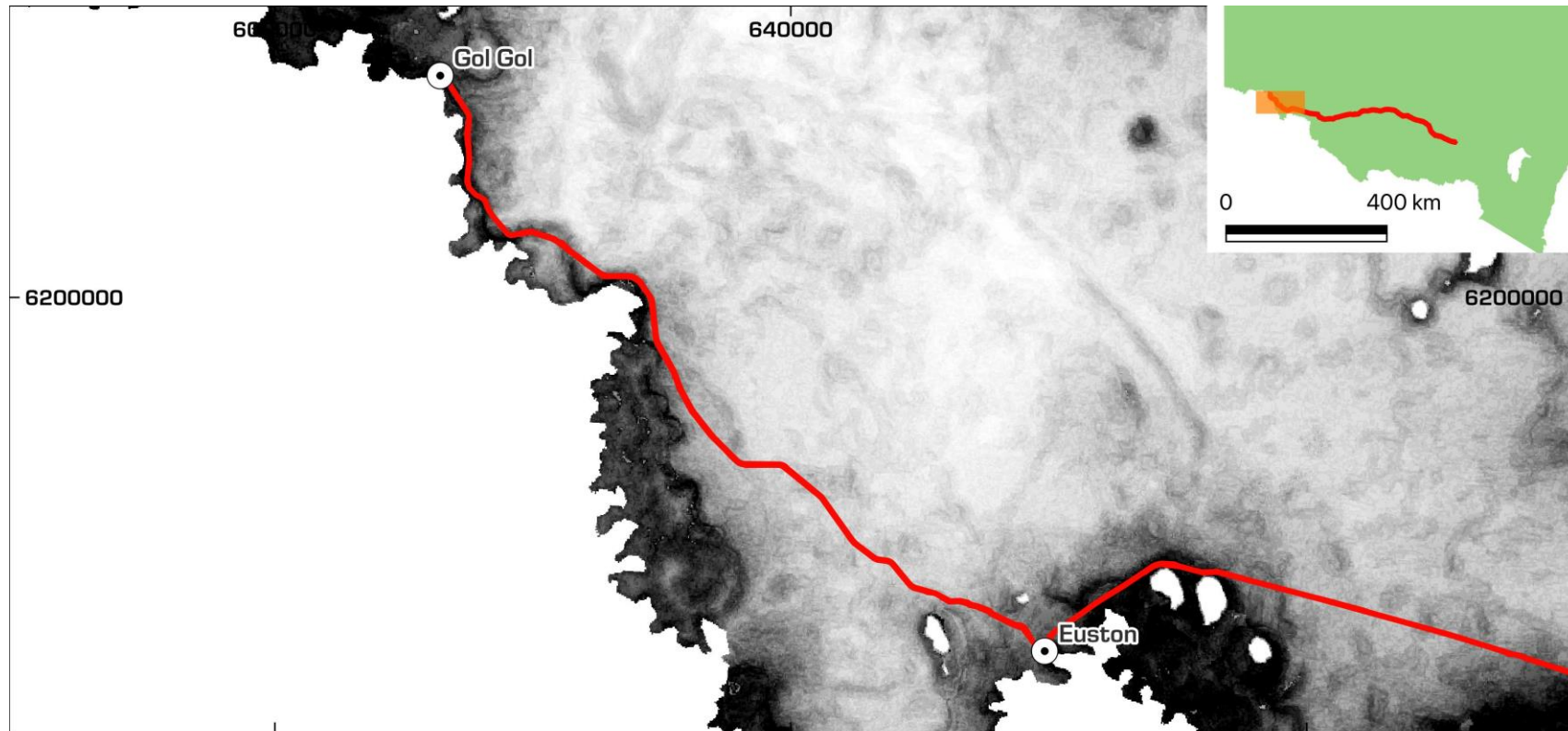


Sturt Highway ASDST Burials - Section 4

Legend

-  Study Area
- ASDST Modelling






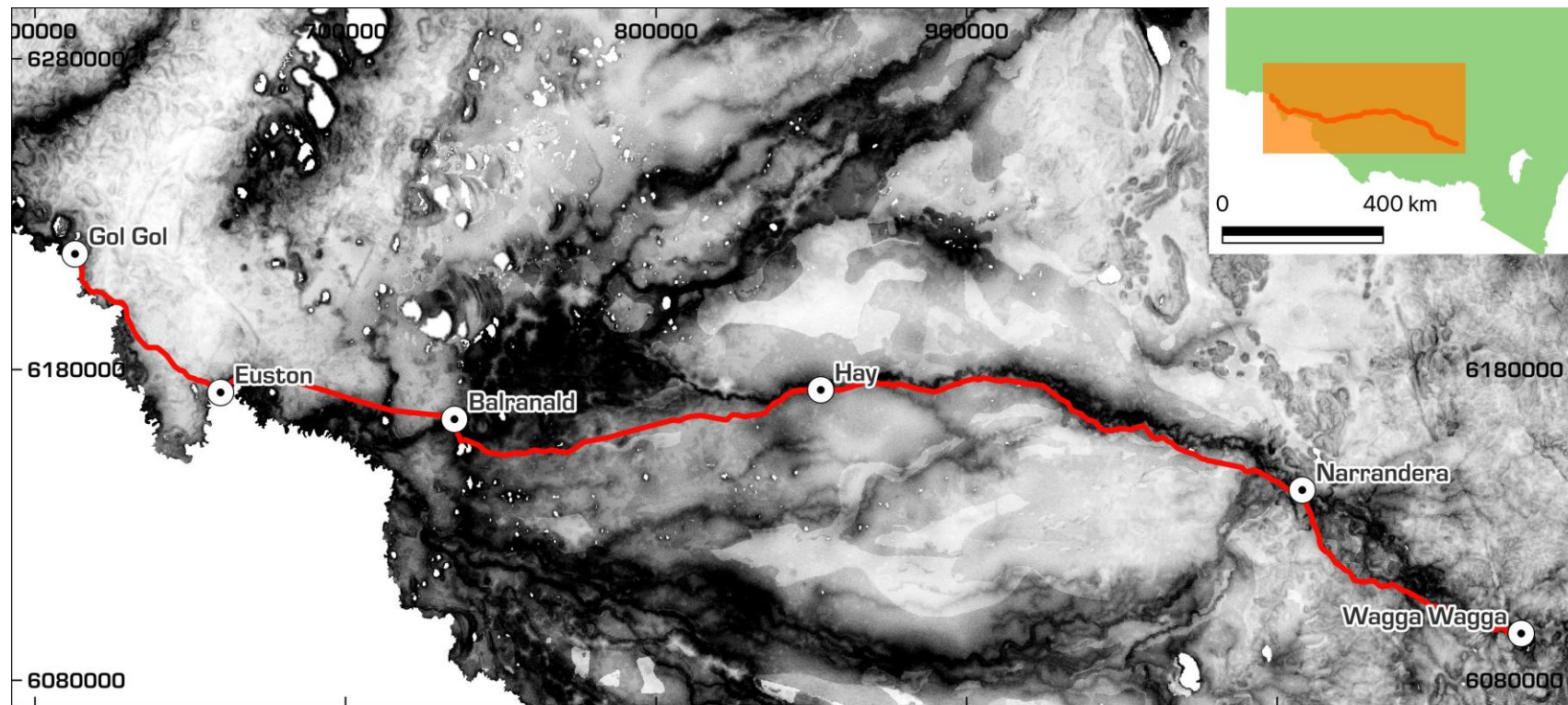
Sturt Highway ASDST Burials - Section 5



Legend


-  Study Area
- ASDST Modelling



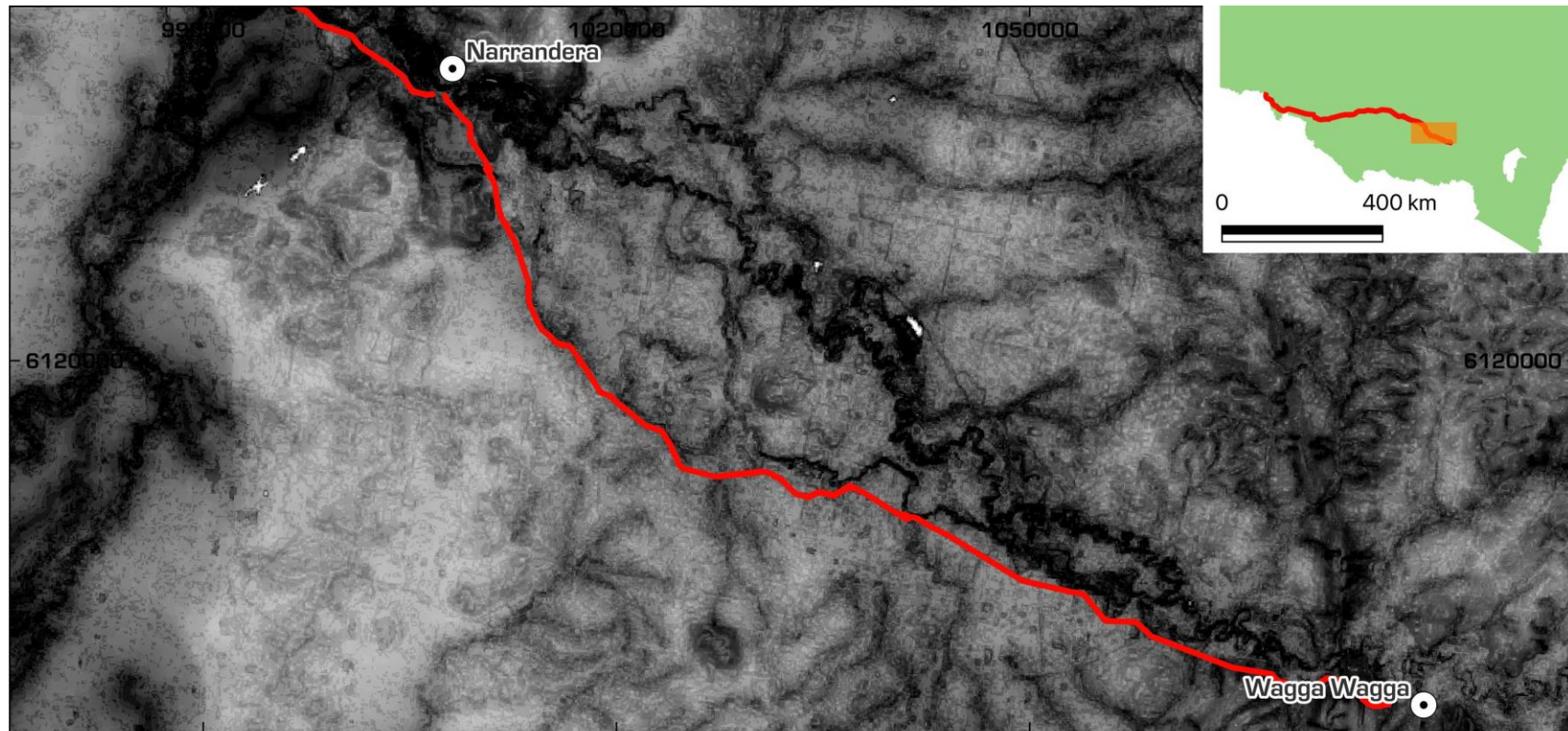


Sturt Highway ASDST Burials - Overview

Legend


-  Study Area
- ASDST Modelling



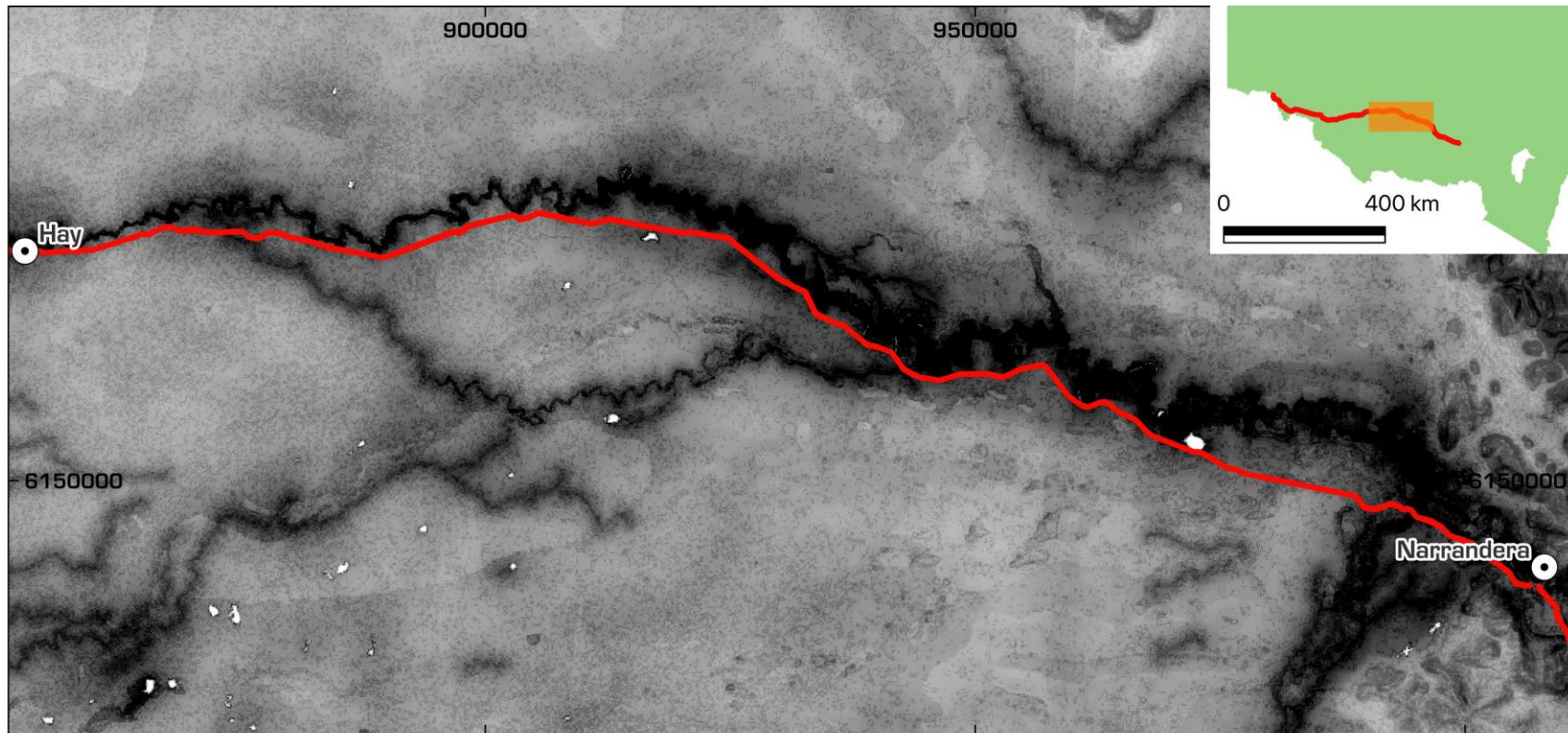


Sturt Highway ASDST Culturally Modified Trees - Section 1

Legend


-  Study Area
- ASDST Modelling



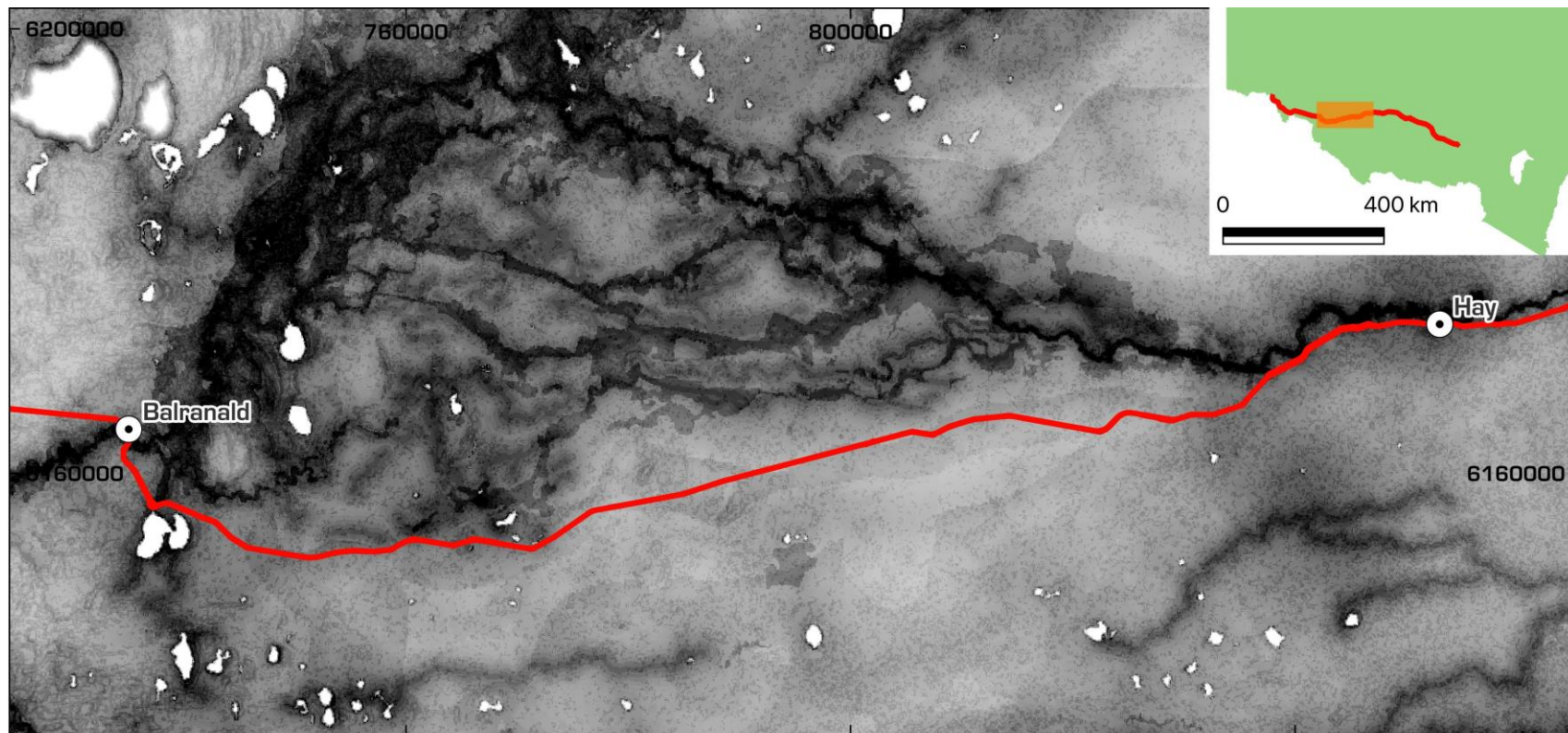


Sturt Highway ASDST Culturally Modified Trees - Section 2

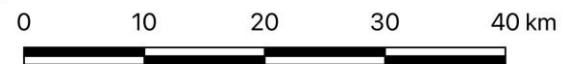
Legend

-  Study Area
- ASDST Modelling






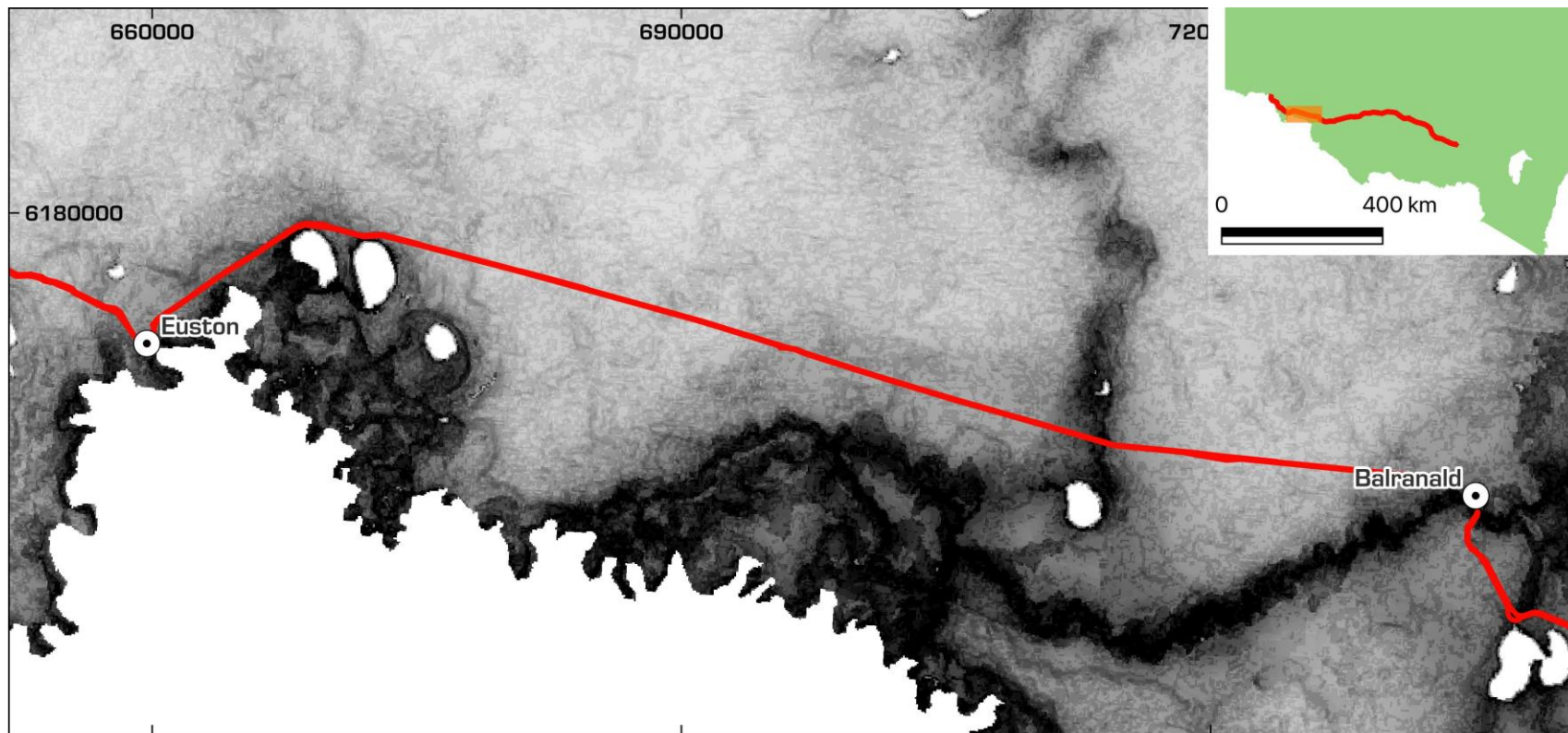
Sturt Highway ASDST Culturally Modified Trees - Section 3



Legend


-  Study Area
- ASDST Modelling

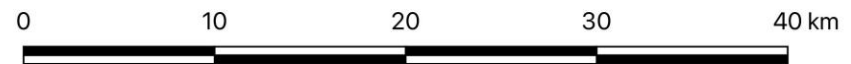


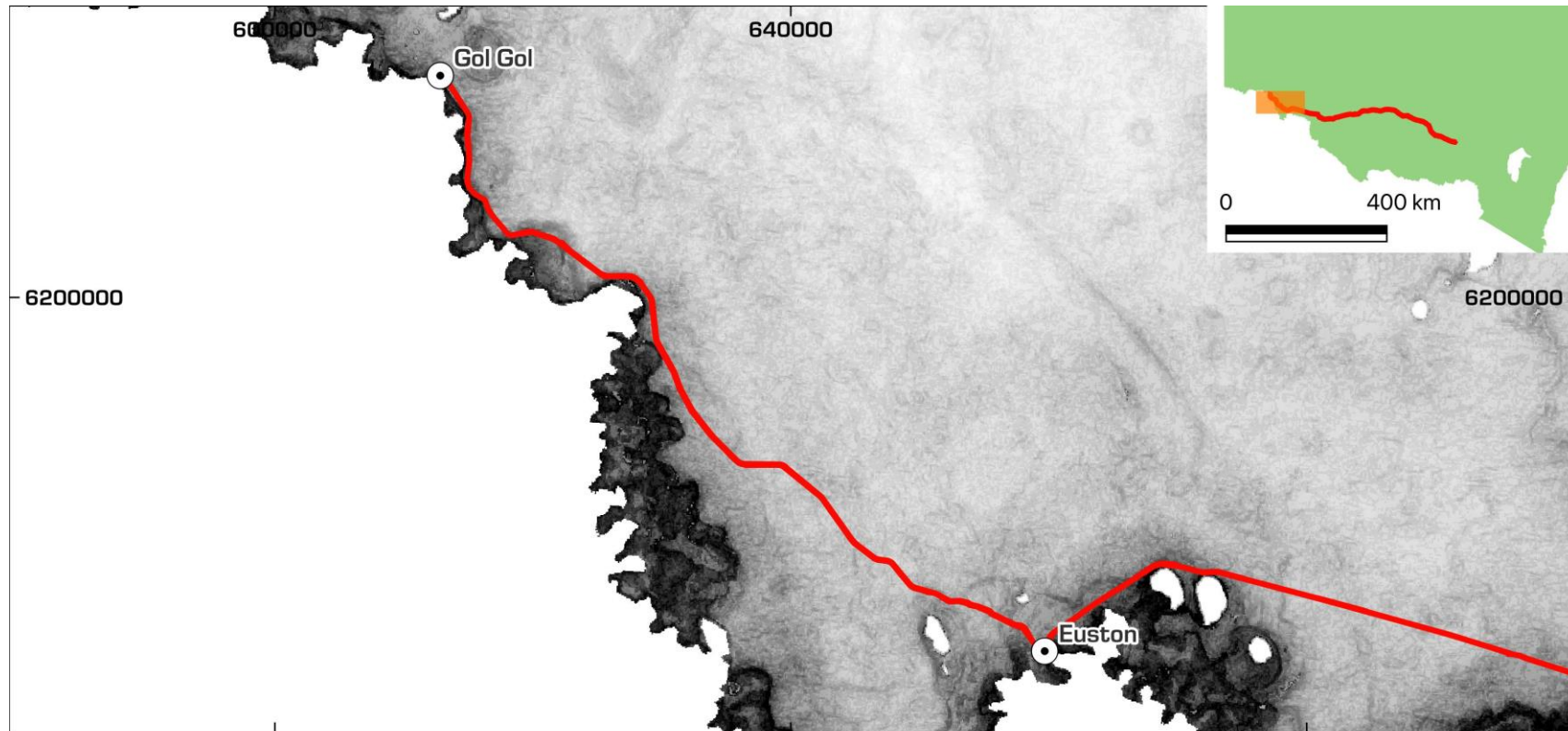


Sturt Highway ASDST Culturally Modified Trees - Section 4

Legend

-  Study Area
- ASDST Modelling






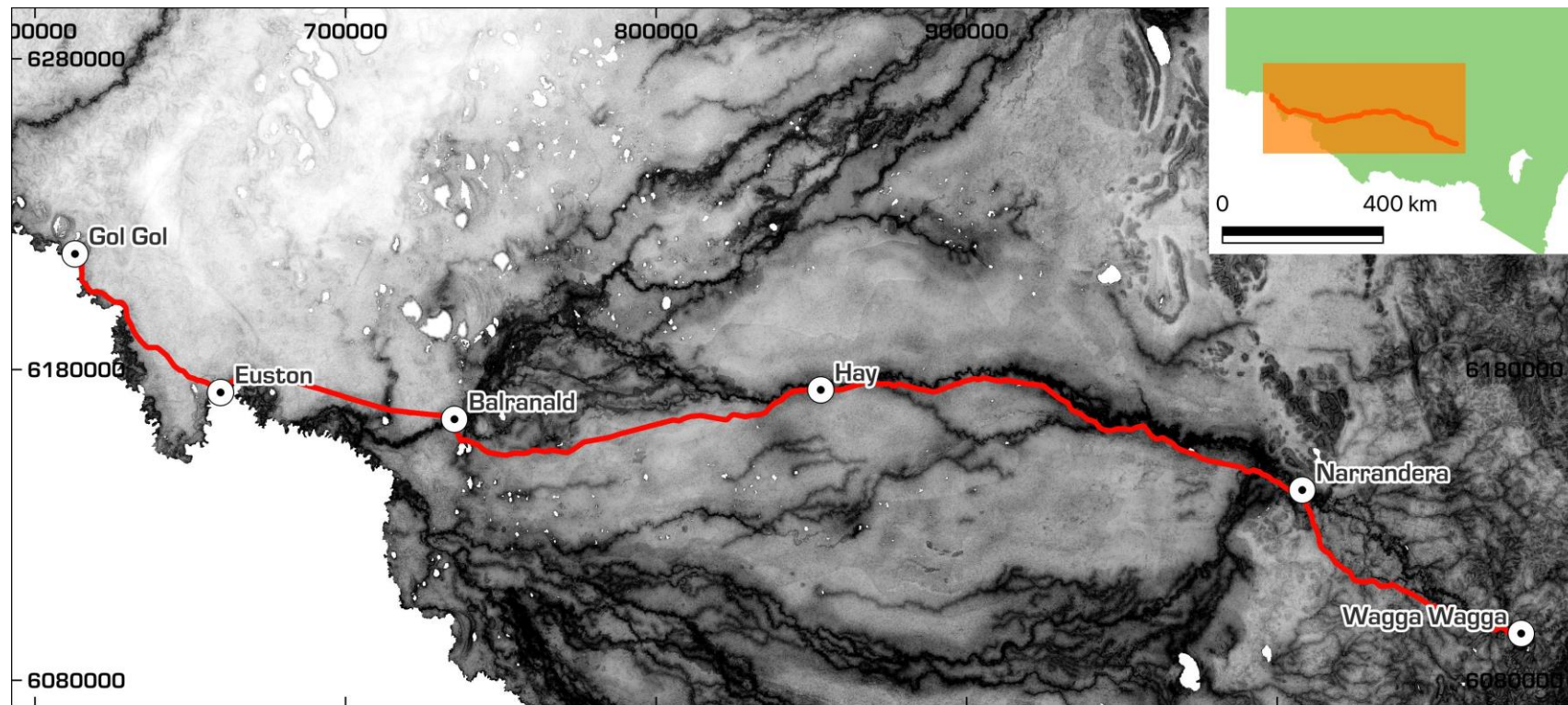
Sturt Highway ASDST Culturally Modified Trees - Section 5



Legend


-  Study Area
- ASDST Modelling



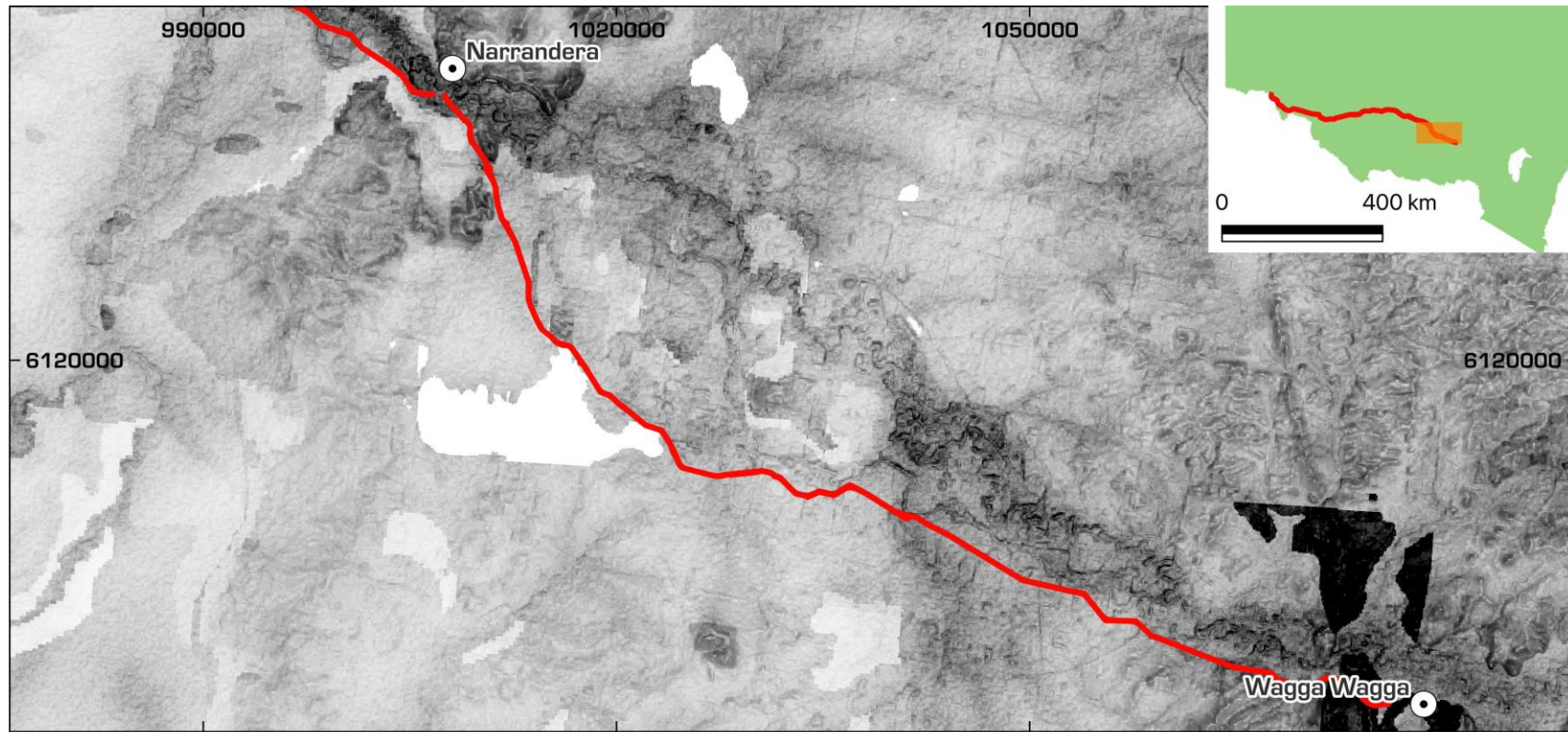


Sturt Highway ASDST Culturally Modified Trees - Overview

Legend

-  Study Area
- ASDST Modelling






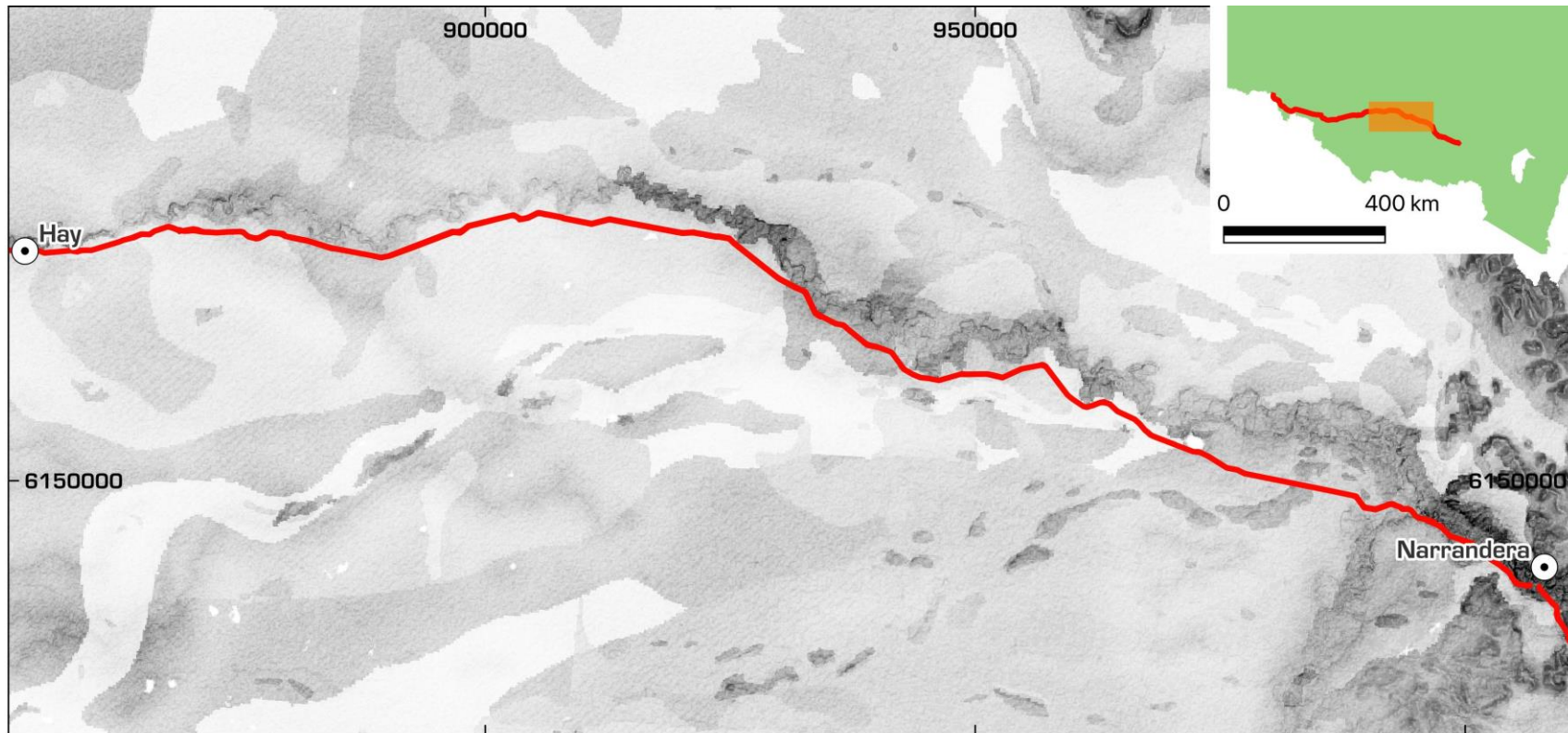
Sturt Highway ASDST Grinding Grooves - Section 1



Legend


-  Study Area
- ASDST Modelling



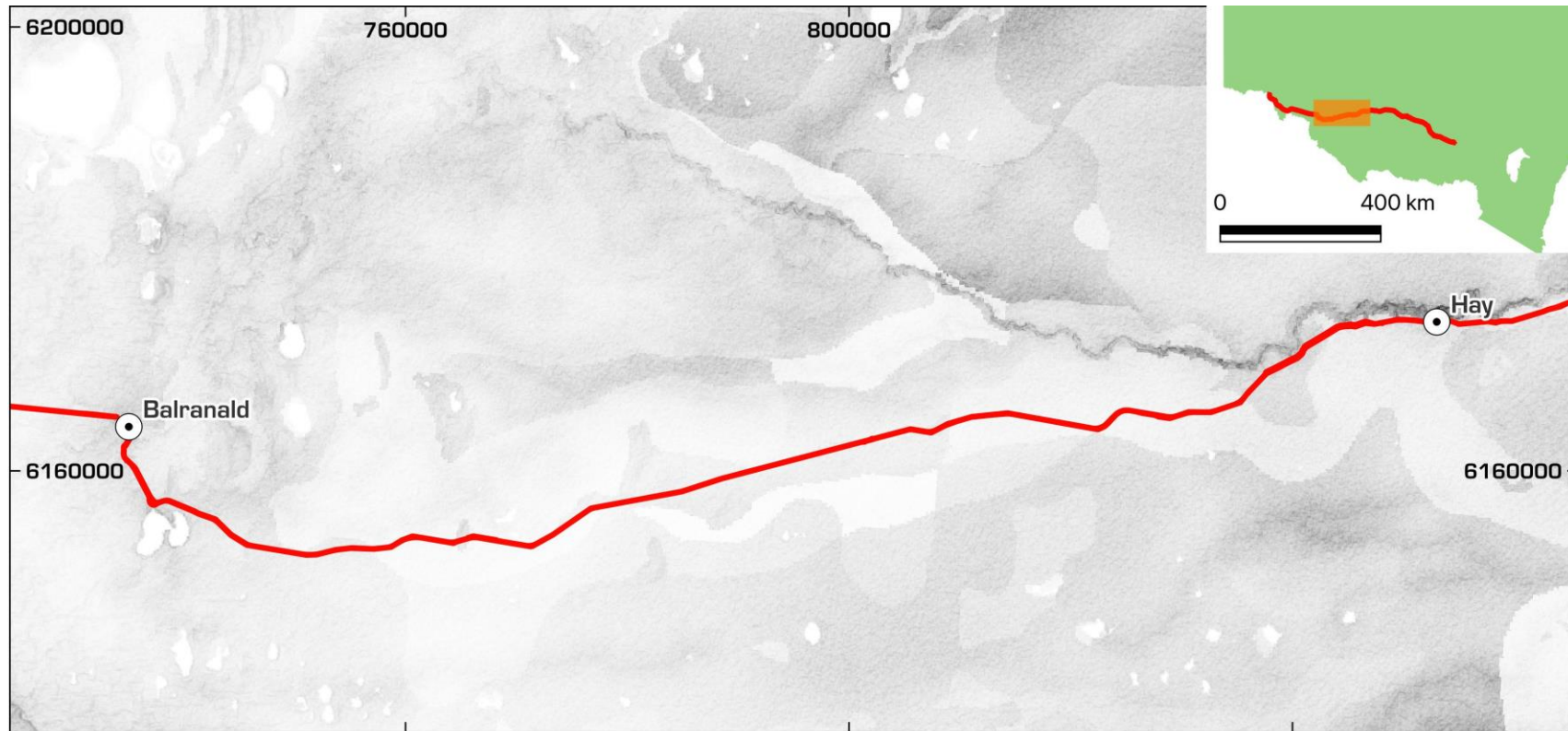


Sturt Highway ASDST Grinding Grooves - Section 2

Legend

-  Study Area
- ASDST Modelling






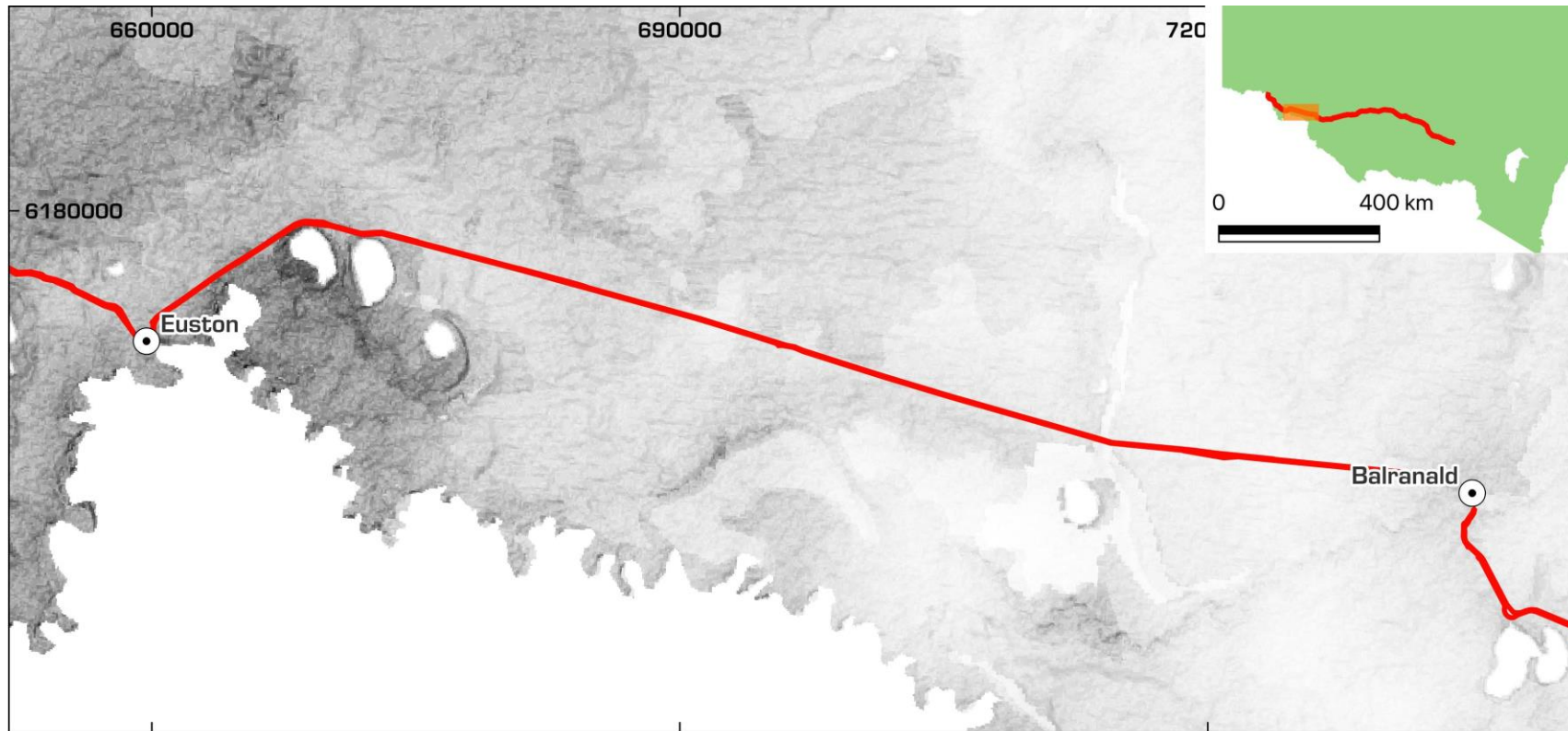
Sturt Highway ASDST Grinding Grooves - Section 3



Legend


-  Study Area
- ASDST Modelling

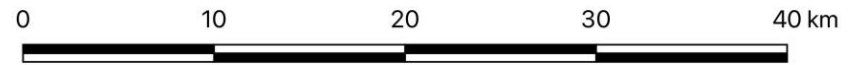


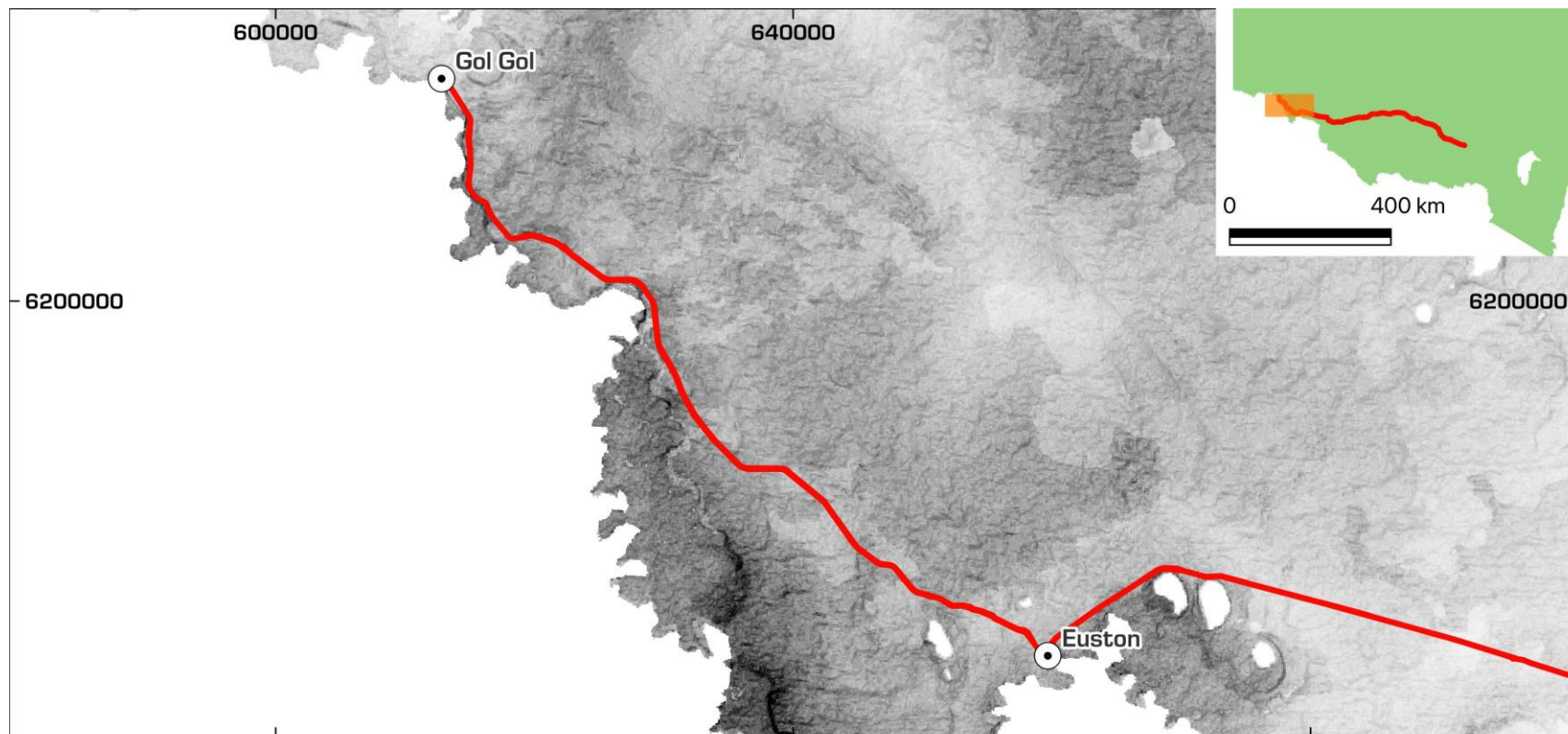


Sturt Highway ASDST Grinding Grooves - Section 4

Legend

-  Study Area
- ASDST Modelling






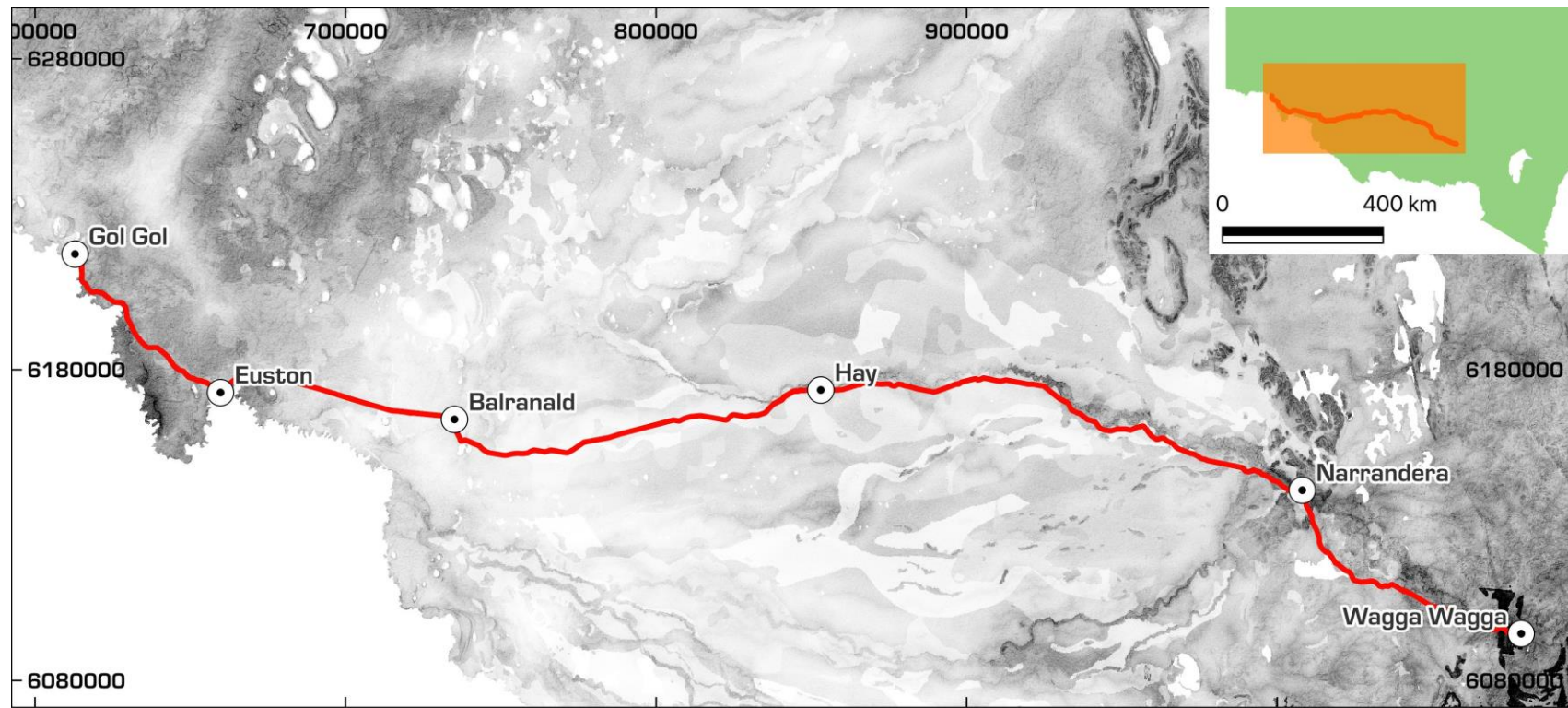
Sturt Highway ASDST Grinding Grooves - Section 5



Legend

-  Study Area
- ASDST Modelling






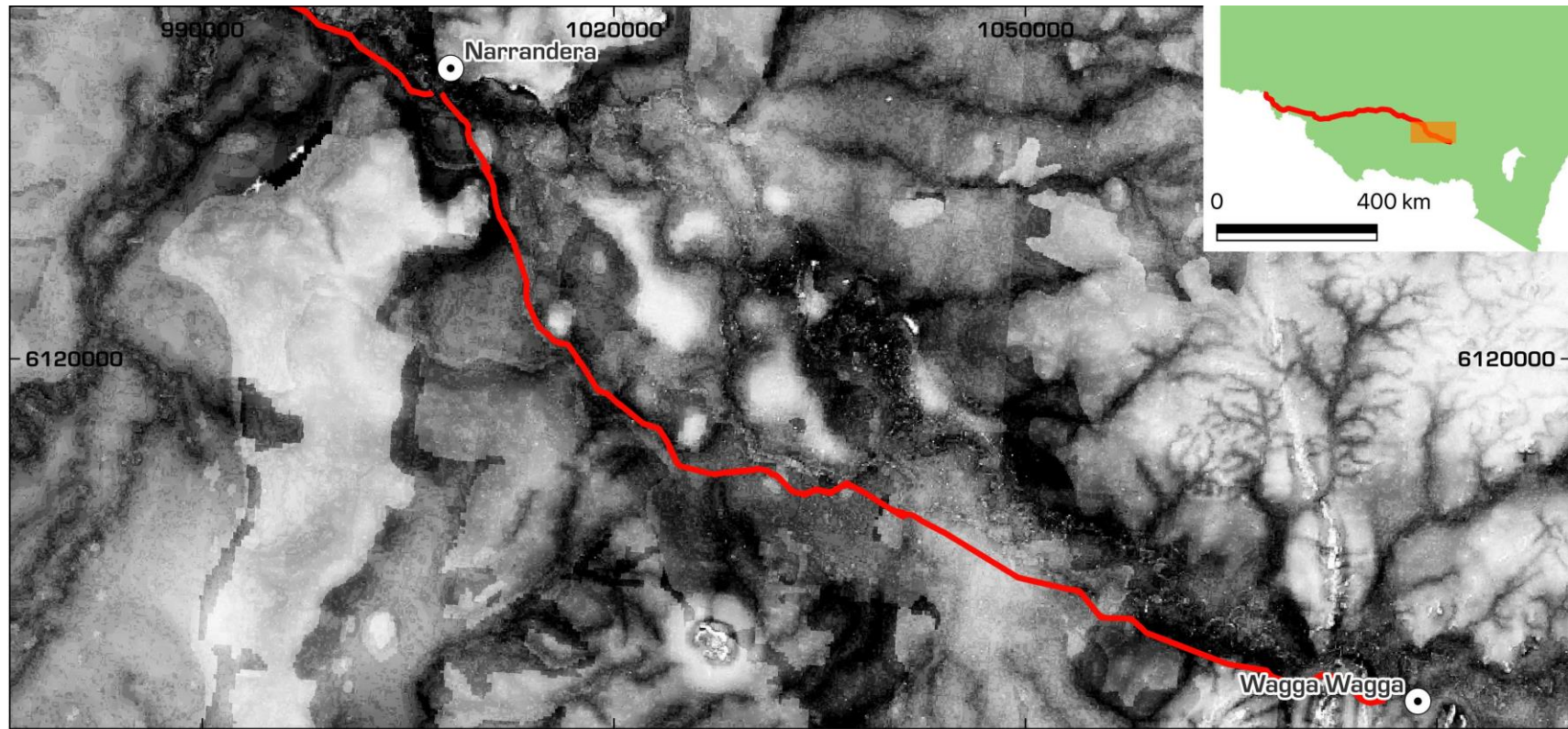
Sturt Highway ASDST Grinding Grooves - Overview



Legend

-  Study Area
- ASDST Modelling






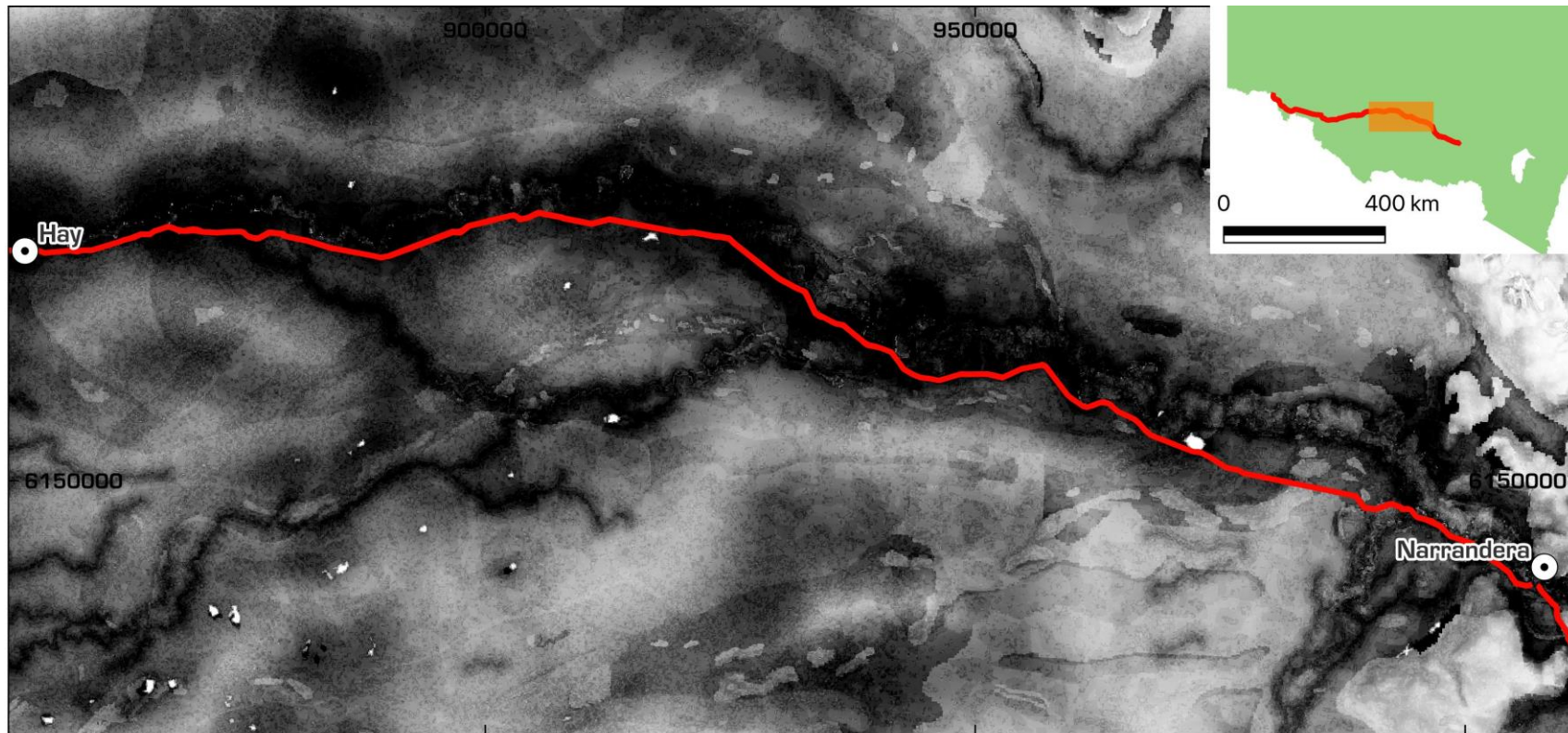
Sturt Highway ASDST Hearths - Section 1



Legend

-  Study Area
- ASDST Modelling






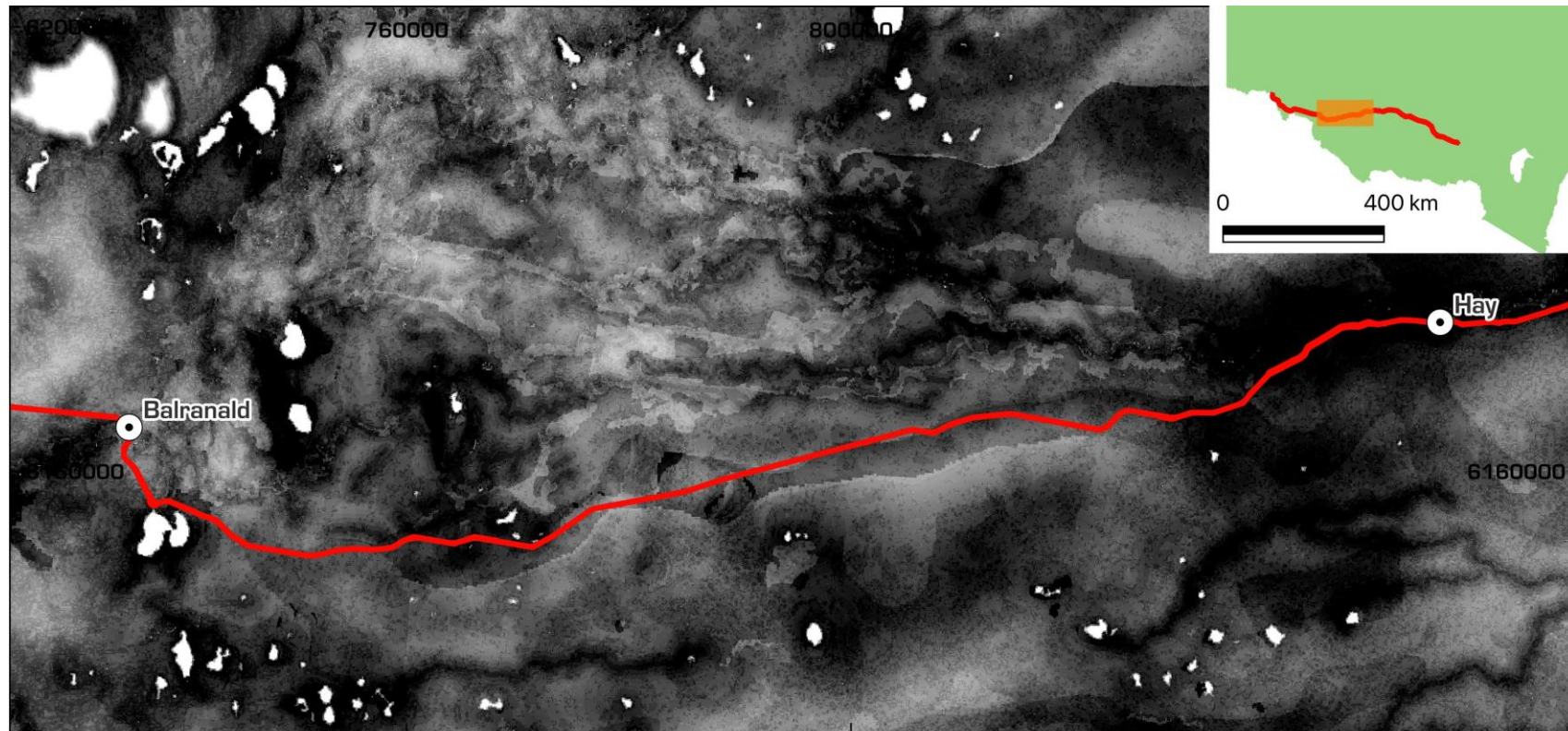
Sturt Highway ASDST Hearths - Section 2



Legend

-  Study Area
- ASDST Modelling






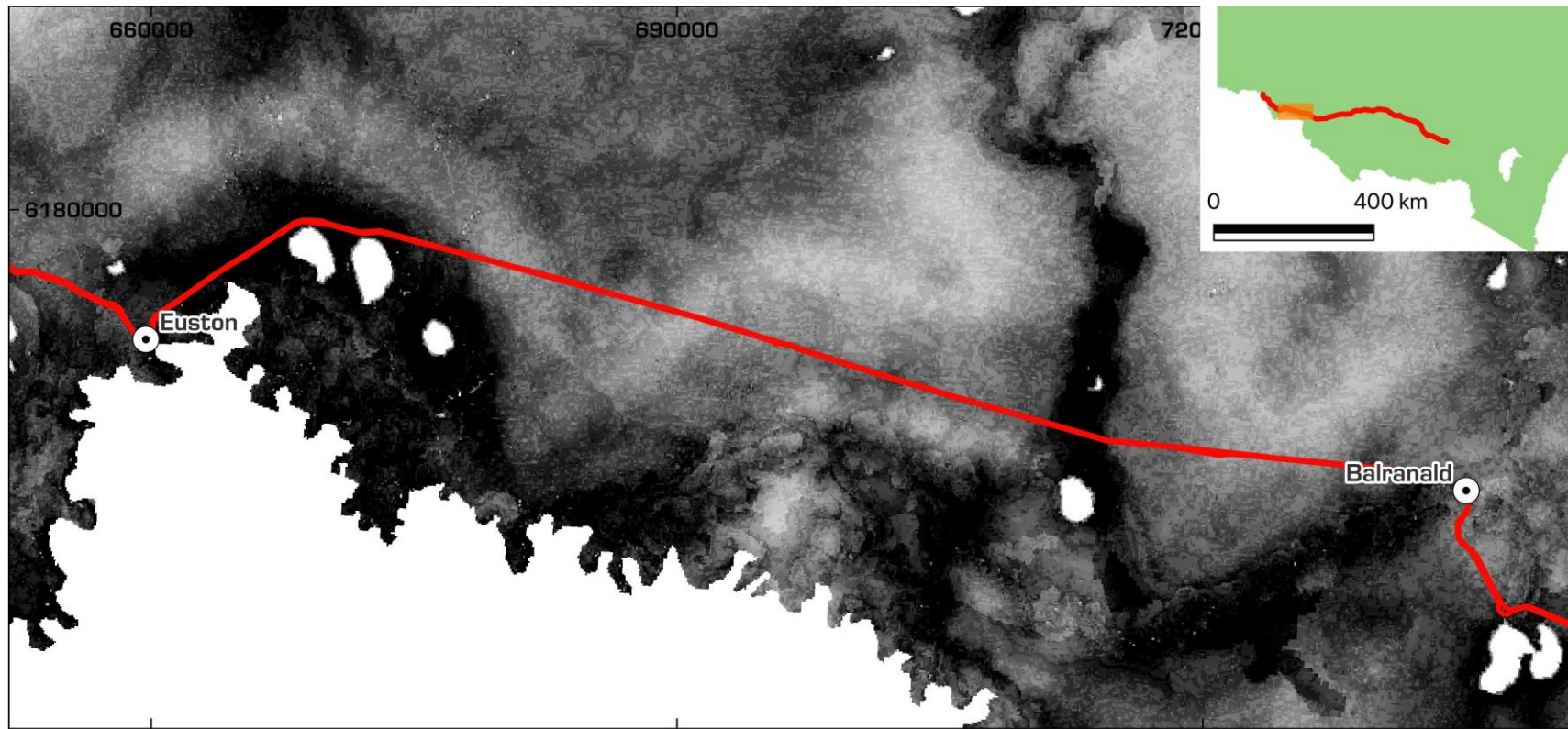
Sturt Highway ASDST Hearths - Section 3



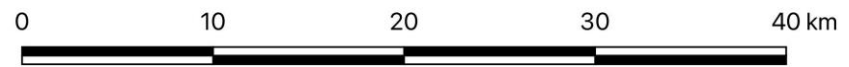
Legend

-  Study Area
- ASDST Modelling






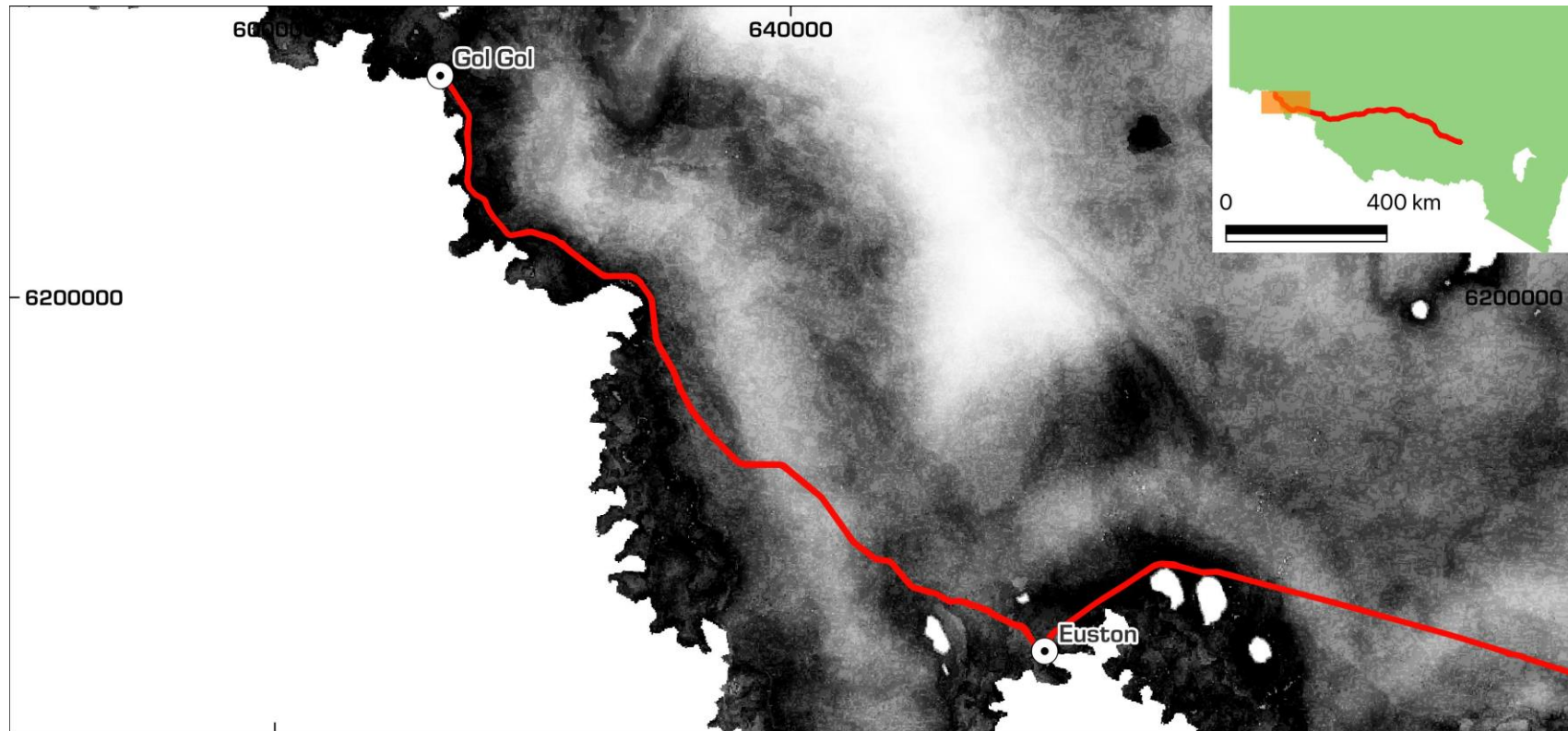
Sturt Highway ASDST Hearths - Section 4



Legend

-  Study Area
- ASDST Modelling





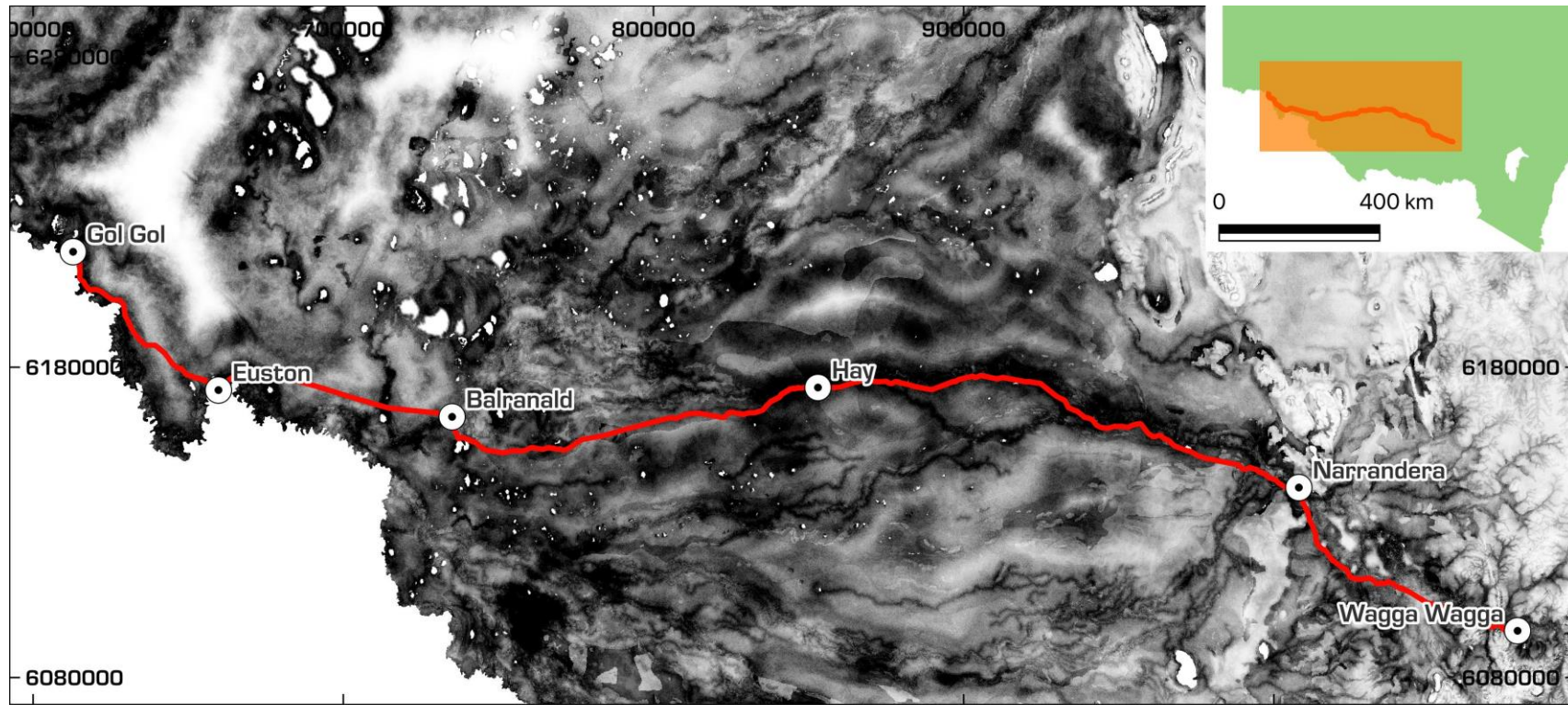
Sturt Highway ASDST Hearths - Section 5



Legend

- Study Area
- ASDST Modelling






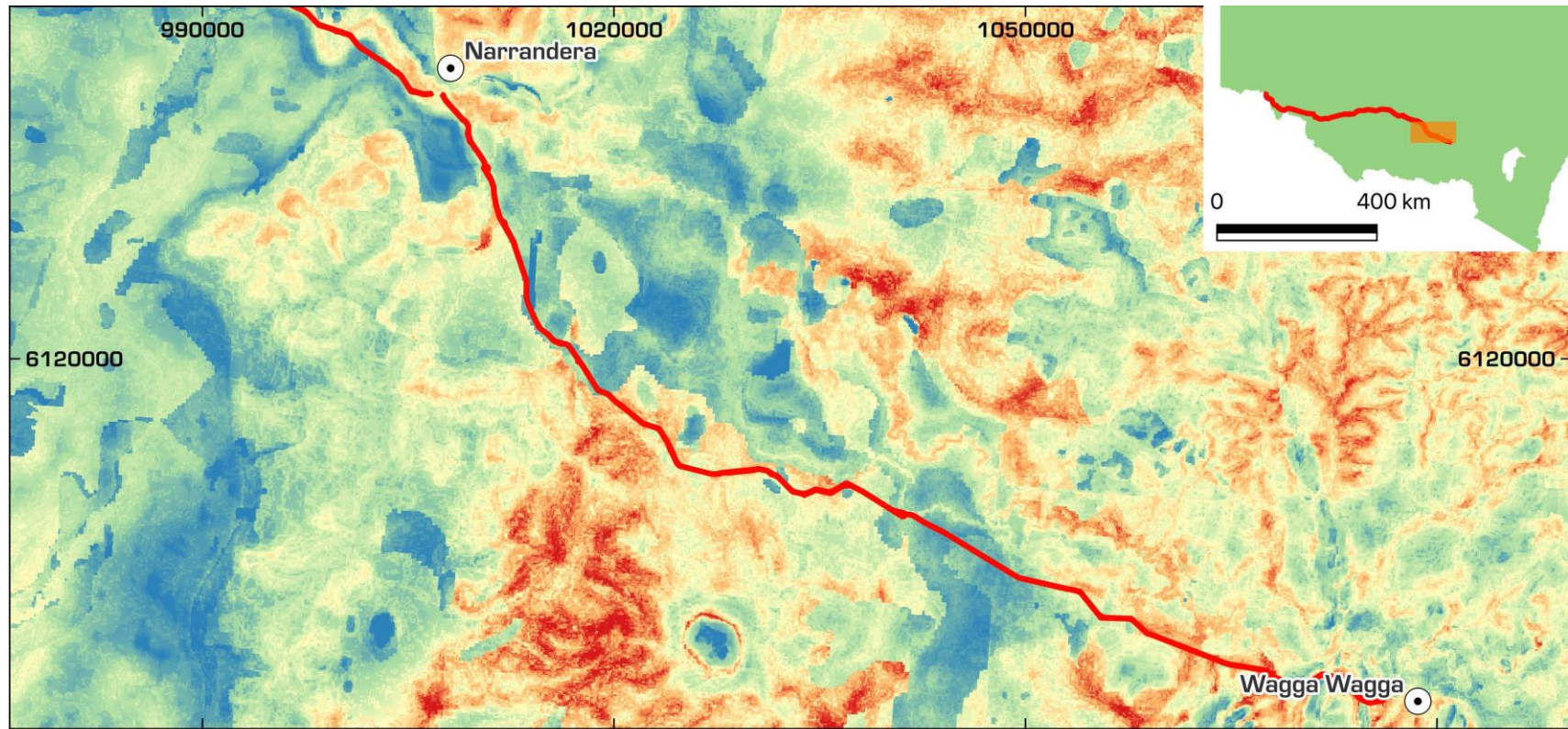
Sturt Highway ASDST Hearths - Overview



Legend

-  Study Area
- ASDST Modelling






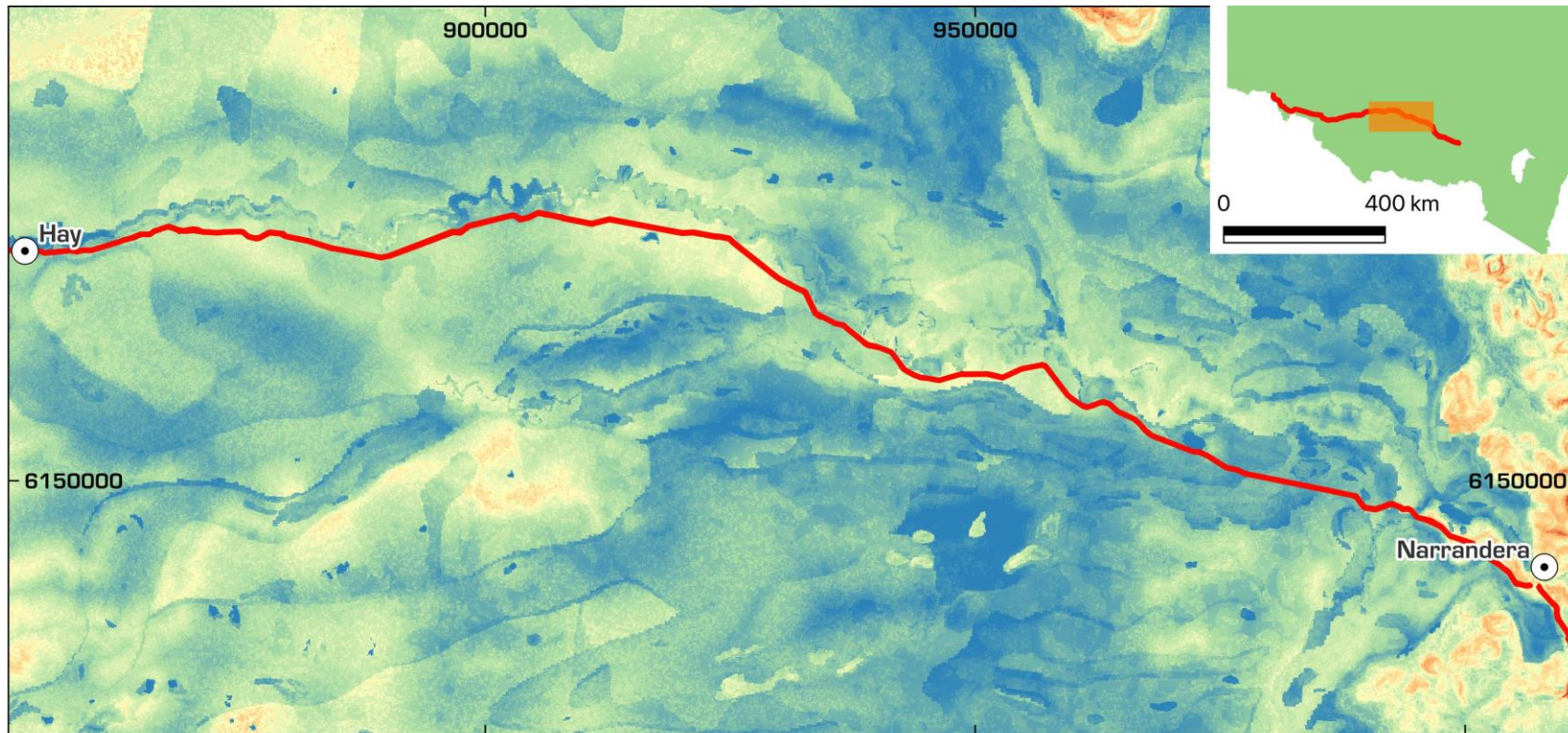
Sturt Highway Reliability of Model - Section 1



Legend

-  Study Area
- ASDST Modelling





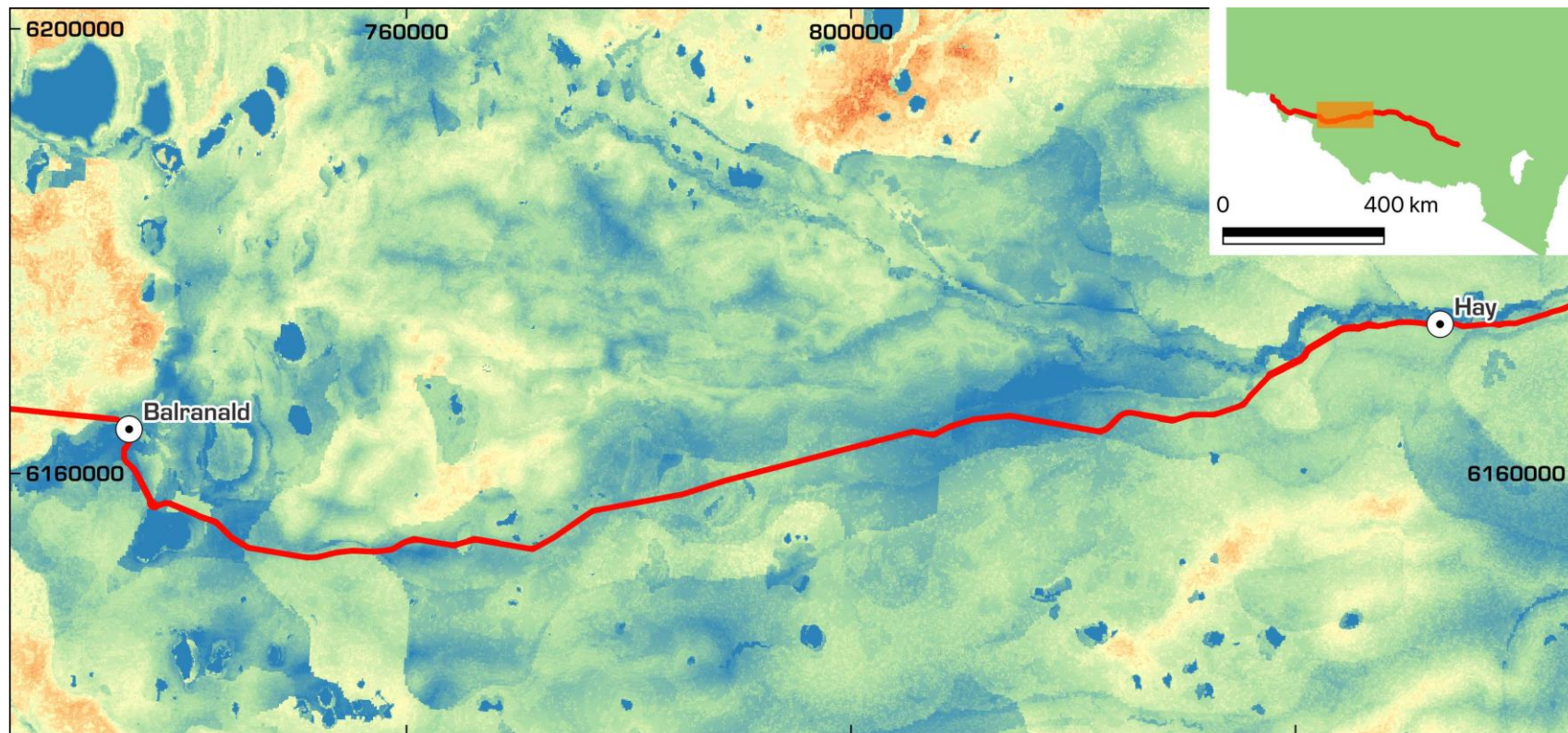
Sturt Highway Reliability of Model - Section 2



Legend

- Study Area
- ASDST Modelling





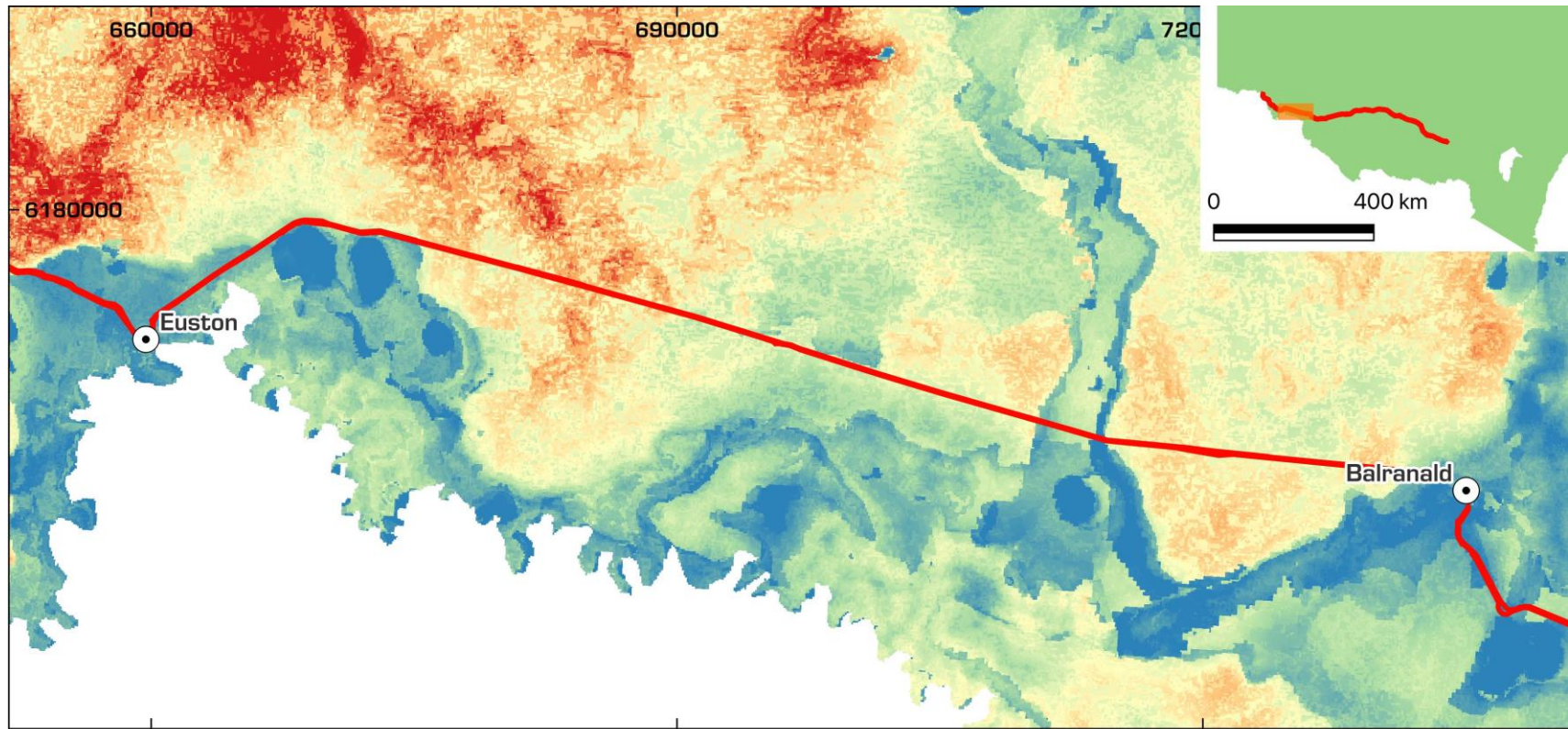
Sturt Highway Reliability of Model - Section 3



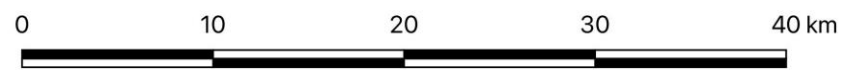
Legend

- Study Area
- ASDST Modelling






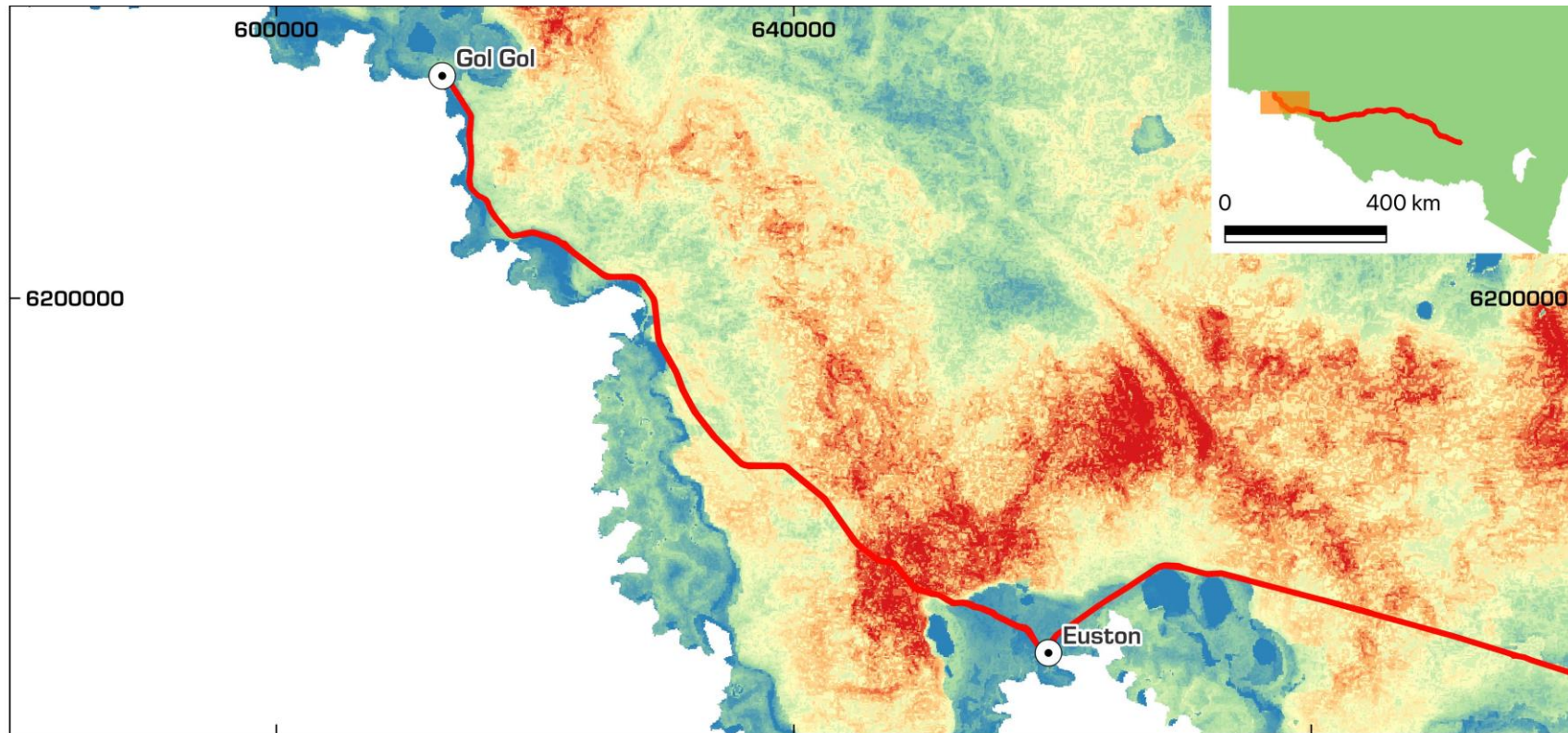
Sturt Highway Reliability of Model - Section 4



Legend

-  Study Area
- ASDST Modelling






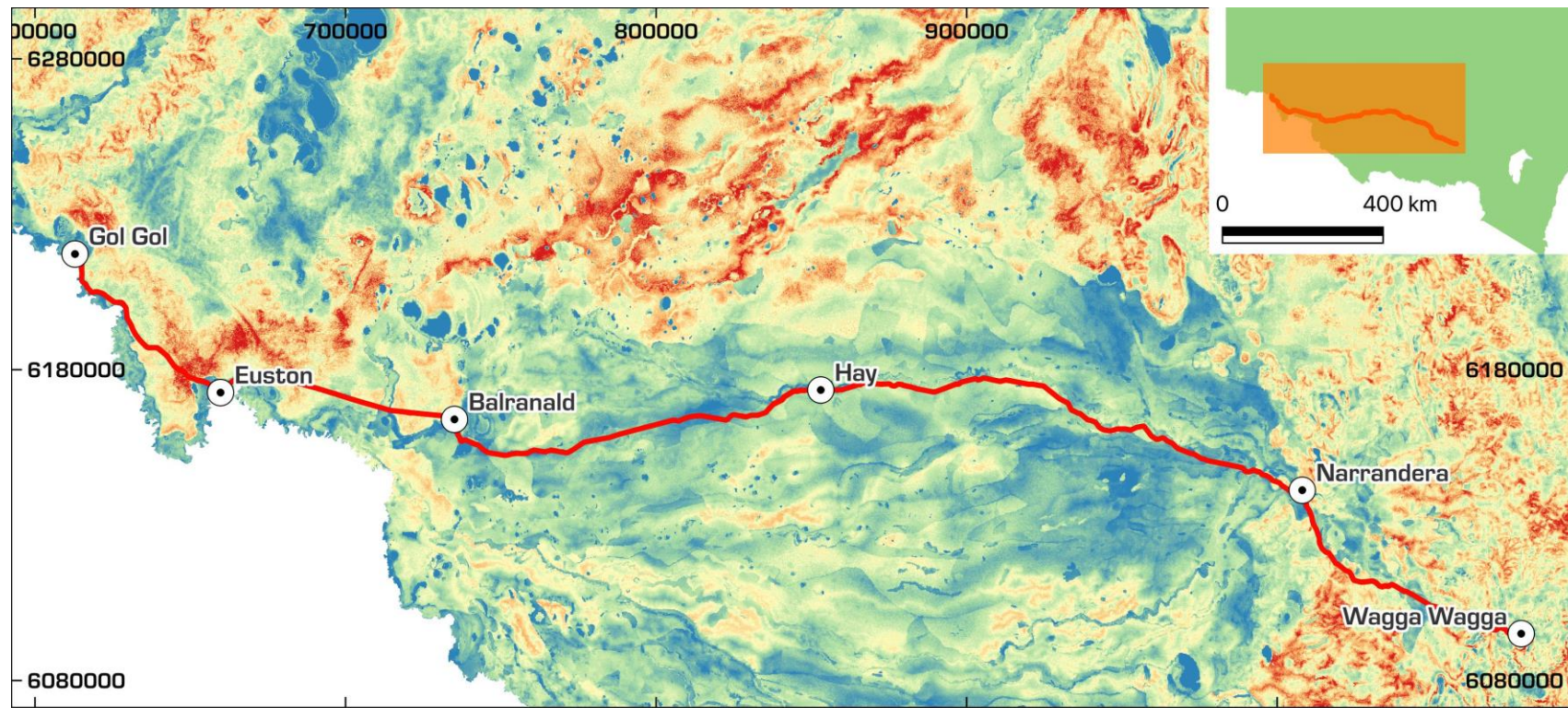
Sturt Highway Reliability of Model - Section 5



Legend

-  Study Area
- ASDST Modelling



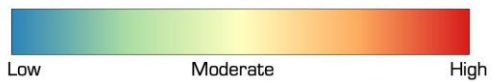


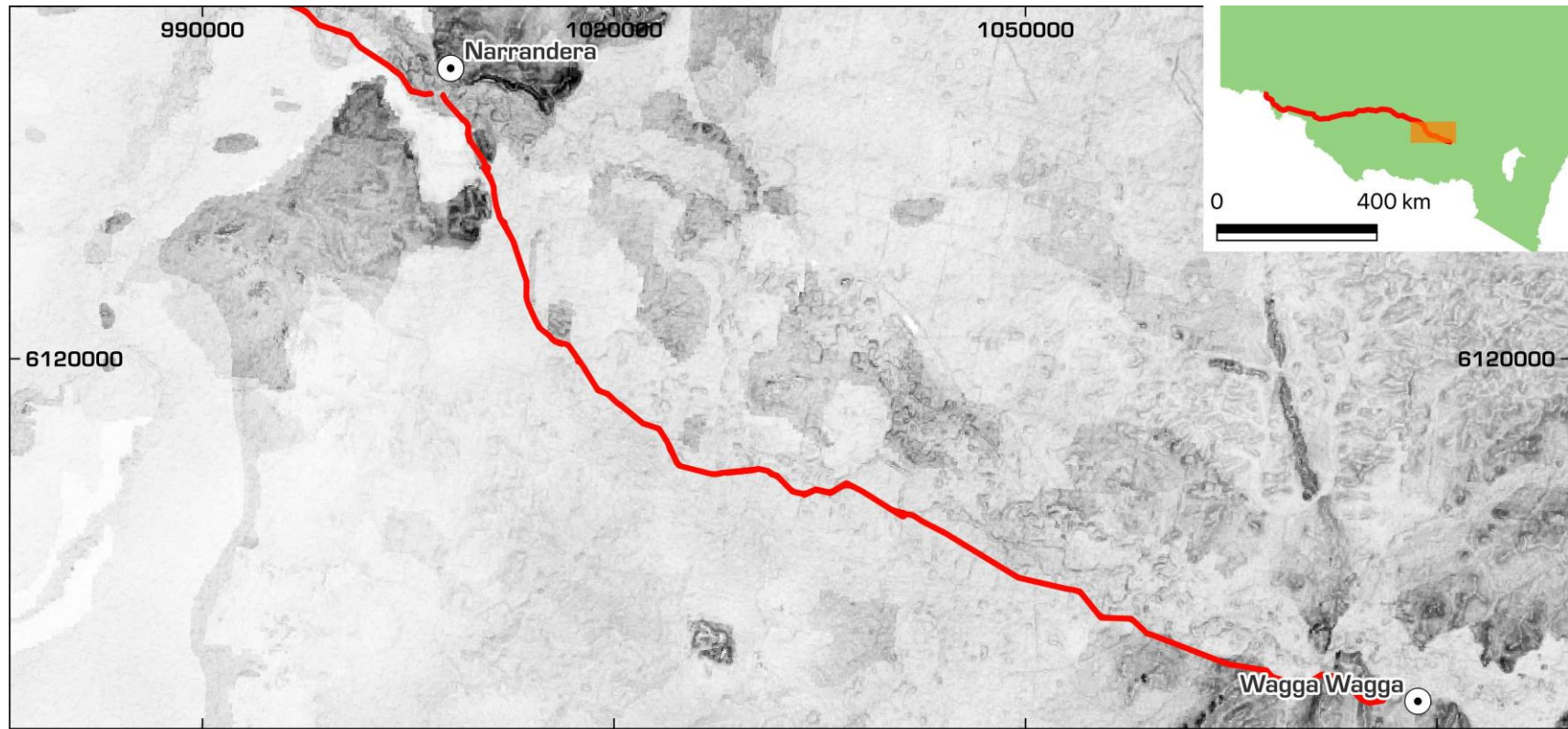
Sturt Highway Reliability of Model - Overview



Legend

- Study Area
- ASDST Modelling






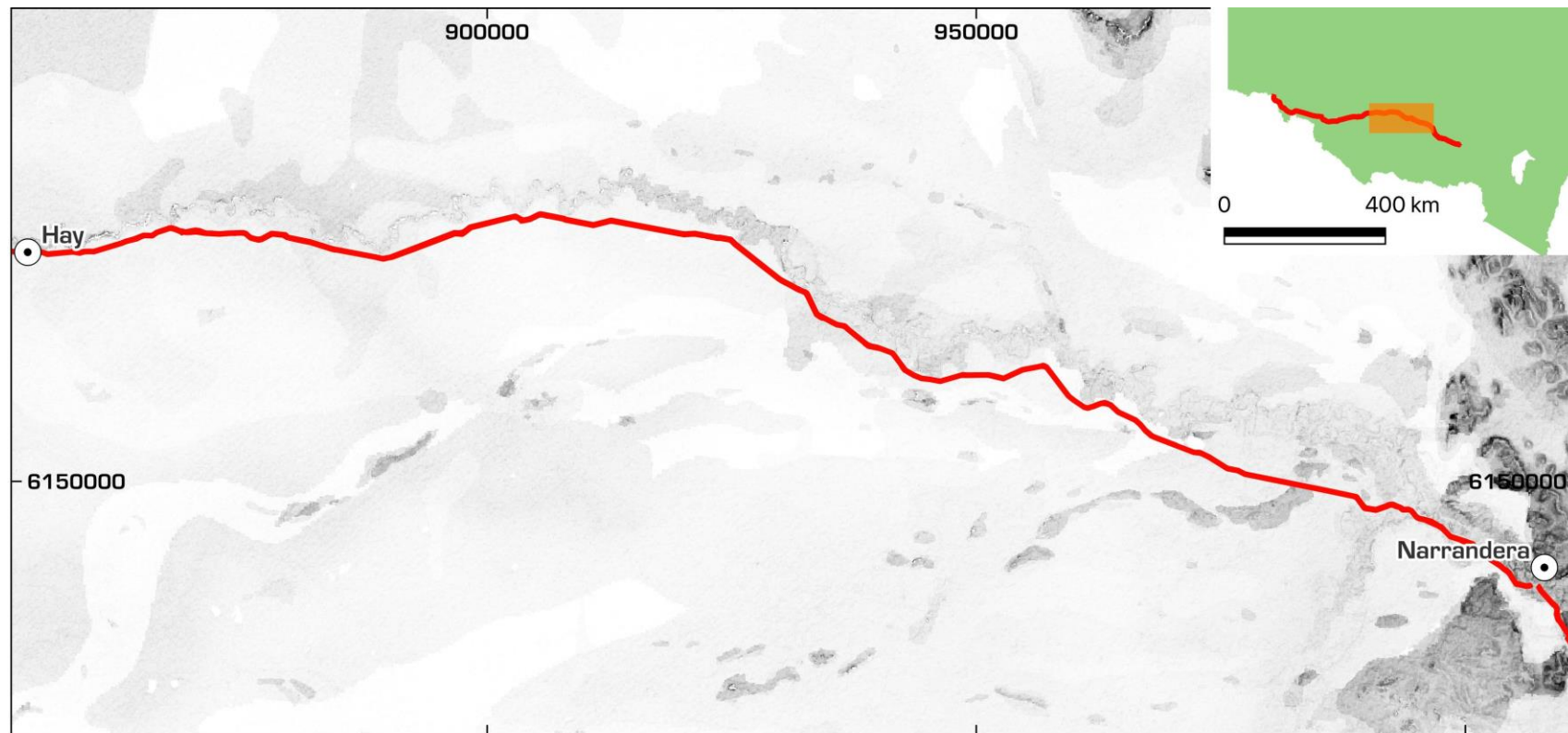
Sturt Highway ASDST Rock Art - Section 1



Legend

-  Study Area
- ASDST Modelling






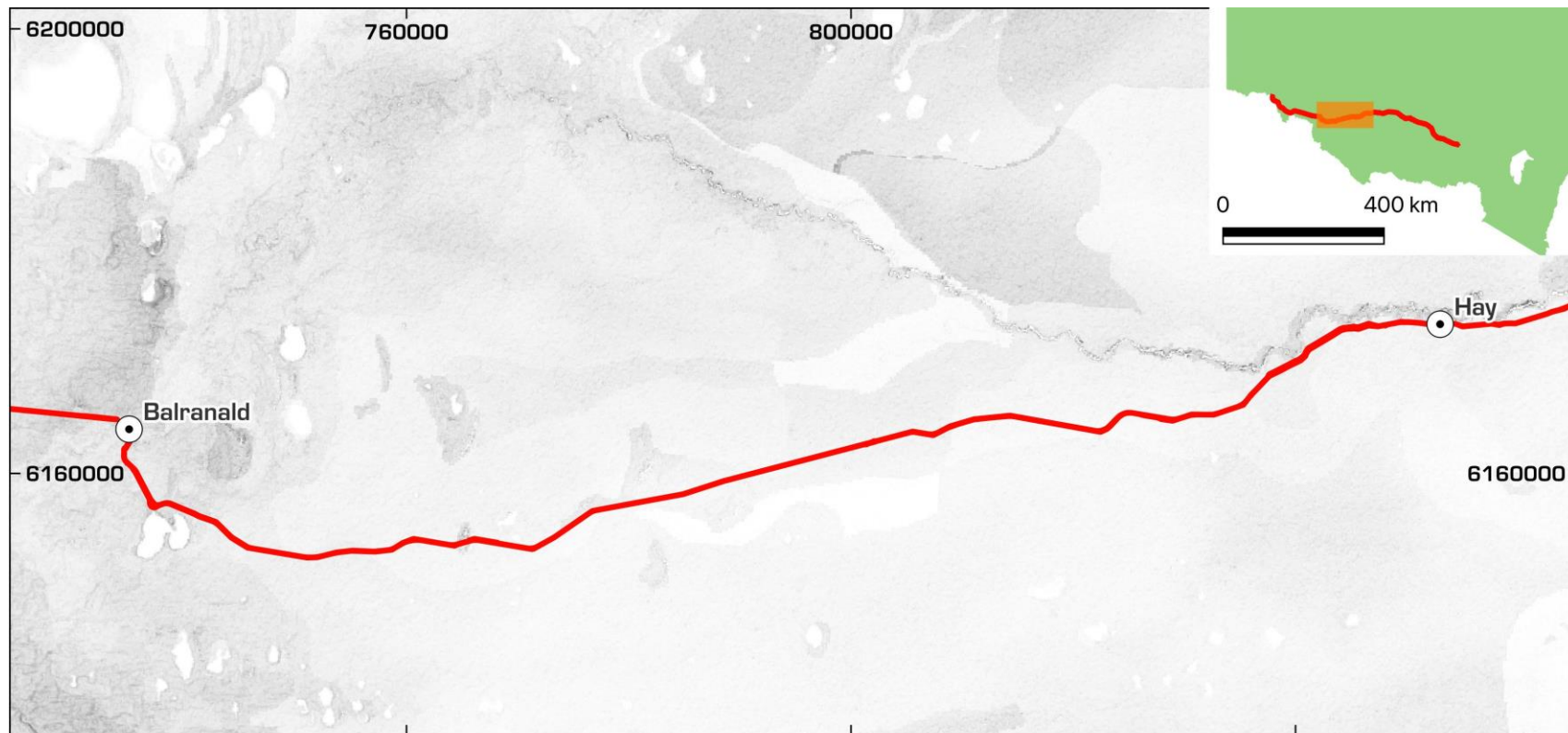
Sturt Highway ASDST Rock Art - Section 2



Legend

-  Study Area
- ASDST Modelling






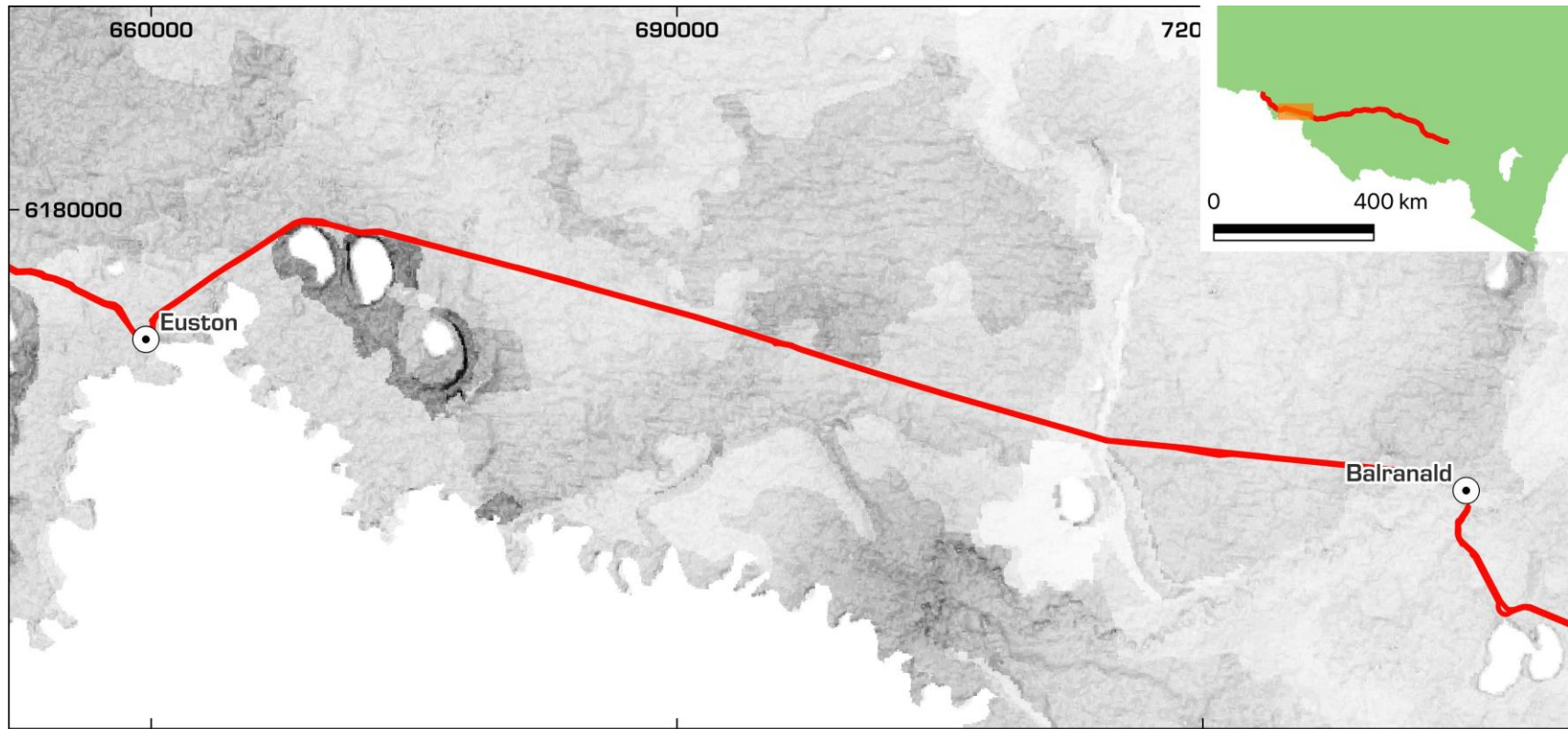
Sturt Highway ASDST Rock Art - Section 3



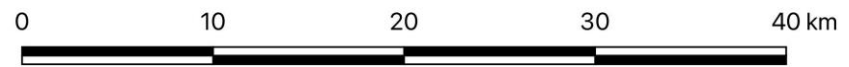
Legend

-  Study Area
- ASDST Modelling






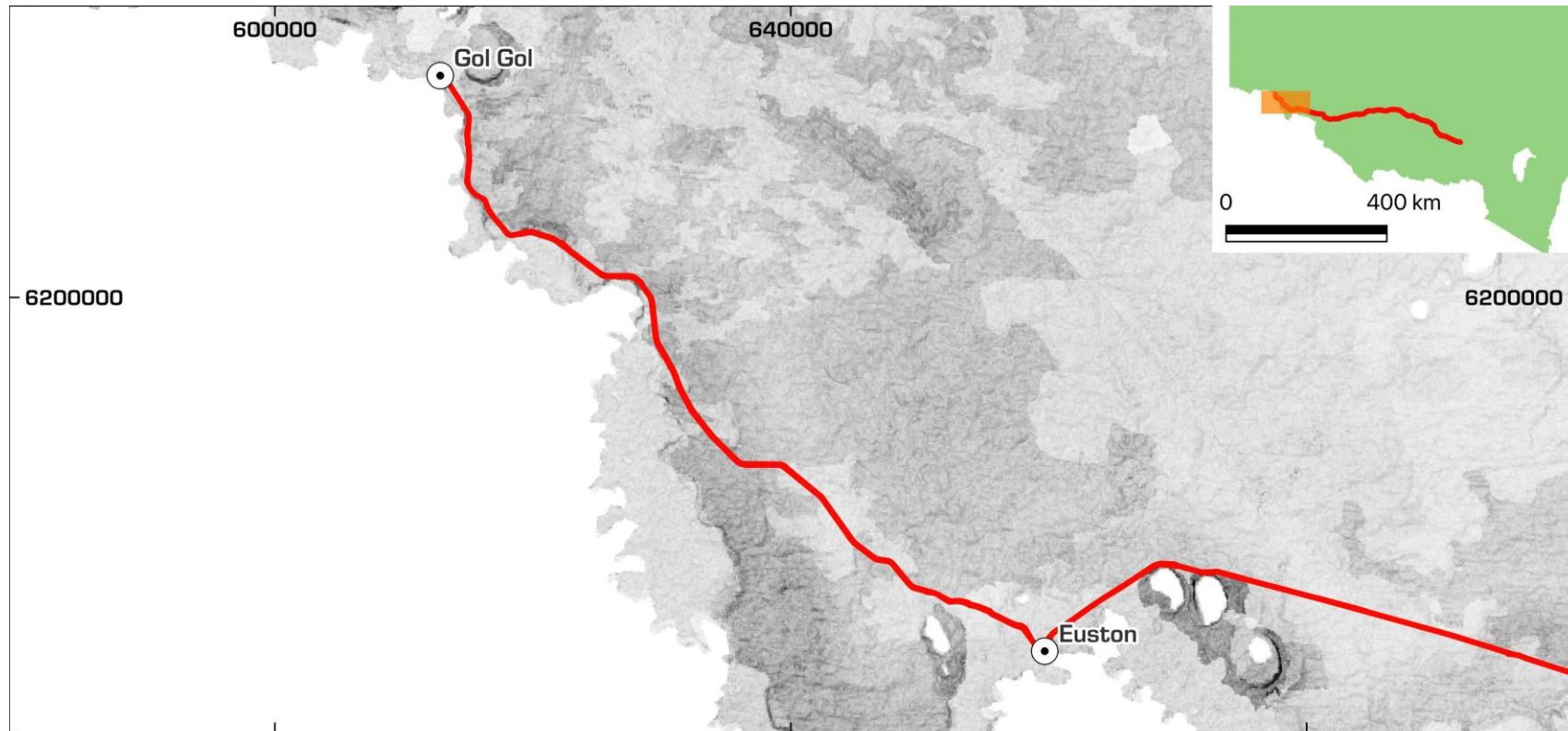
Sturt Highway ASDST Rock Art - Section 4



Legend

-  Study Area
- ASDST Modelling






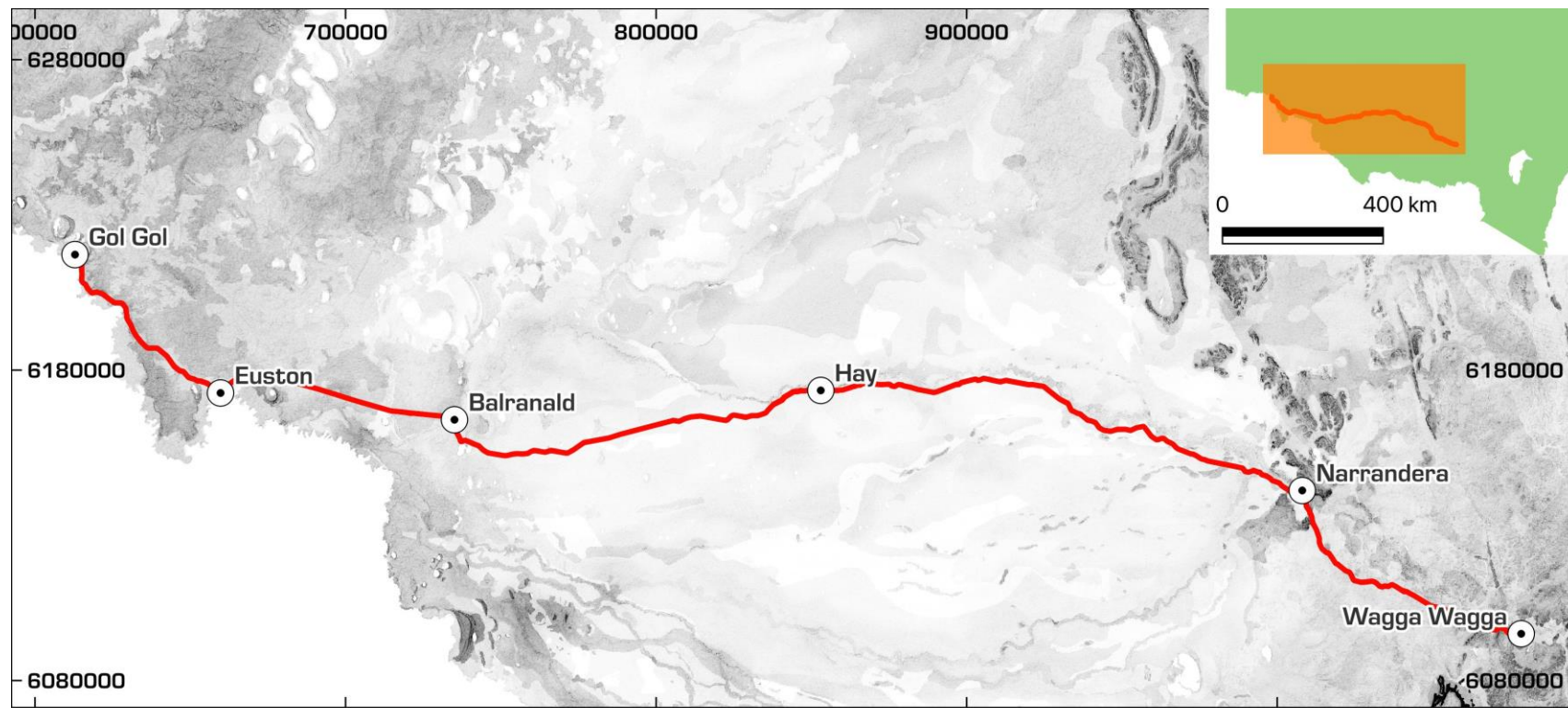
Sturt Highway ASDST Rock Art - Section 5



Legend

-  Study Area
- ASDST Modelling






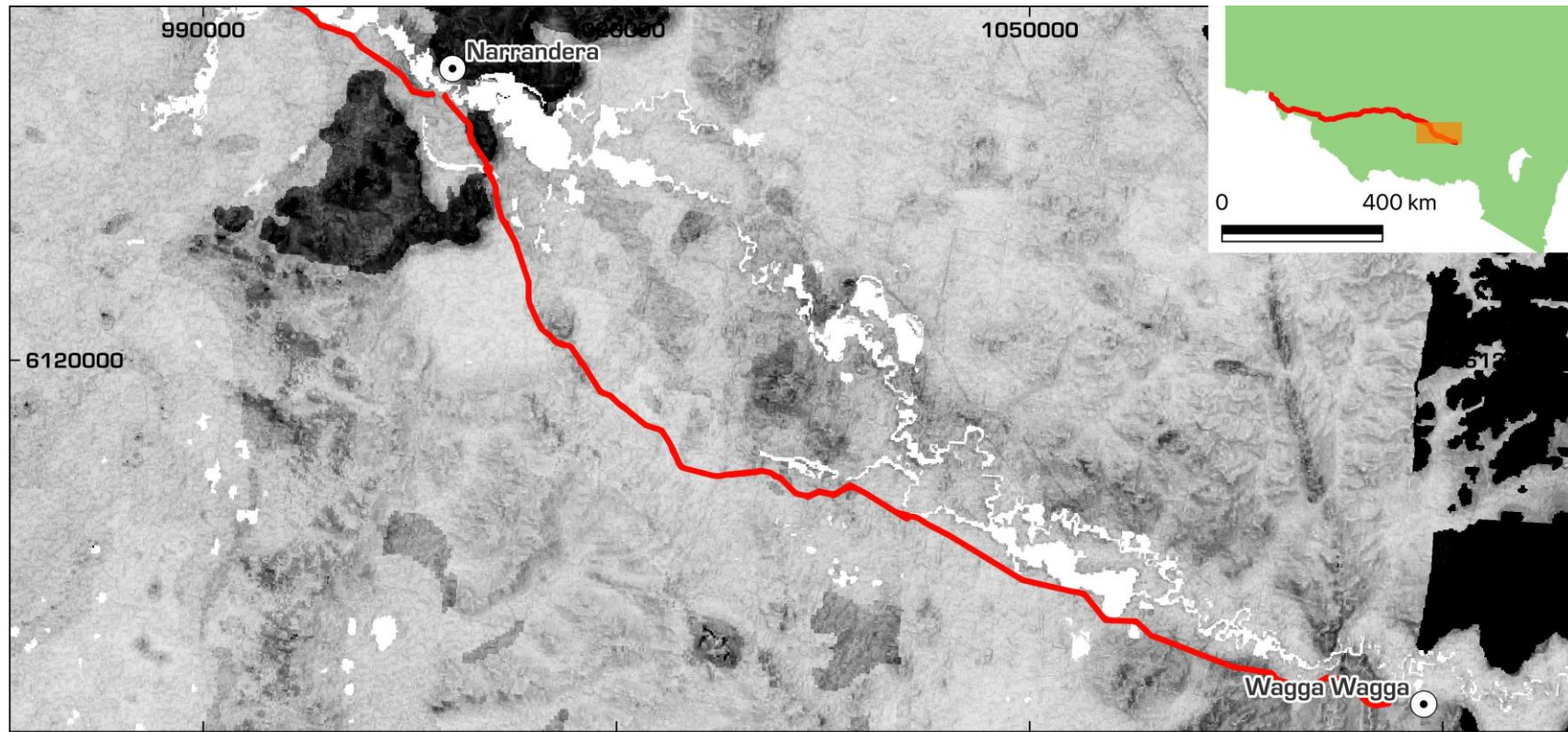
Sturt Highway ASDST Rock Art - Overview



Legend

-  Study Area
- ASDST Modelling






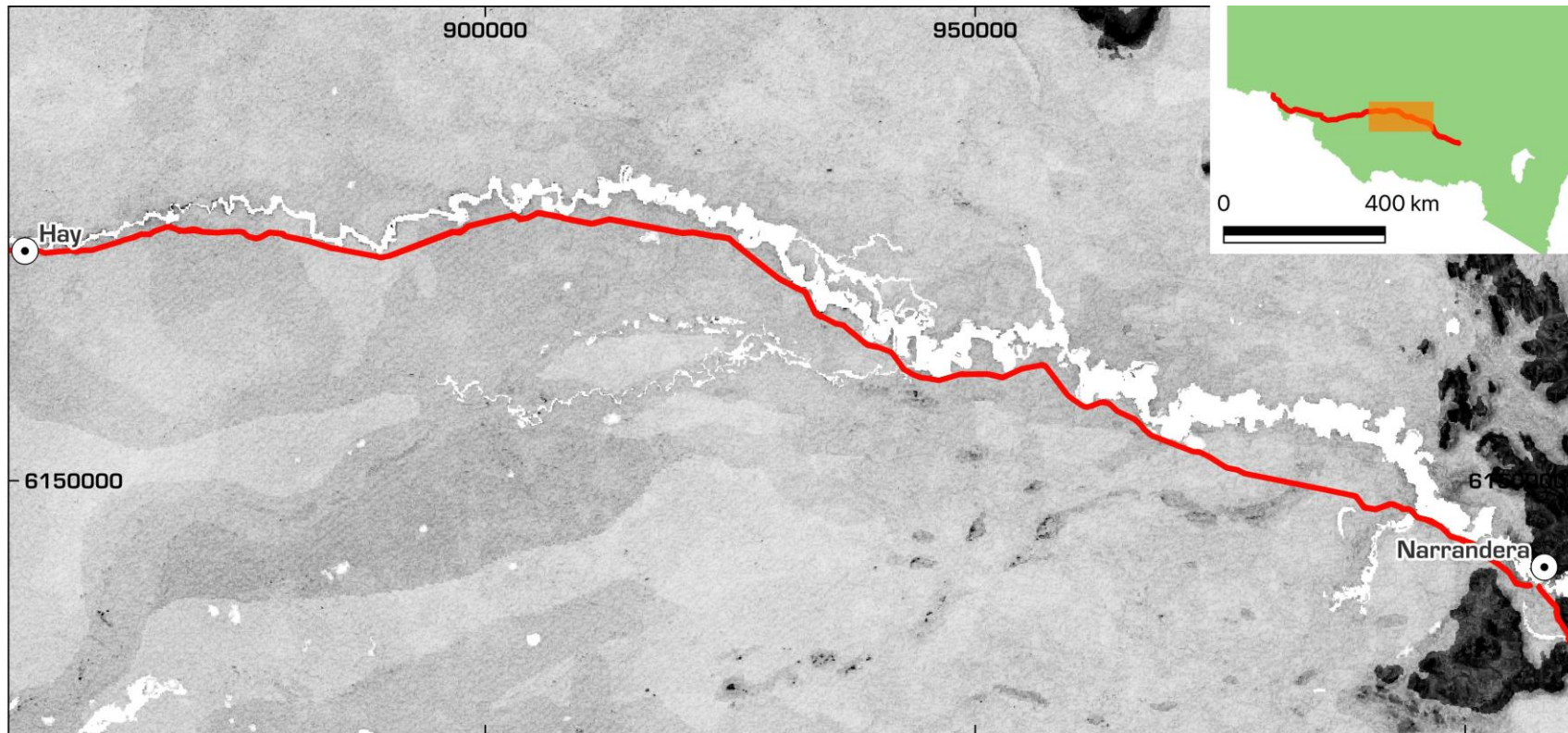
Sturt Highway ASDST Stone Quarries - Section 1



Legend

-  Study Area
- ASDST Modelling






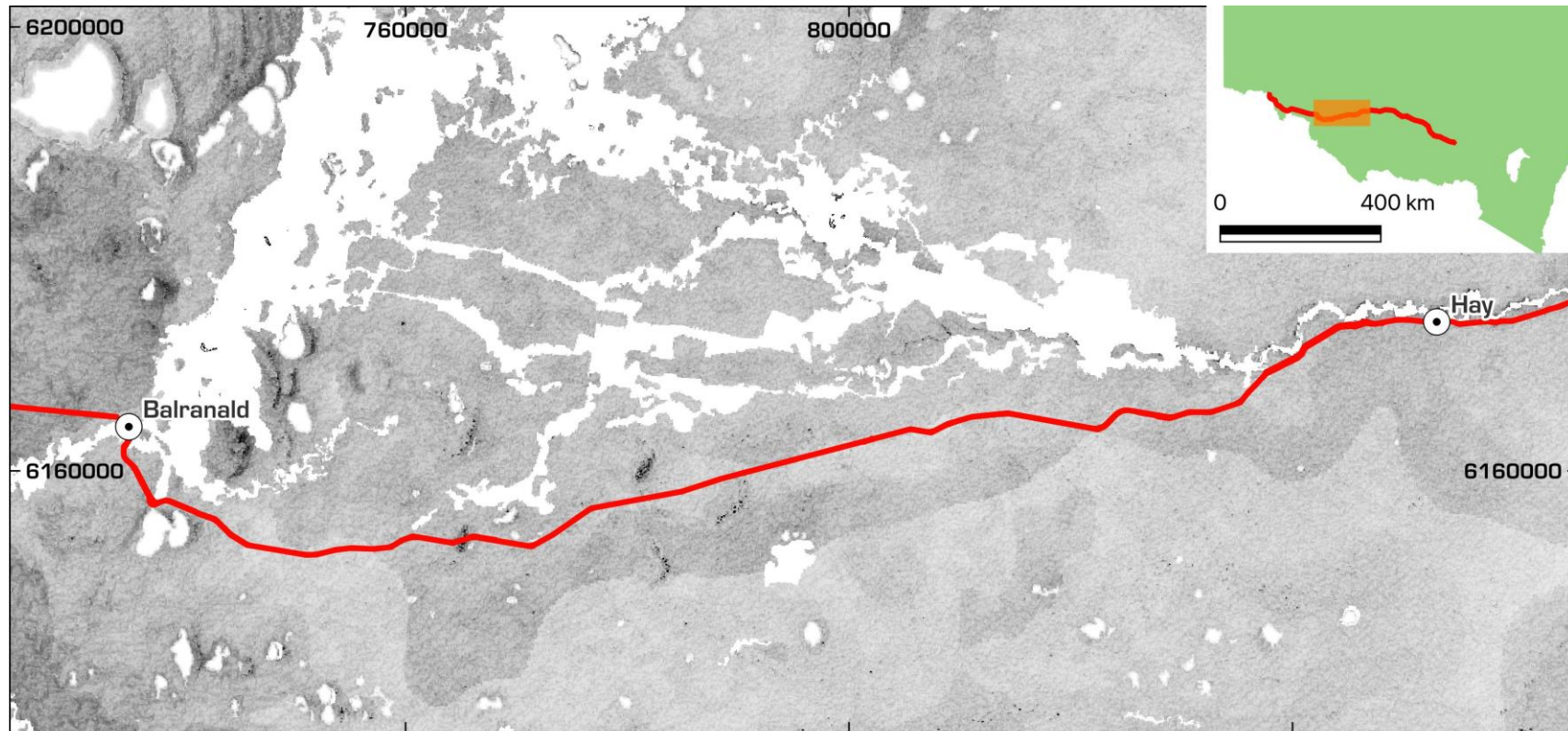
Sturt Highway ASDST Stone Quarries - Section 2



Legend

-  Study Area
- ASDST Modelling






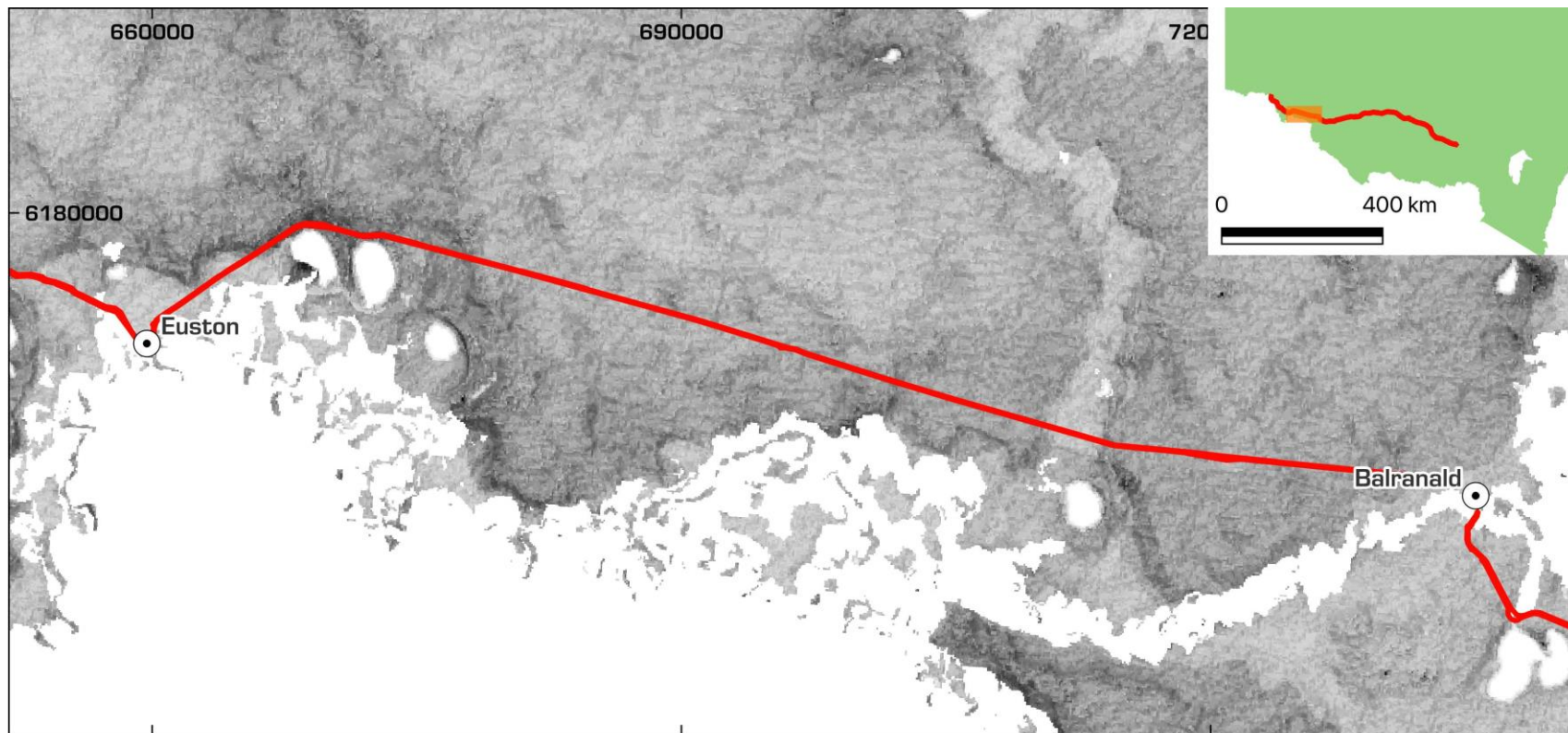
Sturt Highway ASDST Stone Quarries - Section 3



Legend

-  Study Area
- ASDST Modelling






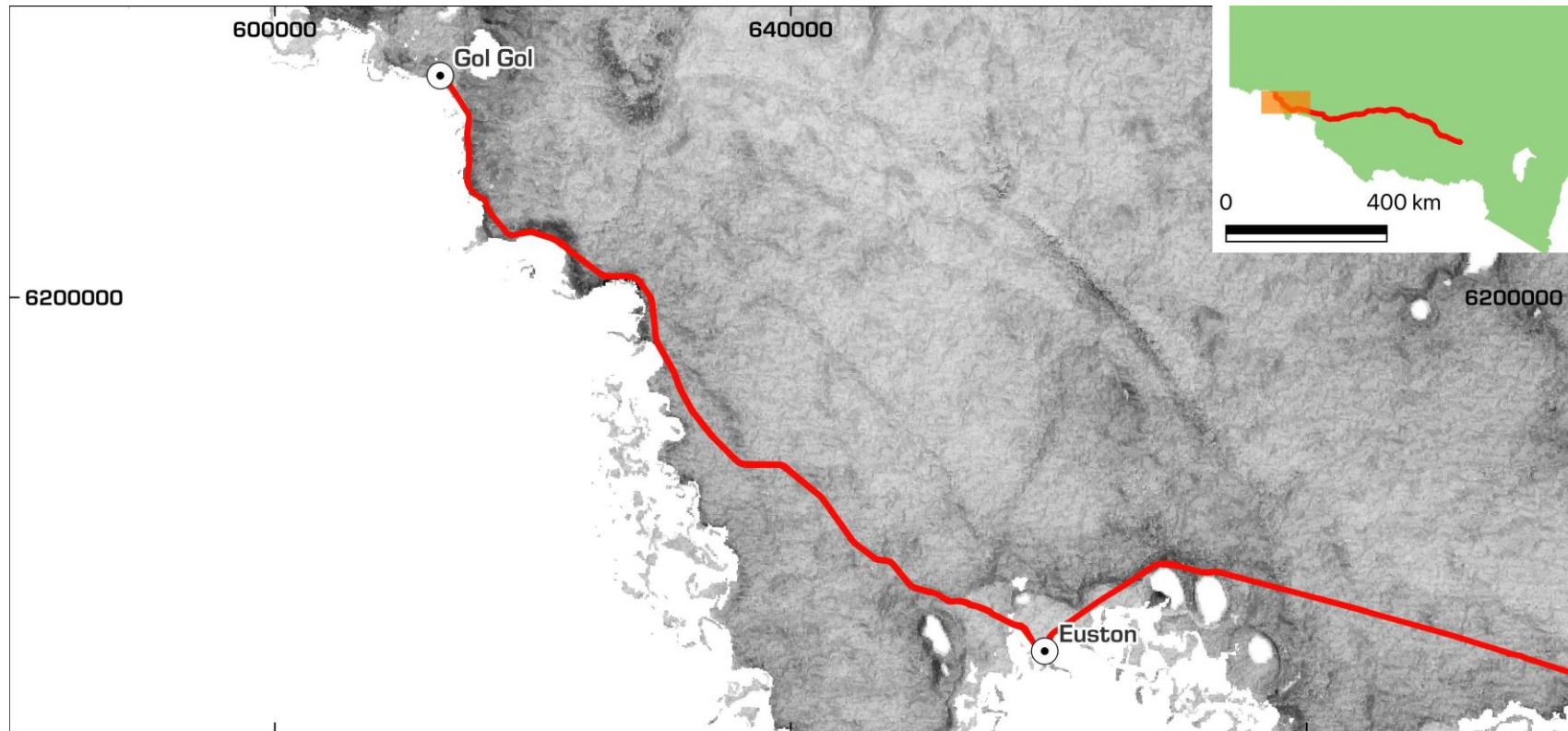
Sturt Highway ASDST Stone Quarries - Section 4



Legend

-  Study Area
- ASDST Modelling





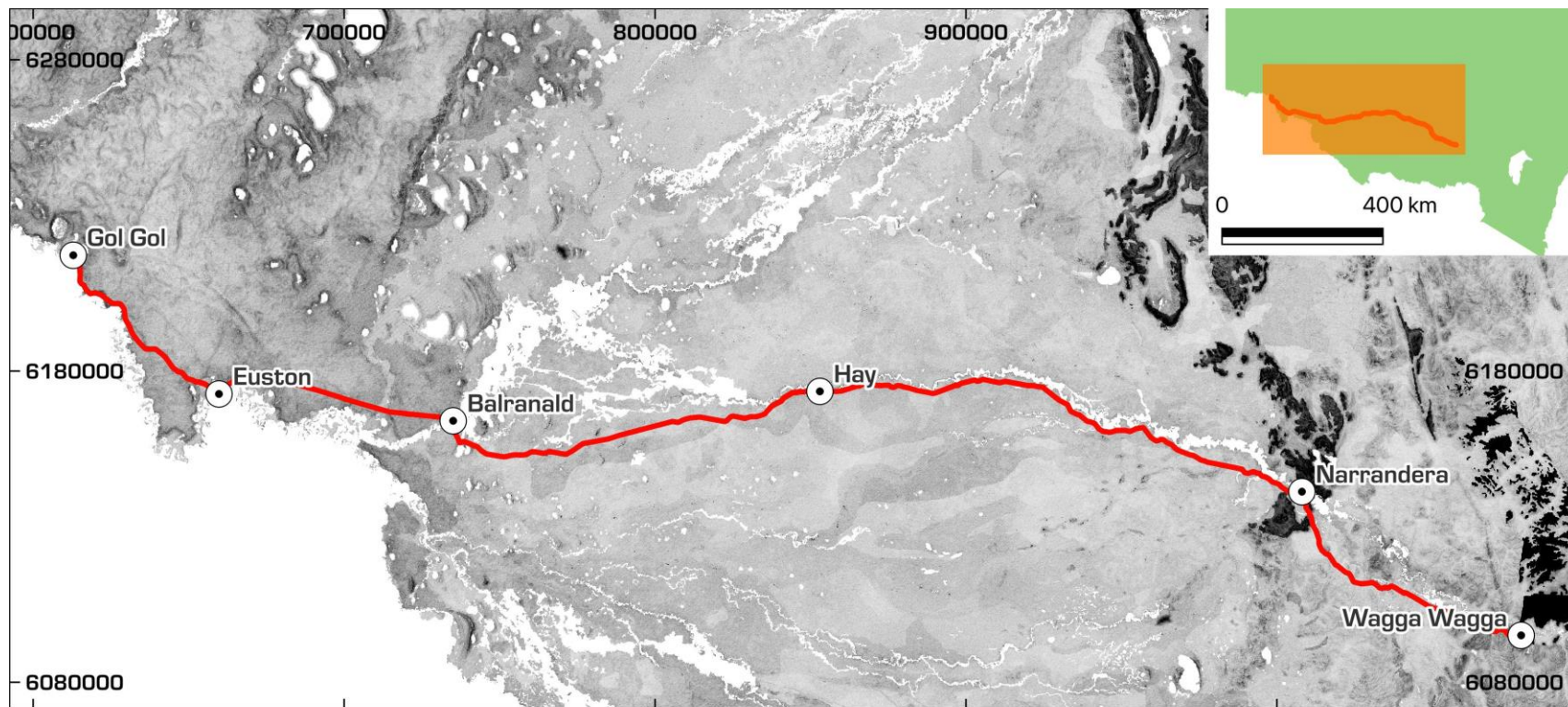
Sturt Highway ASDST Stone Quarries - Section 5



Legend

- Study Area
- ASDST Modelling





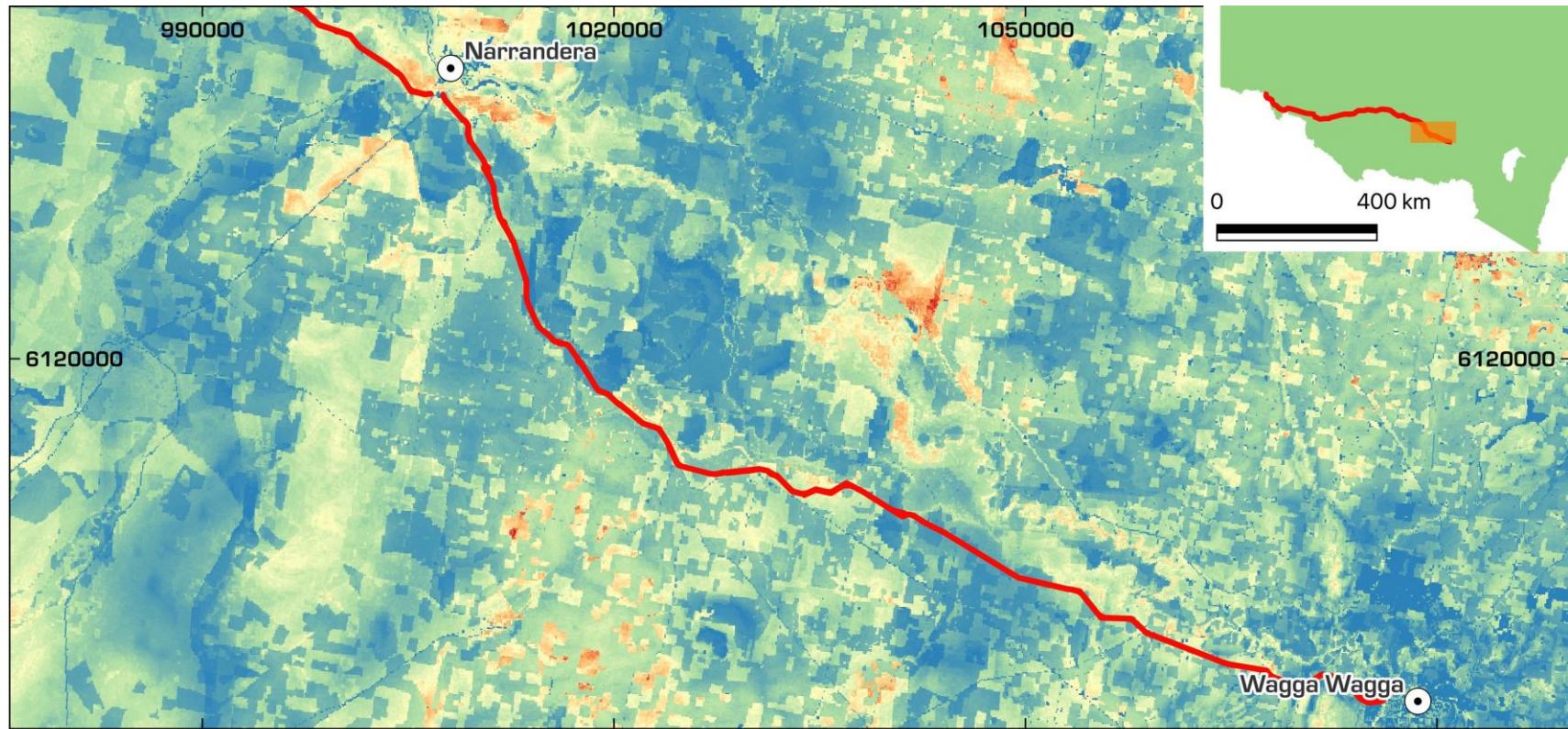
Sturt Highway ASDST Stone Quarries - Overview



Legend


- Study Area
- ASDST Modelling



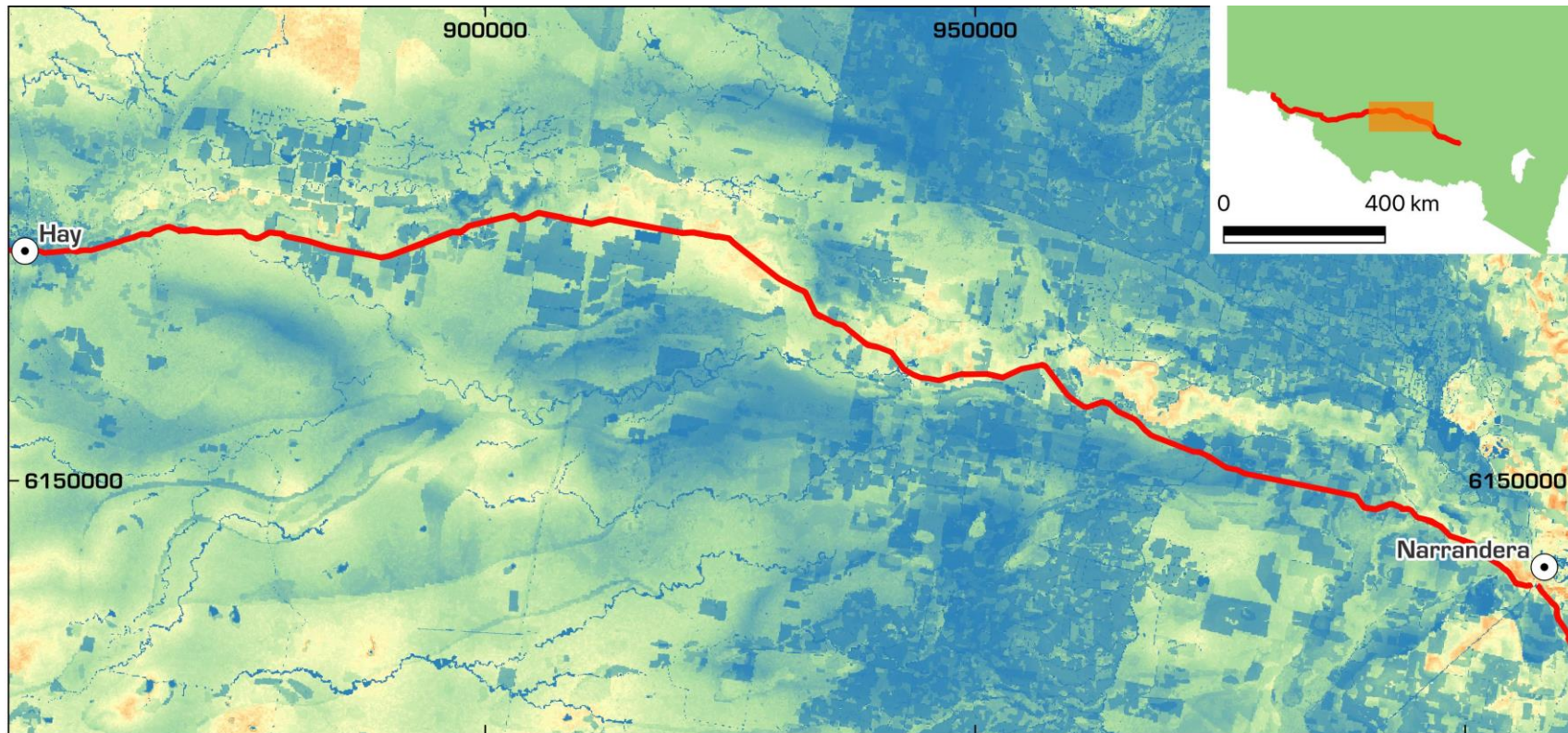


Sturt Highway Survey Priority - Section 1

Legend

-  Study Area
- ASDST Modelling




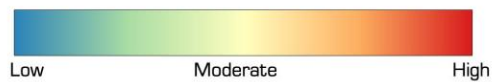


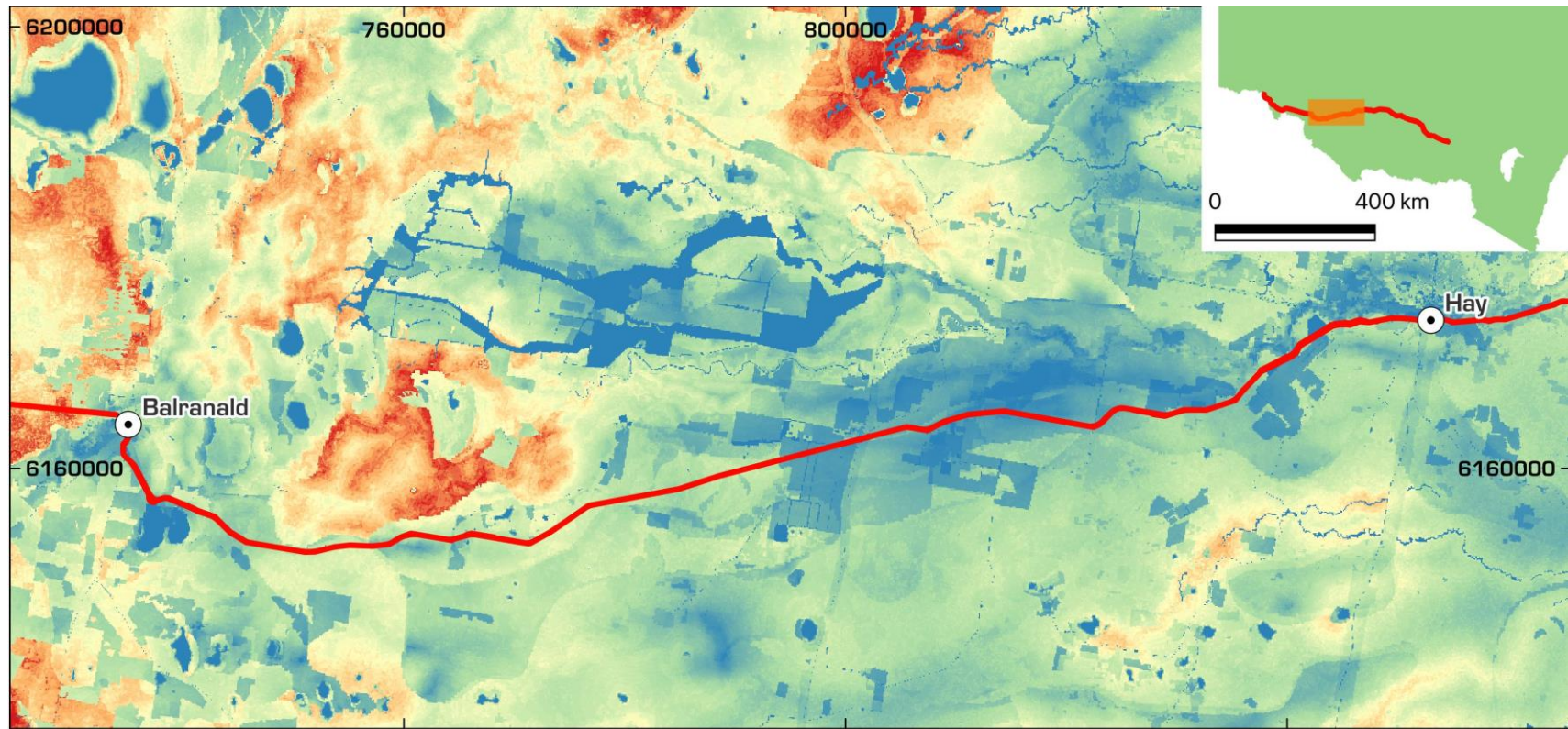
Sturt Highway Survey Priority - Section 2



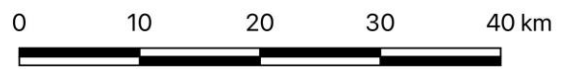
Legend

-  Study Area
- ASDST Modelling



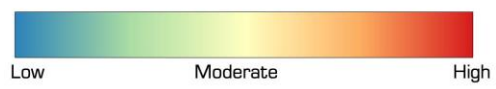


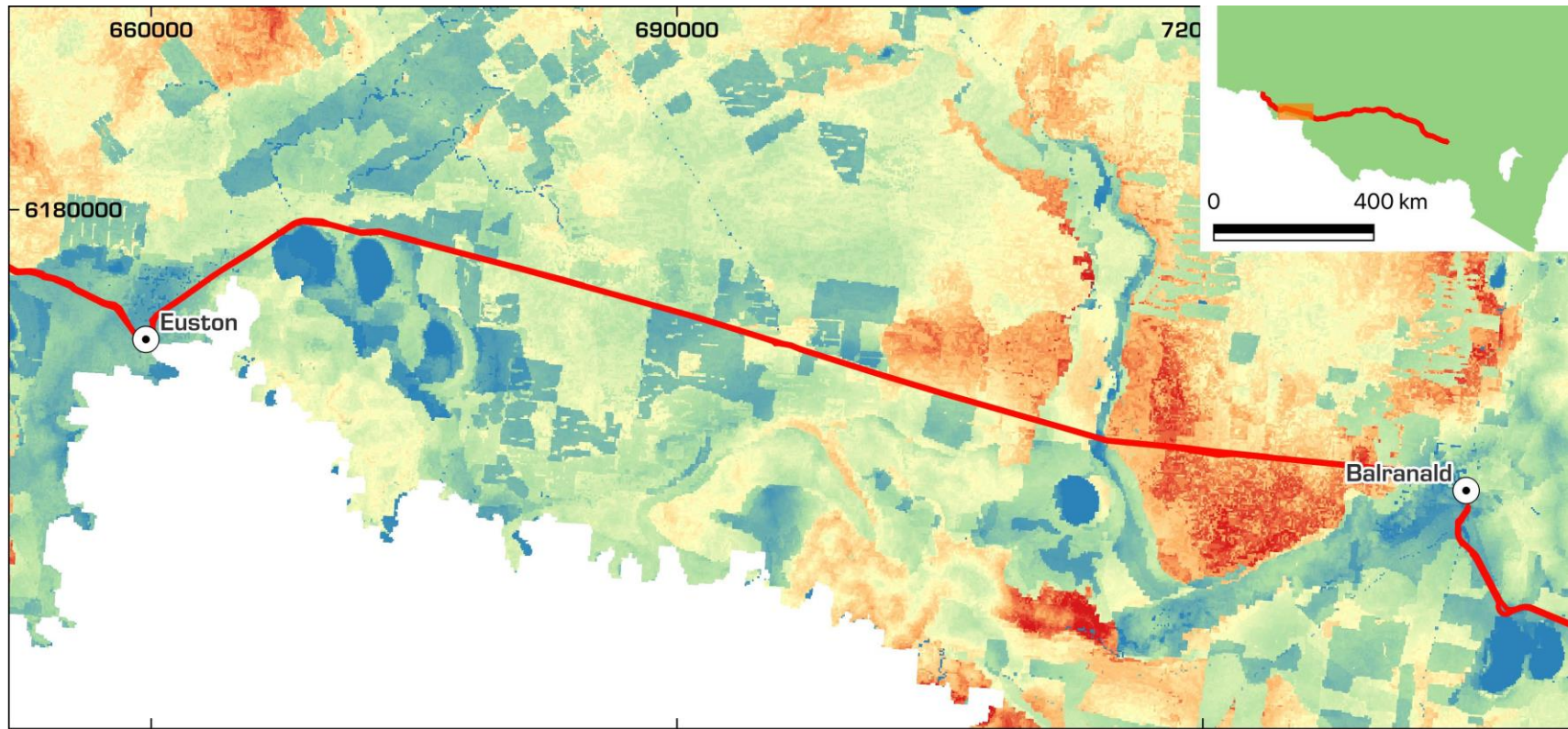
Sturt Highway Survey Priority - Section 3



Legend

- Study Area
- ASDST Modelling






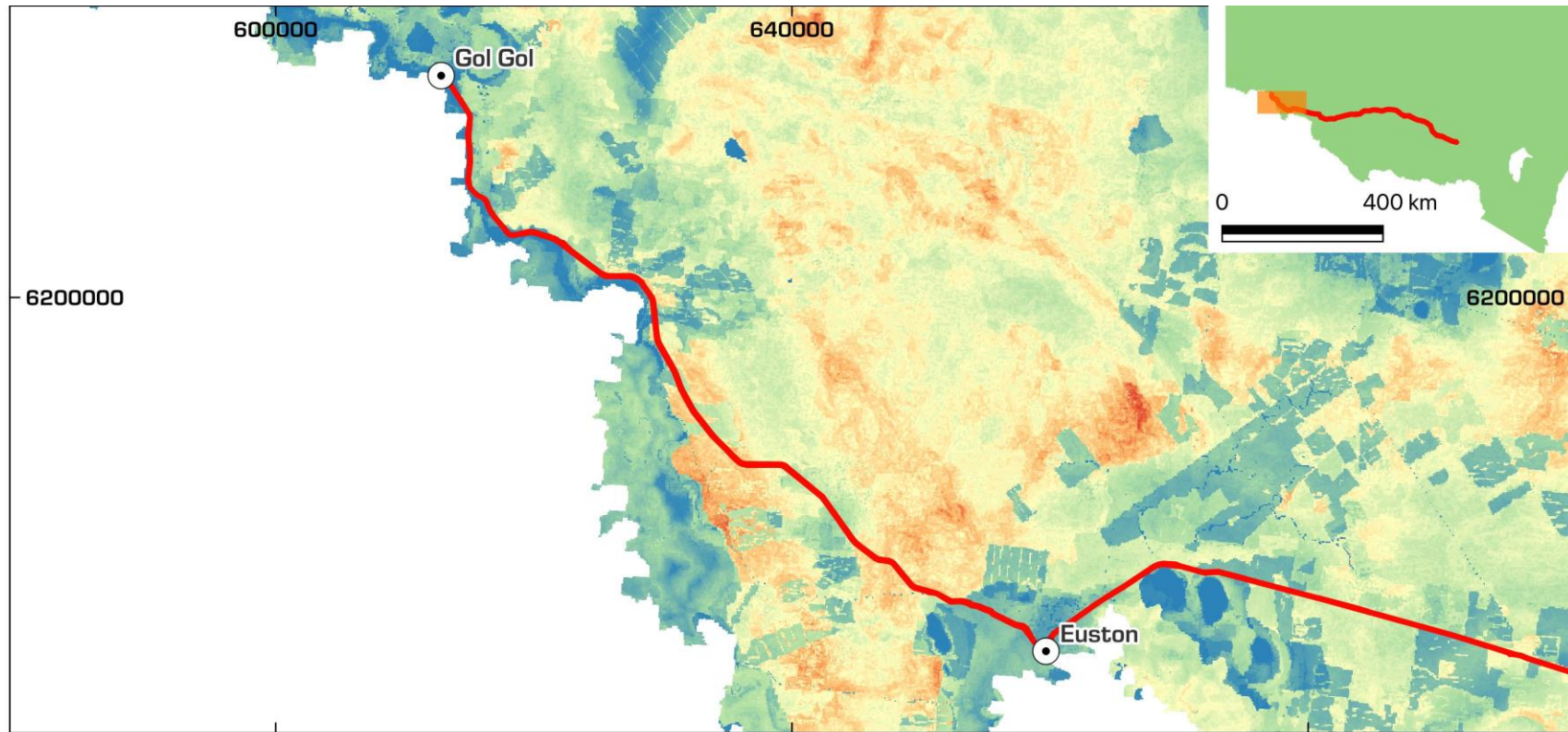
Sturt Highway Survey Priority - Section 4



Legend

-  Study Area
- ASDST Modelling





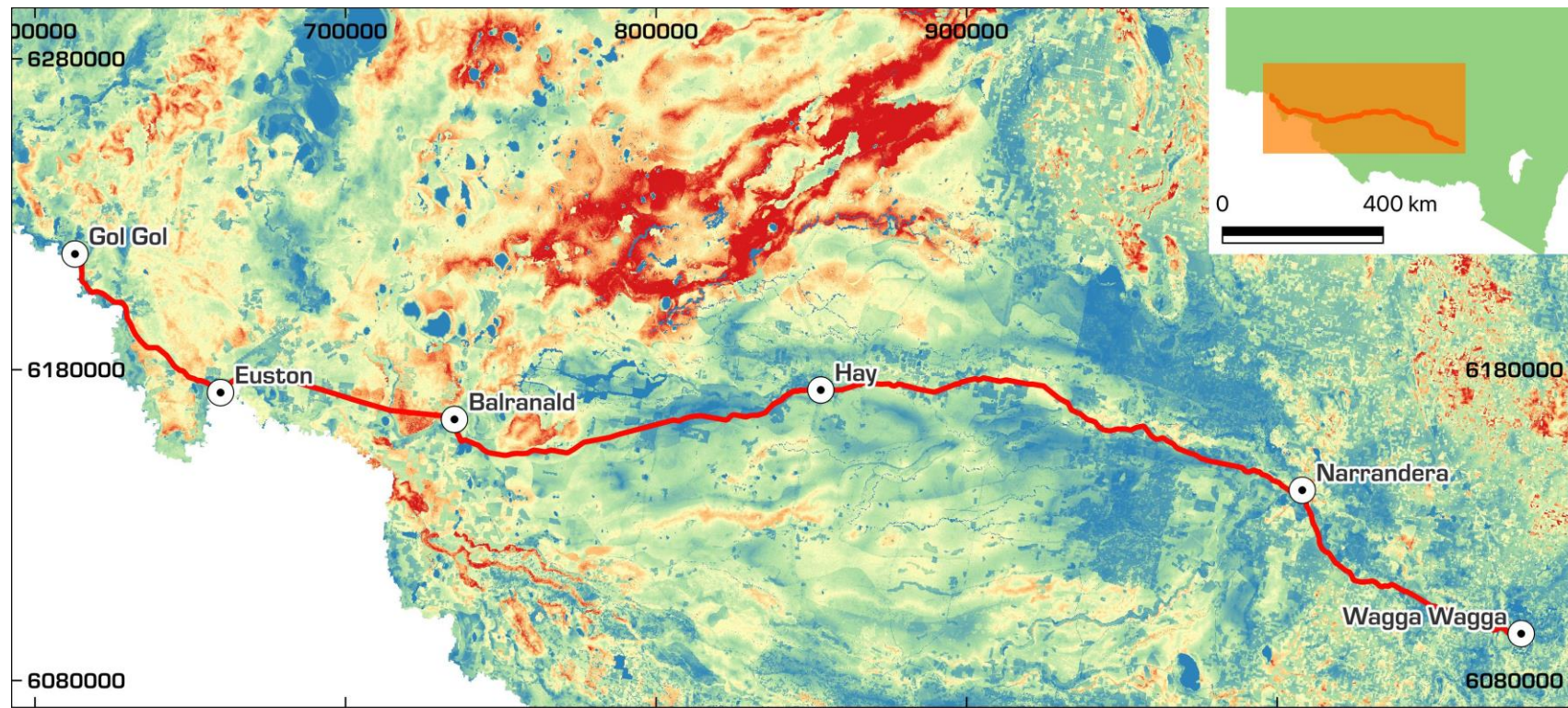
Sturt Highway Survey Priority - Section 5



Legend

- Study Area
- ASDST Modelling




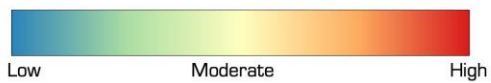


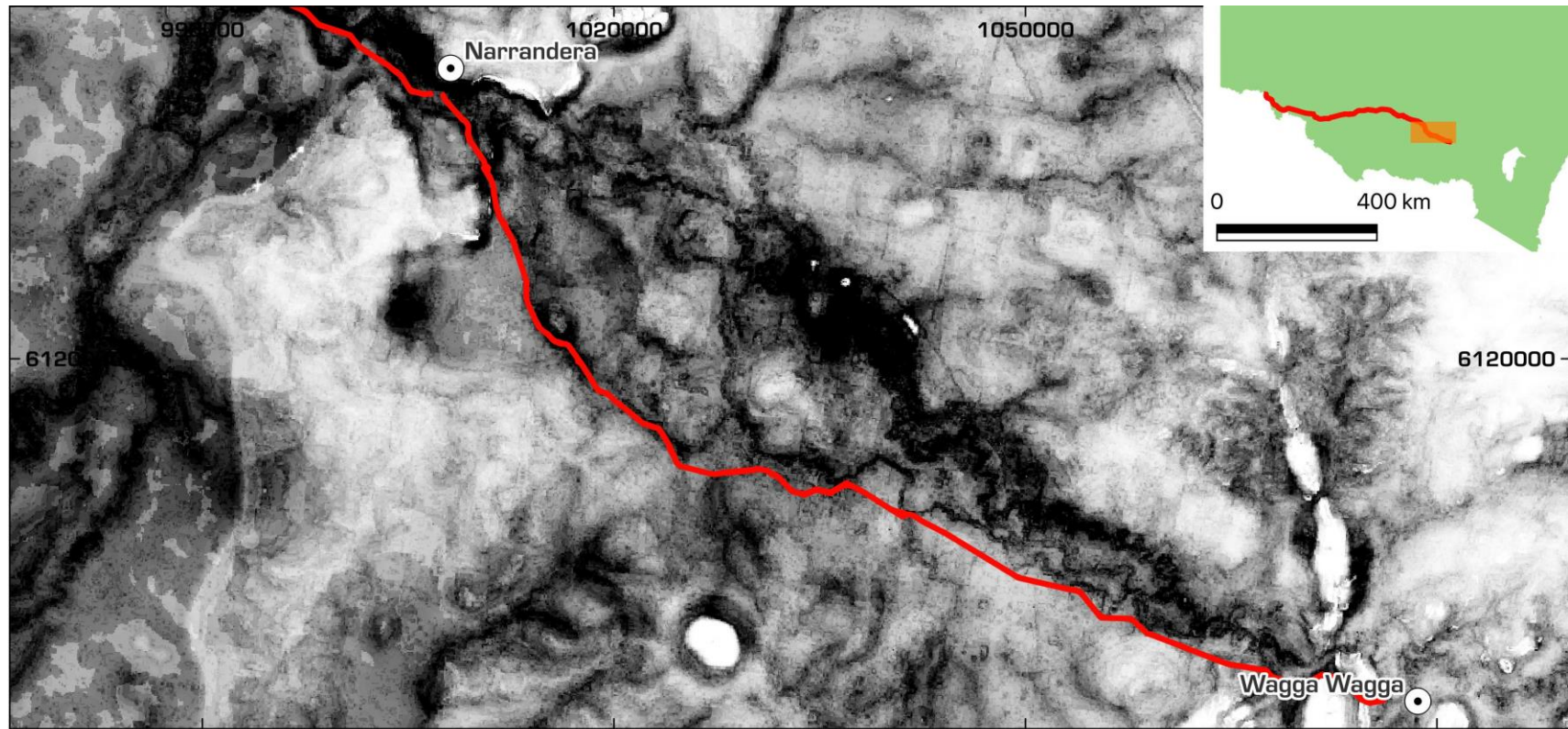
Sturt Highway Survey Priority - Overview



Legend


-  Study Area
- ASDST Modelling



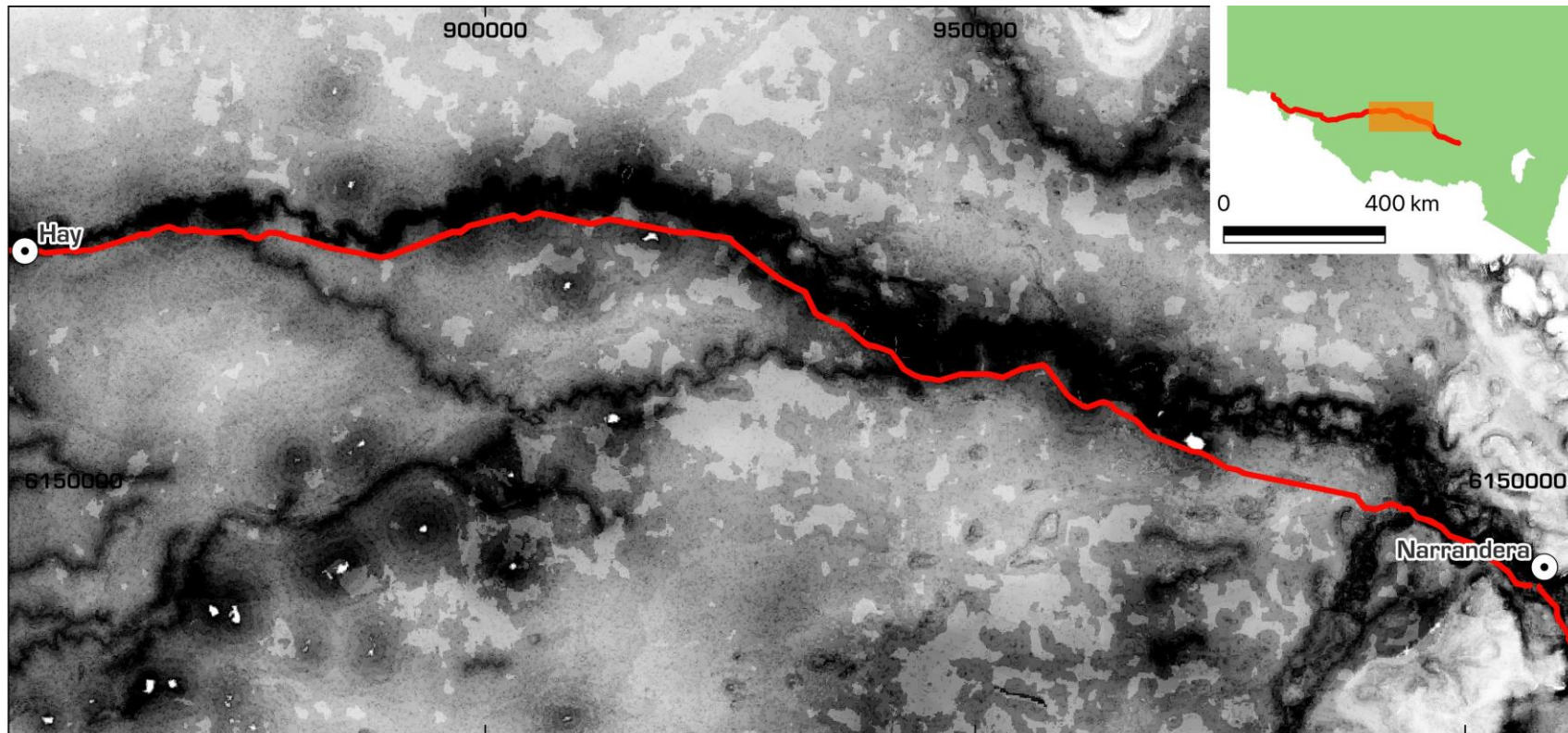


Sturt Highway ASDST Western Mounds and Shell - Section 1

Legend


-  Study Area
- ASDST Modelling



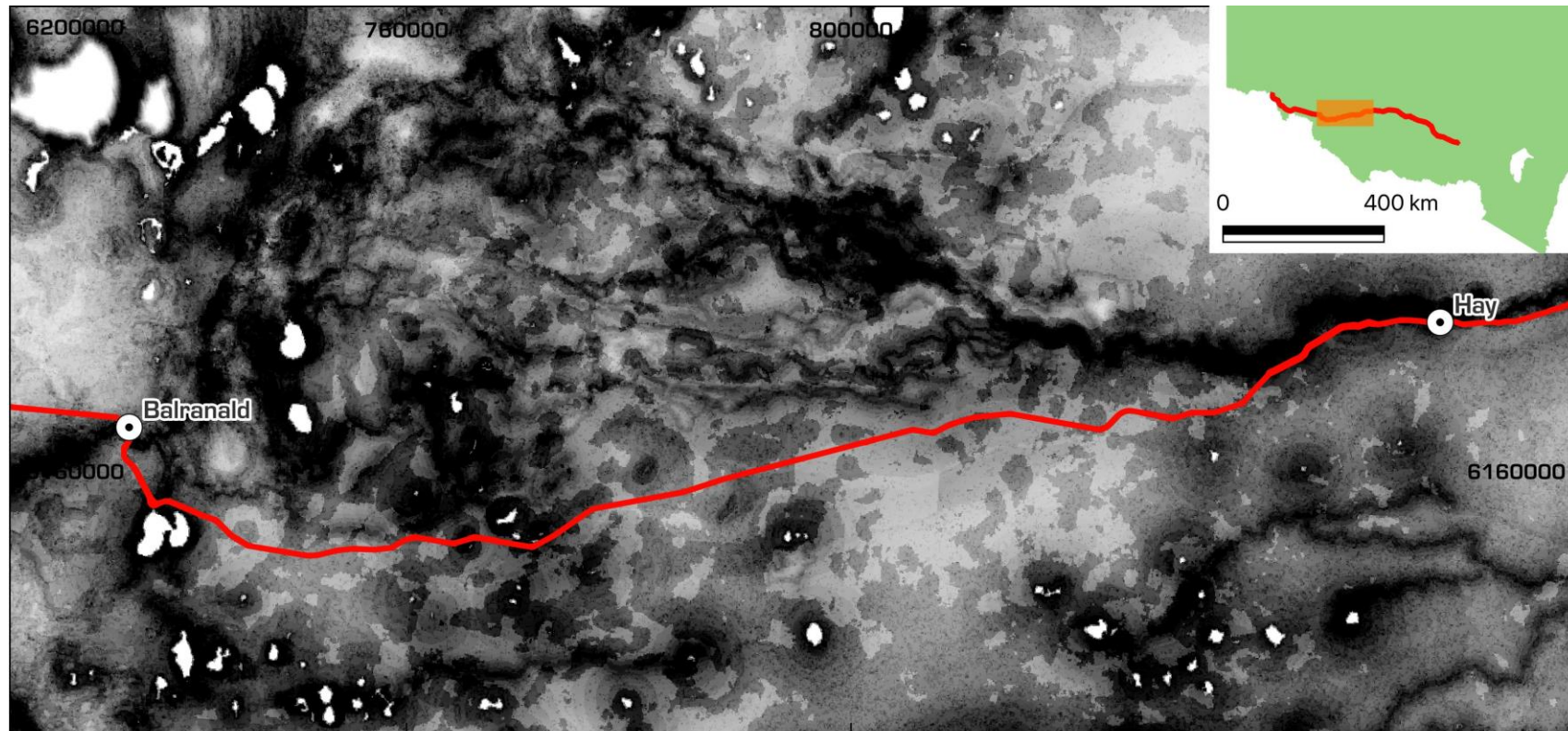


Sturt Highway ASDST Western Mounds and Shell - Section 2

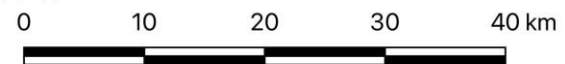
Legend

-  Study Area
- ASDST Modelling






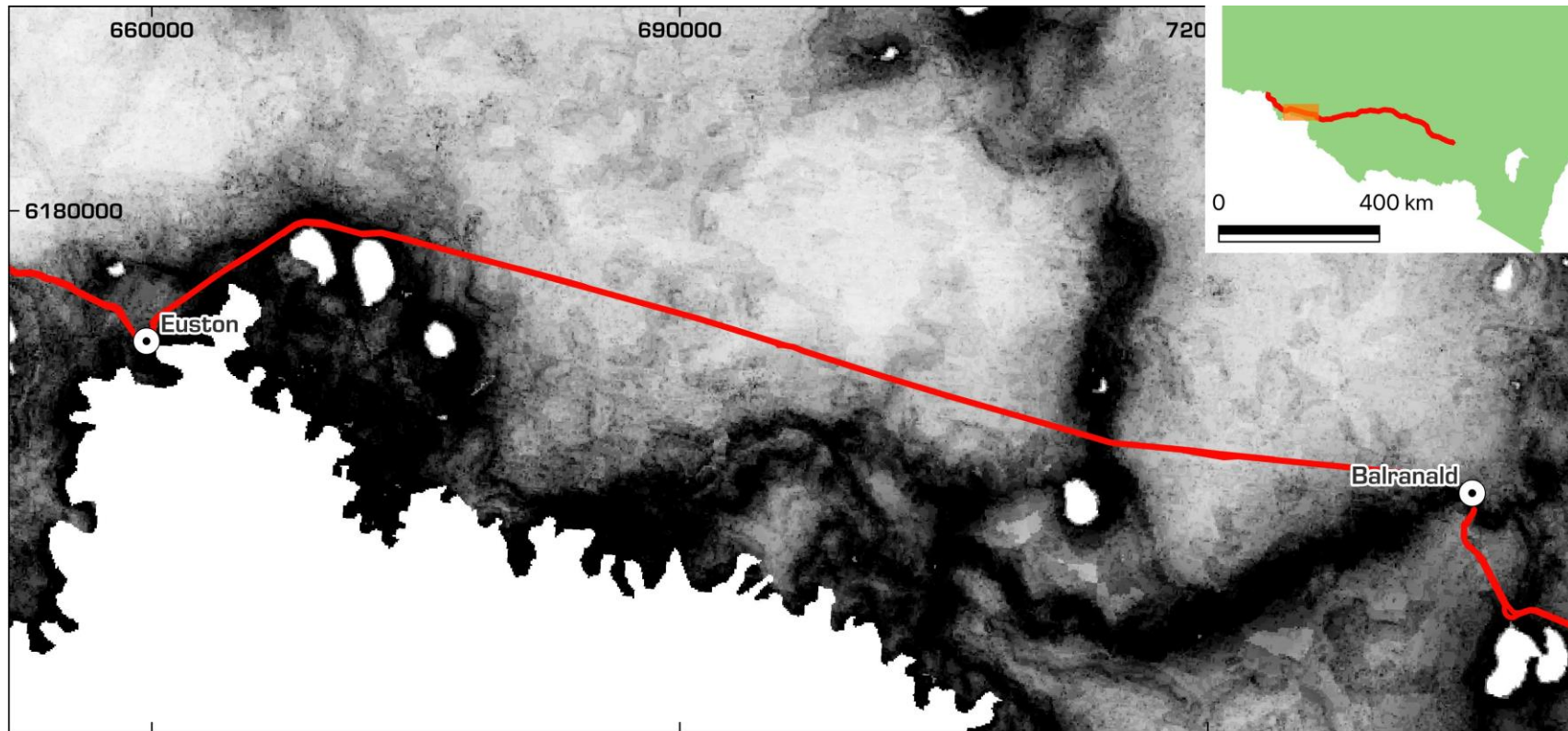
Sturt Highway ASDST Western Mounds and Shell - Section 3



Legend


-  Study Area
- ASDST Modelling

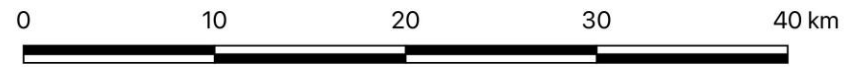


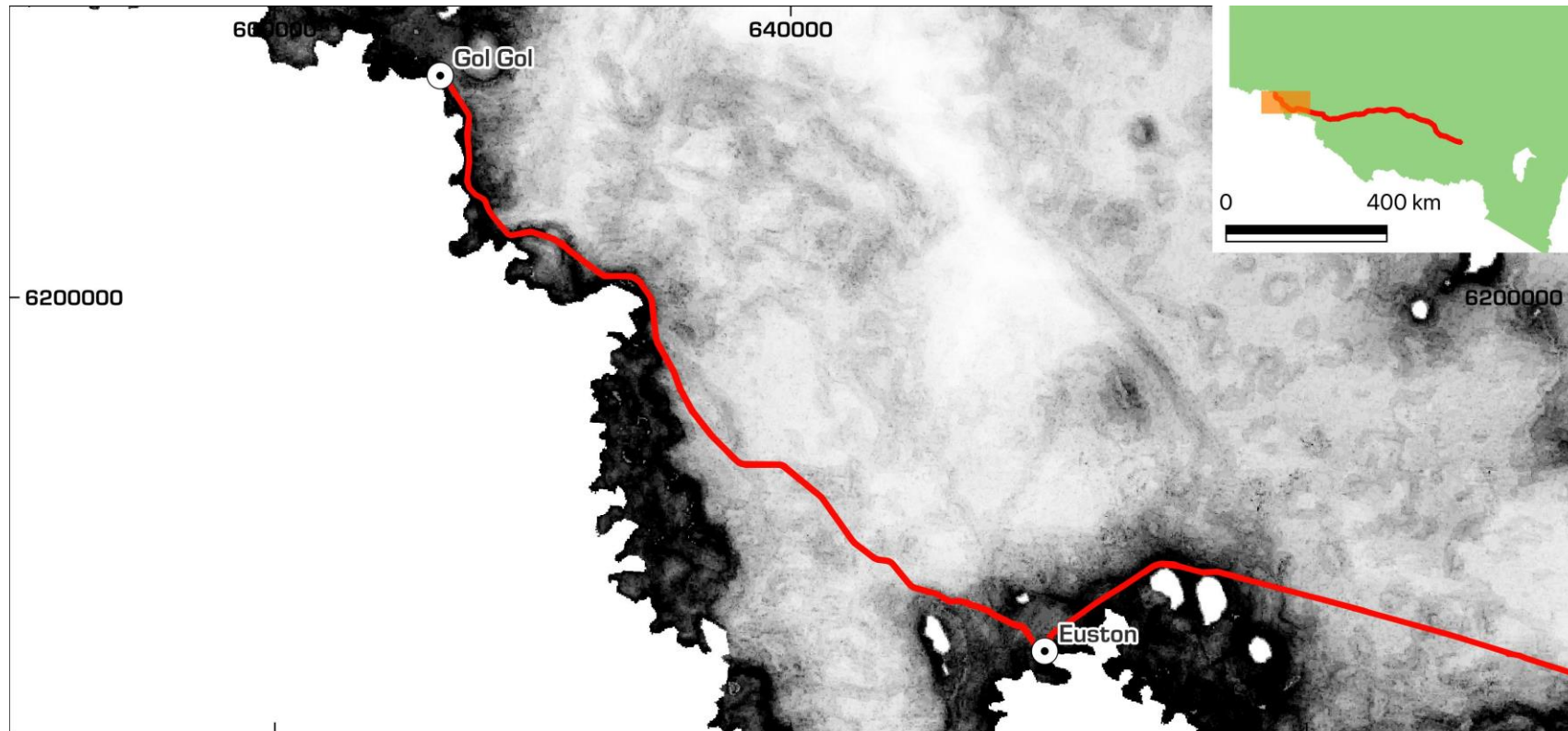


Sturt Highway ASDST Western Mounds and Shell- Section 4

Legend

-  Study Area
- ASDST Modelling





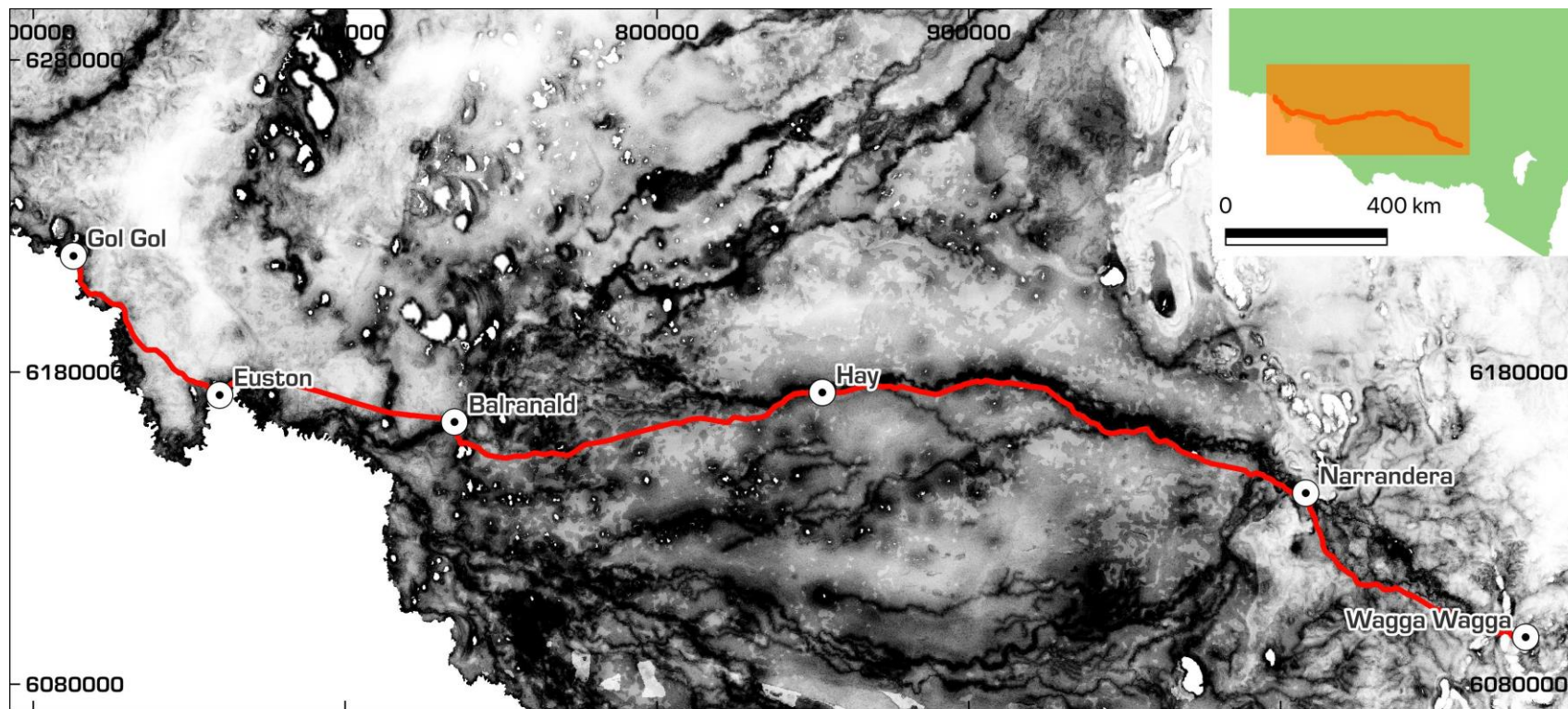
Sturt Highway ASDST Western Mounds and Shell - Section 5



Legend


- Study Area
- ASDST Modelling





Sturt Highway ASDST Western Mounds and Shell - Overview

Legend

-  Study Area
- ASDST Modelling



APPENDIX 3 – ABORIGINAL CONSULTATION

Sample letter sent to the main Agencies and Local Councils to nominate knowledge holders for Sturt Hwy.



Lantern Heritage Pty Ltd

PO Box 7039
Tathra
NSW 2550

ACN: 620 582 658
ABN: 30 620 582 658

Phone: (02) 6494 5759
Mobile: 0402831291

Email: info@lanternheritage.com.au
Web: www.lanternheritage.com.au

6 April 2021

«Contact»
«Comp»
«PO_Box»
«PO_Town» «State» «PC»
E: «Admin_Email»

Dear «Salutation»:

To seek Aboriginal knowledge holders to assist Transport for New South Wales (TfNSW) to prepare a cultural heritage assessment report for the Sturt Highway safety review

Transport for NSW (TfNSW) is seeking the names of Aboriginal people who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places within the project area for Sturt Highway between Wagga Wagga and Buronga.

Aboriginal people identified by your agency will be notified of the project and invited to participate in the assessment process as described in OEH's requirements. Please forward the details of relevant Aboriginal people to TfNSW before 21 April 2021.

The contact details for this project are:

Christine Gant-Thompson
Senior Archaeologist, Lantern Heritage
E: info@lanternheritage.com.au

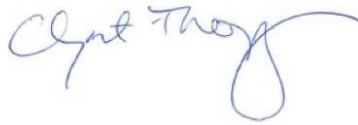
 **Lantern Heritage**
shining a light on people and place

1

TfNSW is conducting a route safety review and safety improvement works of the Sturt Highway between Wagga Wagga and Buronga. As part of this project, Lantern Heritage is preparing a report for TfNSW that maps Aboriginal Cultural Heritage values within the project corridor (see Figure 1).

This letter forms part of TfNSW's commitment to actively identify relevant Aboriginal people in accordance with section 4.1.2 of the Office of Environment and Heritage (OEH) *Aboriginal cultural heritage consultation requirements from proponents* (2010).

Yours Sincerely,



Christine Gant-Thompson
Senior Archaeologist
Lantern Heritage Pty Ltd

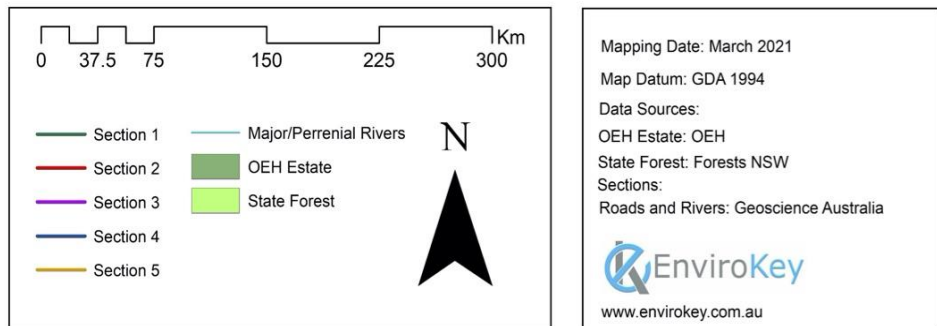
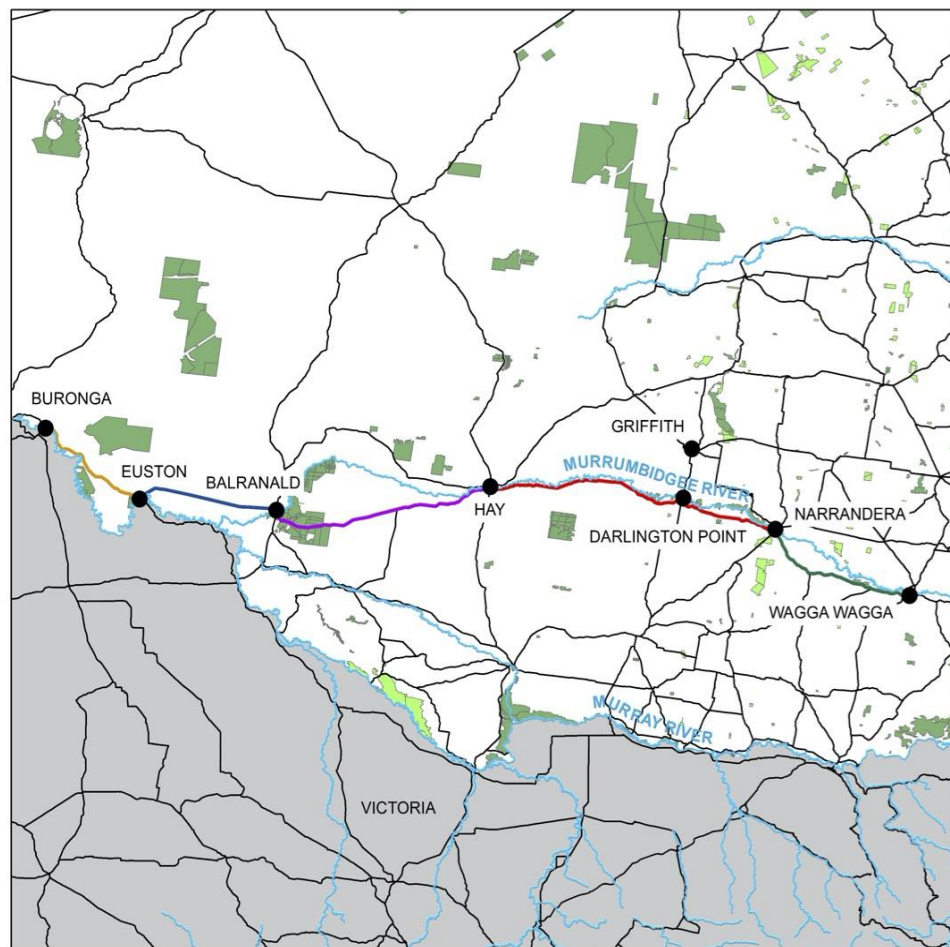


Figure 1: Sturt Highway Aboriginal cultural heritage constraints mapping study area.

Sample letter sent to RAPs to register their interest in participating in the Aboriginal Consultation.



Lantern Heritage Pty Ltd

PO Box 7039
Tathra
NSW 2550

ACN: 620 582 658
ABN: 30 620 582 658

Phone: (02) 6494 5759
Mobile: 0402831291

Email: info@lanternheritage.com.au
Web: www.lanternheritage.com.au

Date

To:

Address:

Dear Sir/Madam:

Aboriginal community consultation notification for proposed Sturt Highway: Aboriginal Cultural Heritage constraints mapping project

Transport for NSW (TfNSW) invites you to participate in community consultation for this project.

To register your interest to be consulted about this project, please contact the project Contact Officer:

Andrew Whitton
TfNSW Aboriginal Cultural Heritage Advisor, South West
M: 0418 486 685
E: Andrew.Whitton@transport.nsw.gov.au

To be involved in the consultation process, responses must be received by 29th of April 2021.

TfNSW is conducting a route safety review and safety improvement works of the Sturt Highway between Wagga Wagga and Buronga. As part of this project, Lantern Heritage is preparing a report for TfNSW that maps Aboriginal Cultural Heritage values within the project corridor (see Figure 1).

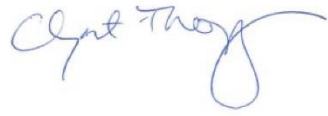
This notification is being undertaken in accordance with section 4.1.1 of the Office of Environment and Heritage (OEH) *Aboriginal cultural heritage consultation requirements from proponents* (2010).

Community consultation may assist TfNSW to (a) prepare an Aboriginal Heritage Impact Permit (AHIP) application for the project, or (b) undertake archaeological testing in accordance with OEH's *Code of practice for archaeological testing in NSW*, or (c) prepare an environmental impact assessment for state significant development or state significant infrastructure.

Yours Sincerely,

 **Lantern Heritage**
shining a light on people and place

1



Christine Gant-Thompson
Senior Archaeologist
Lantern Heritage Pty Ltd

 **Lantern Heritage**
shining a light on people and place

2

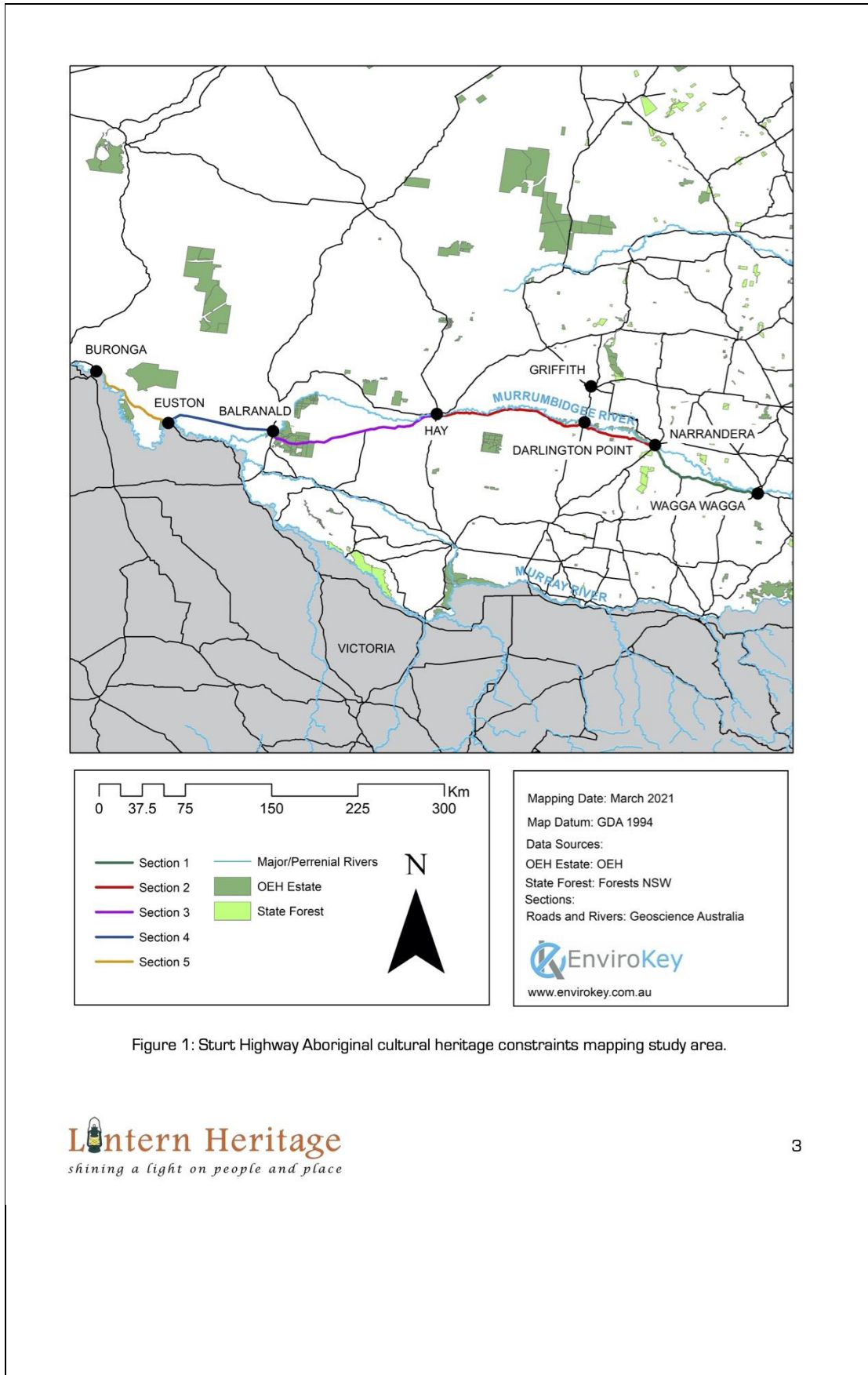


Figure 1: Sturt Highway Aboriginal cultural heritage constraints mapping study area.

Transport for New South Wales Aboriginal Heritage

Sturt Highway road safety review

Transport for New South Wales invites Aboriginal people and Aboriginal groups who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places for the Sturt Highway to register to be consulted.

To register your interest, please contact:

Christine Gant-Thompson
Senior Archaeologist, Lantern Heritage
E: info@lanternheritage.com.au

Registrations must be received in writing by COB April 26, 2021.

TfNSW proposes to undertake key roadside infrastructure and line marking safety improvements along the Sturt Highway between Wagga Wagga and Buronga. Part of this proposal is a review of Aboriginal cultural heritage constraints.

The proposal may result in TfNSW:

- Applying for an Aboriginal Heritage Impact Permit (AHIP) under Part 6 of the *National Parks and Wildlife Act 1974*, and/or
- Undertaking investigations in accordance with the *Code of practice for archaeological investigations in NSW 2010*, and/or
- Undertaking and environmental impact assessment under the *Environmental Planning & Assessment ACT 1979*.

Copy of the advertisement placed in the Wagga Wagga Weekend Advertiser, Swan Hill Guardian, and Sunraysia.

Consultation Log - Sturt Highway route safety review project				
Date	Organisation	Contact Name/s	Consultation type / Comment	Method
6.04/2021	Lantern Heritage Pty Ltd	Anna Raudino (Business Manager/Senior Archaeologist - Lantern Heritage), National Native Title Services New South Wales - Sydney Office, NTSCorp, Heritage Branch OEH Queanbeyan, Office of the Registrar Aboriginal Land Rights Act 1983 (NSW), and Local Land Services	A letter was sent to the main Agencies and Local Councils to nominate knowledge holders for Sturt Hwy.	Email sent
7.04.2021	LLS Enquiry SouthEast	Customer & Administration officer-South East Local Land Services and Anna Raudino (Business manager/Senior Archaeologist - Lantern Heritage)	South East Local Land Services forwarded lantern Heritage Letter onto Local Land Services Riverina and Murray Teams.	Email received
8.04.2021	Heritage Branch OEH	Dan Clegg (Aboriginal Heritage Planning Support Officer Aboriginal Heritage Regulation Branch - South heritage NSW) and Anna Raudino (Business Manager/Senior Archaeologist Lantern Heritage)	Heritage Branch OEH provided a list of known Aboriginal parties and local government areas that Heritage NSW considers likely to have an interest in the activity.	Email received
8.04.2021	Wagga Wagga City Council	Rosie Powell (Aboriginal Youth & Community Development Officer) and Beverley Atkins (Office manager Lantern Heritage Pty Ltd)	Wagga Wagga City Council provided a list of Registered Aboriginal parties: James Ingram; Hewitt Whyman; Dorothy Whyman; Mark Saddler; Peter Ingram; Wagga Local Aboriginal Lands Council (Lorraine).	Email received

Consultation Log - Sturt Highway route safety review project				
9.04.2021	NTSCorp	James MacLeod (Senior Solicitor NTSCorp), Maeve Rose Parker (NTSCorp Solicitor) and Anna Raudino (Business Manager/Senior Archaeologist Lanter Hertiage)	James MacLeod requested to register Barkandji Native Title Group Aboriginal Corporation as a RAP.	Email received
11.04.2021	Miyagan Culture and Heritage	Rober Carroll - Miyagan Culture and Heritage (Member of Walumarra Culture and Heritage Inc.) and Chrstine Gant-Thompson (Senior Archaeologist Lantern Heritage Pty Ltd)	Robert Carroll contacted Lantern Heritage Pty Ltd to register his interest in participating in the Aboriginal Consultation for Sturt Hwy..	Email received
12.04.2021	NTSCorp	James MacLeod (Senior Solicitor NTSCorp), Maeve Rose Parker (NTSCorp Solicitor) and Anna Raudino (Business Manager/Senior Archaeologist Lanter Hertiage)	Maeve Rose Parker provided the contact of the Barkandji Corporation CEO (Derek Hardman).	Email received
13.04.2021	Lantern Heritage Pty Ltd	Anna Raudino (Business Manager/Senior Archaeologist Lanter Hertiage) emailed the Barkandji Corporation CEO (Derek Hardman)	Anna Raudino from Lantern Heritage Pty Ltd sent an invitation letter to Derek hardman to register his interest in participating in the Aboriginal consultation for Sturt Hwy and requesting to be informed if other organisations or individuals will be interested.	Email sent
13.04.2021	Lantern Heritage Pty Ltd	Alistair Grinbergs (Archaeologist - Lantern Heritage Pty Ltd)	Alistair Grinbergs registered Arthur Kirby interest in participating in the Aboriginal consultation for Sturt Hwy.	Via Phone
13.04.2021	Lantern Heritage Pty Ltd	Anna Raudino (Business Manager/Senior Archaeologist - Lantern Heritage)	Anna raudino sent an invitation letter to the following RAPs: Wagga Wagga Local Aboriginal Land Council; Yalmambirra; Bundyi Aboriginal Cultural Knowledge; Robert Carroll (Miyagan Culture & Heritage); Will Carter; Ray Woods; Bangerang Aboriginal Corporation; Wakool Indigenous Corporation; Hay Aboriginal Community Working Party; Marie (Sissy) Havea; Galen Pettit;	Email sent

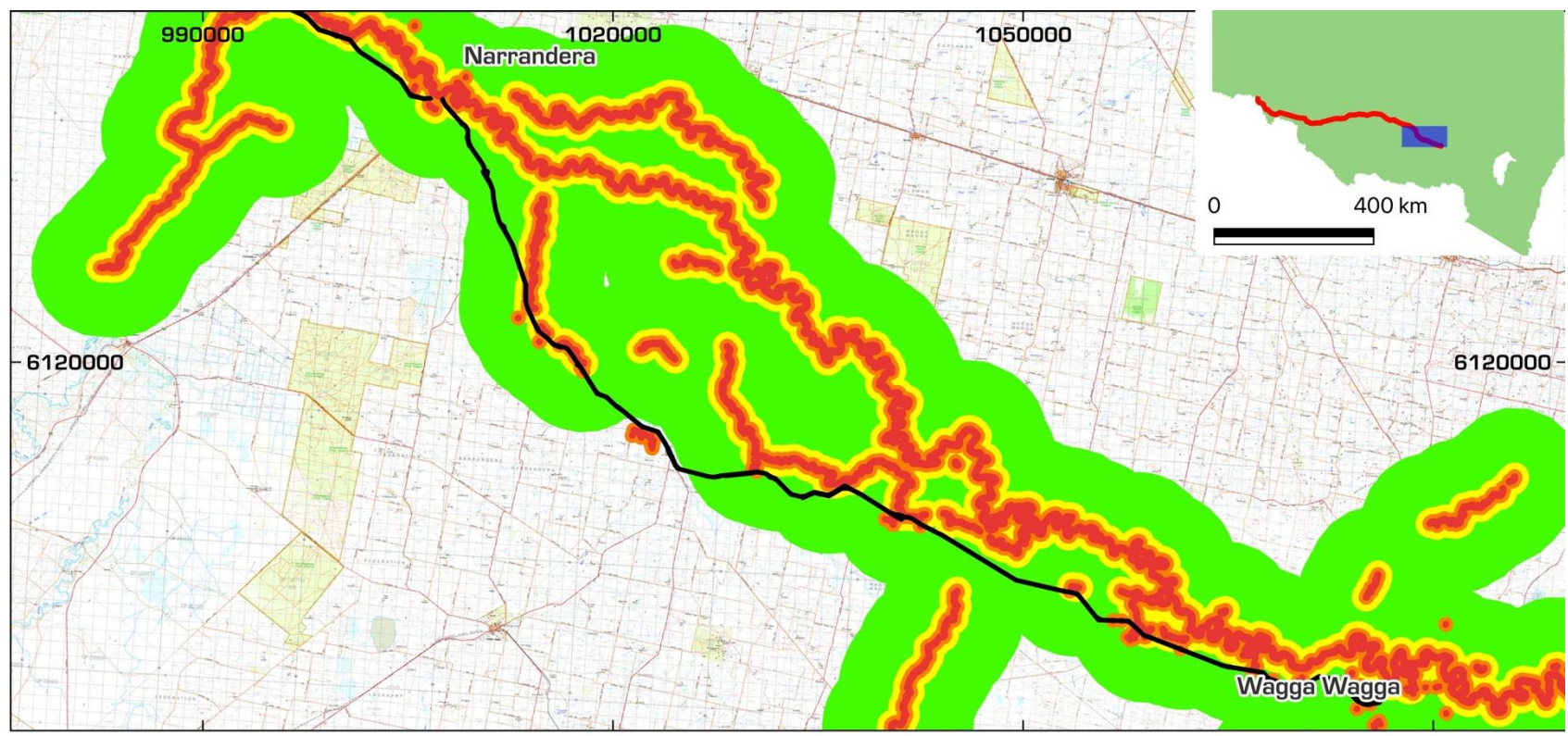
Consultation Log - Sturt Highway route safety review project				
			Daryl Singh; Geraldine Johnson; Yorta Yorta Nation Aboriginal Corporation; Yarkuwa Indigenous Knowledge Centre; Bangerang Aboriginal Corporation; John Jackson; National Koorie Site Management; WLRWHA Aboriginal Advisory Group; Barkindji Maraura Elders Council; WLRWHA Aboriginal Advisory Group; Ta-Ru Board of Management/ Maura ua Barkintji Traditional Owners; Miyagan Culture and Heritage/Walumarra Culture and Heritage Inc.; Barkandji Native Title Group Aboriginal Corporation; James Ingram-Bidya Marra Consultancy (Wiradjuri NSW Australia); Hewitt Whyman; Dorothy Whyman and Edie Whyman; Mark Saddler; Peter Ingram.	
13.04.2021	Bundi Aboriginal Cultural Knowledge	Mark Saddler	Bundi Aboriginal Cultural Knowledge registered their interest in the Aboriginal Consultation for Sturt Hwy.	Email received
13.04.2021	WLRWHA Aboriginal Advisory Group	Dan Rosendhal (Executive Officer/Team Leader Partnerships, Planning and Heritage Branch NSW National Parks & Wildlife Service	Dan Rosendhal informed that they were not interested in registering their interest in the Aboriginal Consultation for Sturt Hwy.	
13.04.2021	Peter Ingram		Peter Ingram registered his interest in participating in the Aboriginal Consultation for Sturt hwy.	Email received
14.04.2021	Lantern Heritage Pty Ltd	Anna Raudino (Business Manager/Senior Archaeologist - Lantern Heritage)	Anna Raudino sent an invitation letter to the following RAPs: Waagan Waagan Project Group; Pappin Family Aboriginal Corporation; Gary Pappin; Corey Hughes; Tara Dixon; Jamie Woods; Ian Woods; Mabel Fitzpatrick; Josephine Goulding; Kerrie Parker; Tiem Wilson; Brian Gash Jnr; Richard Dixon; Cherokee Dixon; Terence Singh; Alice Pettit; Alvira Wighton; Marie Murray; Pappin Family Aboriginal Corporation; Gary Pappin; Muthi Muthi Nations; Arthur Kirby; Terence Singh; Ms Mary Ann Marton;	Email sent
14.04.2021	John Jackson		John Jackson registered his interest in taking part of the Aboriginal Consultation for Sturt Hwy.	Email received
15.05.2021	Hay Shire Council	David Webb (General Manager)	Hay City Council provided a list of Registered Aboriginal parties.	Email received
15.04.2021	Lantern Heritage Pty Ltd	Anna Raudino (Business Manager/Senior Archaeologist - Lantern Heritage)	Anna Raudino sent an invitation letter to the following RAPs: Hay Local Aboriginal Land Nari Nari Tribal Council; Hay Aboriginal Community Working Party;	Email sent

Consultation Log - Sturt Highway route safety review project				
			Wentworth Shire Council; Far West Aboriginal Land Council; Barkandji Prescribed Body Corporate.	
15.04.2021	Far West Aboriginal Land Council	Pam Handy	Far West Aboriginal Land Council registered their interest in taking part of the Aboriginal Consultation for Sturt Hwy.	Email received
15.04.2021	Yalmambirra		Yalmambirra registered their interest in in the Aboriginal Consultation for Sturt Hwy.	Email received
19.4.2021	Bangerang Aboriginal Corporation	Kevin Atkinson (Bangerang appointend RAP)	Bangerang registered their interest in in the Aboriginal Consultation for Sturt Hwy.	Email received
20.04.2021	TRANSPORT	Andrew Witton (Transport)	Andrew Witton informed Lantern Heritage Pty Ltd that Robert Carroll registered his interest in participating in the Aboriginal Consultation for Sturt Hwy.	Via Email
20.04.2021	TRANSPORT	Andrew Witton (Transport)	Andrew Witton informed Lantern Heritage Pty Ltd that John Jackson registered his interest in the Aboriginal Consultation for Sturt Hwy.	Email received
20.04.2021	TRANSPORT	Andrew Witton (Transport)	Andrew Witton informed Lantern Heritage Pty Ltd that Hay Aboriginal Community Working Party registered their interest in the Aboriginal Consultation for Sturt Hwy.	
21.04.2021	Narrandera City Council	Stacie Mohr (Community Support Manager)	Stacie Mohr provided the details of two local Aboriginal Elders: Roland Williams and Michael Lyons.	Email received
21.04.201	Lantern Heritage Pty Ltd	Anna Raudino (Business Manager/Senior Archaeologist - Lantern Heritage)	Lantern Heritage sent an invitation letter to Roland Williams	Letter sent
21.04.2021	Lantern Heritage Pty Ltd		Lantern Heritage sent an invitation letter to Michael Lyons.	Email sent
26.04.2021	TRANSPORT	Andrew Witton (Transport)	Andrew Witton informed Lantern Heritage Pty Ltd that (Aunty Do) Dorothy Whyman (Wagga Wagga) registered her interest in the Aboriginal Consultation for Sturt Hwy.	Email received
27.04.2021	Pappin Family Aboriginal Corporation		Pappin Family Aboriginal Corporation registered their interest in the Aboriginal Consultation for Sturt Hwy.	Via Phone
27.04.2021	Bidya Marra Consultancy	James Ingram	James Ingram registered his and Quenty and Dylan Ingram's interest in taking part of the Aboriginal consultation for Sturt Hwy.	Email received

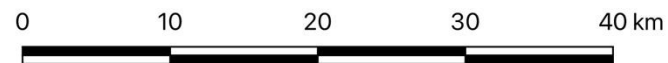
Consultation Log - Sturt Highway route safety review project				
	(Wiradjuri NSW Australia)			
29.04.2021	Marie (Sissy) Havea	Marie (Sissy) Havea	Marie (Sissy) Havea registered her interest in the Aboriginal Consultation for Sturt Hwy.	Email received
1.06.2021	Lantern Heritage Pty Ltd	Anna Raudino (Business Manager/Senior Archaeologist - Lantern Heritage)	Lantern Heritage sent meeting invitations to the RAPs that registered their interest in the Aboriginal Consultation for Sturt Hwy.	Email sent
2.06.2021	Far West Aboriginal Land Council	Pam Handy	Far West Aboriginal Land Council informed Lantern Heritage Pty Ltd that they were not available the week of 7 to 10 June 2021 for the meeting.	Email received
3.06.2021	Yalmambirra		Yalmambirra informed that they could not attend the meeting.	Email received
17.06.2021	All RAPs	Christine Gant-Thompson (Lantern Heritage)	Meetings rescheduled from week starting 15 June due to low registration numbers. Meetings to be held from 28 June to 1 July. Registrations close 23 June.	Email
17.06.2021	Miyagan Culture and Heritage	Mark Saddler phone call to Christine Gant-Thompson (Lantern Heritage)	Mark called to say that he was unable to make the proposed meeting dates due to other commitments. Mark's biggest issue with the proposed Sturt Highway project is the apparent lack of due diligence that Transport has shown with pruning trees in other locations. Mark stated that a current AHIMS search needs to be completed before any tree pruning is undertaken as the AHIMS sites are constantly being updated. Mark requested that Transport consider implementation of cultural heritage training before works start to identify scar trees.	Phone call
17.6.2021	Hay LALC	Ian Woods	Confirmed attendance of Kerrie Parker, Mabel Fitzpatrick, Jamie Woods, Ian Woods, Rene Woods and Tara Dixon	Email received
17.06.2021	Dareton LALC	Pam Hardy	Confirmed attendance of Dareton LALC	Email received
18.06.2021	Yalmambirra		Yalmambirra informed that they could not attend the meeting.	Email received
19.06.2021	Miyagan Culture and Heritage	Robert Carroll	Robert may not be able to attend the rescheduled meeting and asked to register his son, Neerim Carroll to attend in his place.	Email received
20.06.2021	Hay Aboriginal Community Working Party	John Gubba woods	Confirmed attendance at Hay meeting	Email received
22.06.2021	Ricky Mitchell		Confirmed attendance of Snr Maraura Elder Remy Smith and Ricky Mitchell at Buronga meeting	Email received

Consultation Log - Sturt Highway route safety review project				
28.06.2021	Wagga Wagga LALC	Lorraine	Lorraine (Wagga Wagga LALC) registered the interest of the following RAPs: Darcy Lyons; Clorine Lyons; Nikita Ingram; Nathan Williams; Darrell Charles	Email received
30.06.2021	Transport for NSW	Balranald LALC and Rodney Simpson (Transport for NSW)	Rodney called Balranald LALC to discuss the Sturt Highway project as no one was at the meeting. The CEO was non-committal about sending someone to the meeting at short notice. He requested that Balranald LALC is kept updated about the project	Phone call
30.06.2021	Transport for NSW	Moore's buses and Rodney Simpson (Transport for NSW)	Rodney called Moore's buses as they are an Aboriginal bus company based in Balranald. He asked if they had any safety concerns about the Sturt Highway project. They said they would let Rod know.	Phone call
6.07.2021	Leeton LALC		Leeton LALC confirmed their interest in taking part of the Aboriginal Consultation via Tom Knight (Archaeologist - Lantern Heritage Pty Ltd)	In Person+A1:E47

APPENDIX 4 – MAPS OF BUFFERS BASED ON SITE LOCATION AND WATER COURSES



Sturt Highway Constraints - Section 1

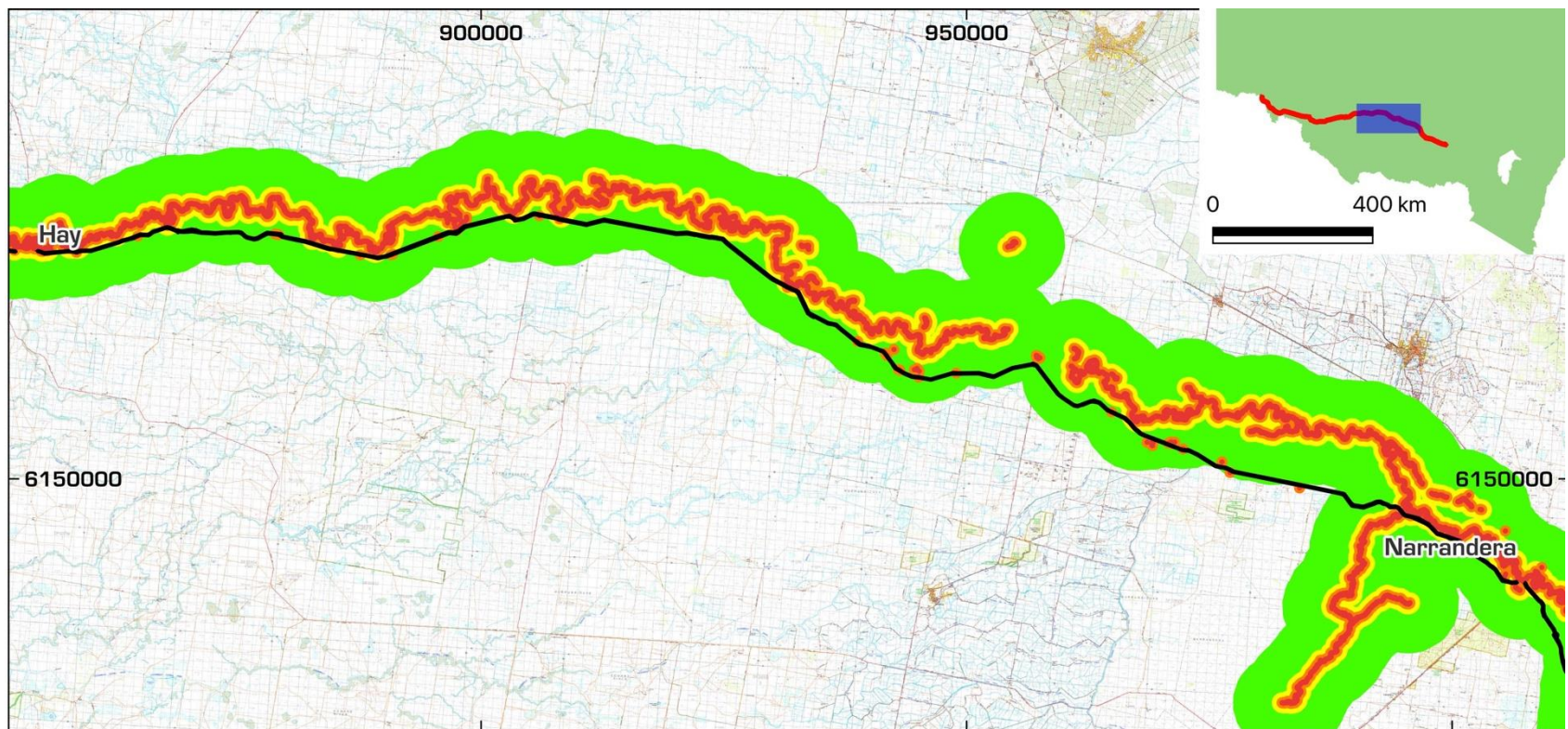


Legend

- Very High Sensitivity (200m buffer around known sites and rivers)
- High Sensitivity (500m buffer around known sites and rivers)
- Moderate-High Sensitivity (1 km buffer around rivers)
- Low-Moderate Sensitivity (5km buffer around rivers)
- Study Area



Figure 48: Illustration of levels of archaeological and cultural sensitivities within section 1 of Sturt Highway study area



Sturt Highway Constraints - Section 2

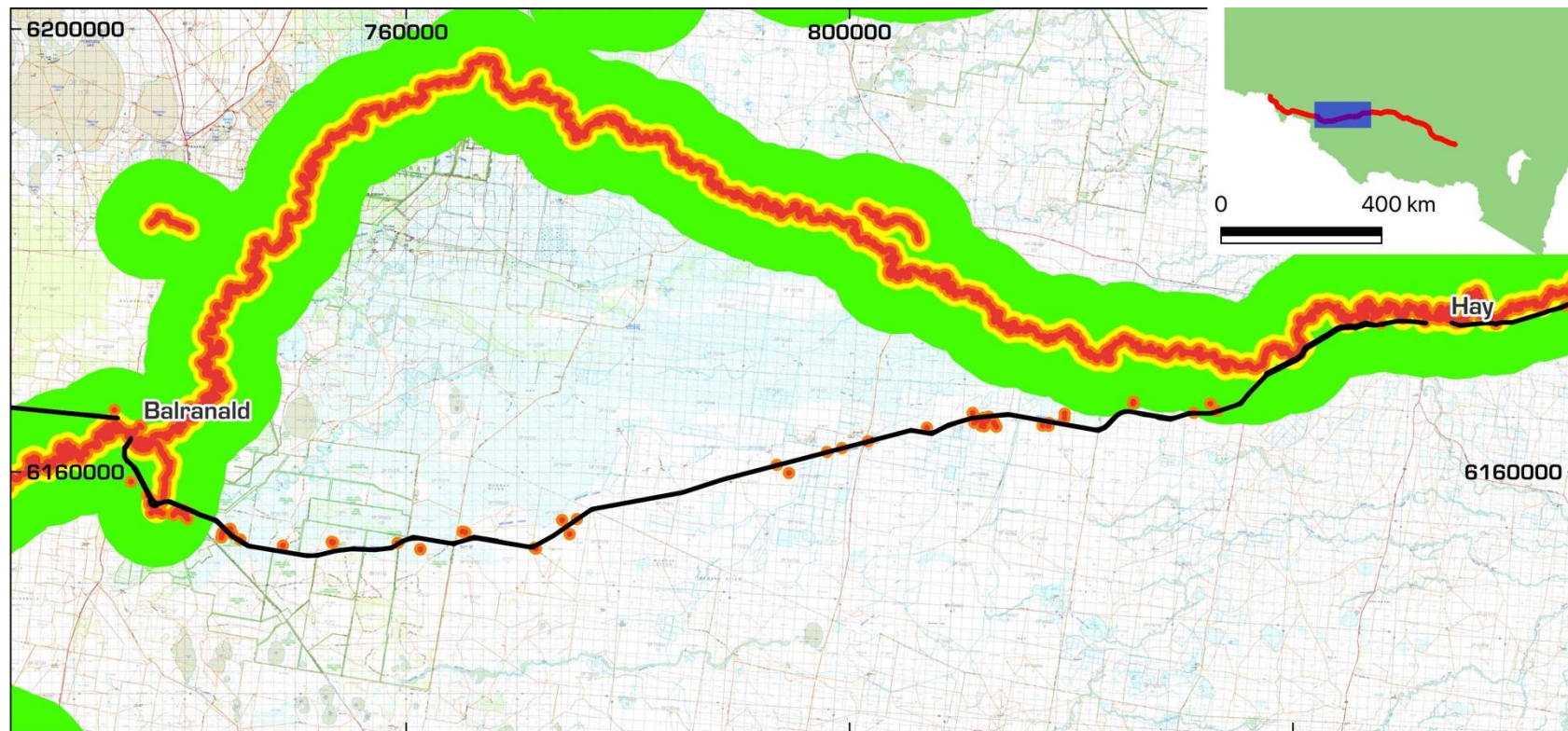


Legend

- Very High Sensitivity (200m buffer around known sites and rivers)
- High Sensitivity (500m buffer around known sites and rivers)
- Moderate-High Sensitivity (1km buffer around rivers)
- Low-Moderate Sensitivity (5km buffer around rivers)
- Study Area



Figure 49: Illustration of levels of archaeological and cultural sensitivities within section 2 of Sturt Highway study area



Sturt Highway Constraints - Section 3

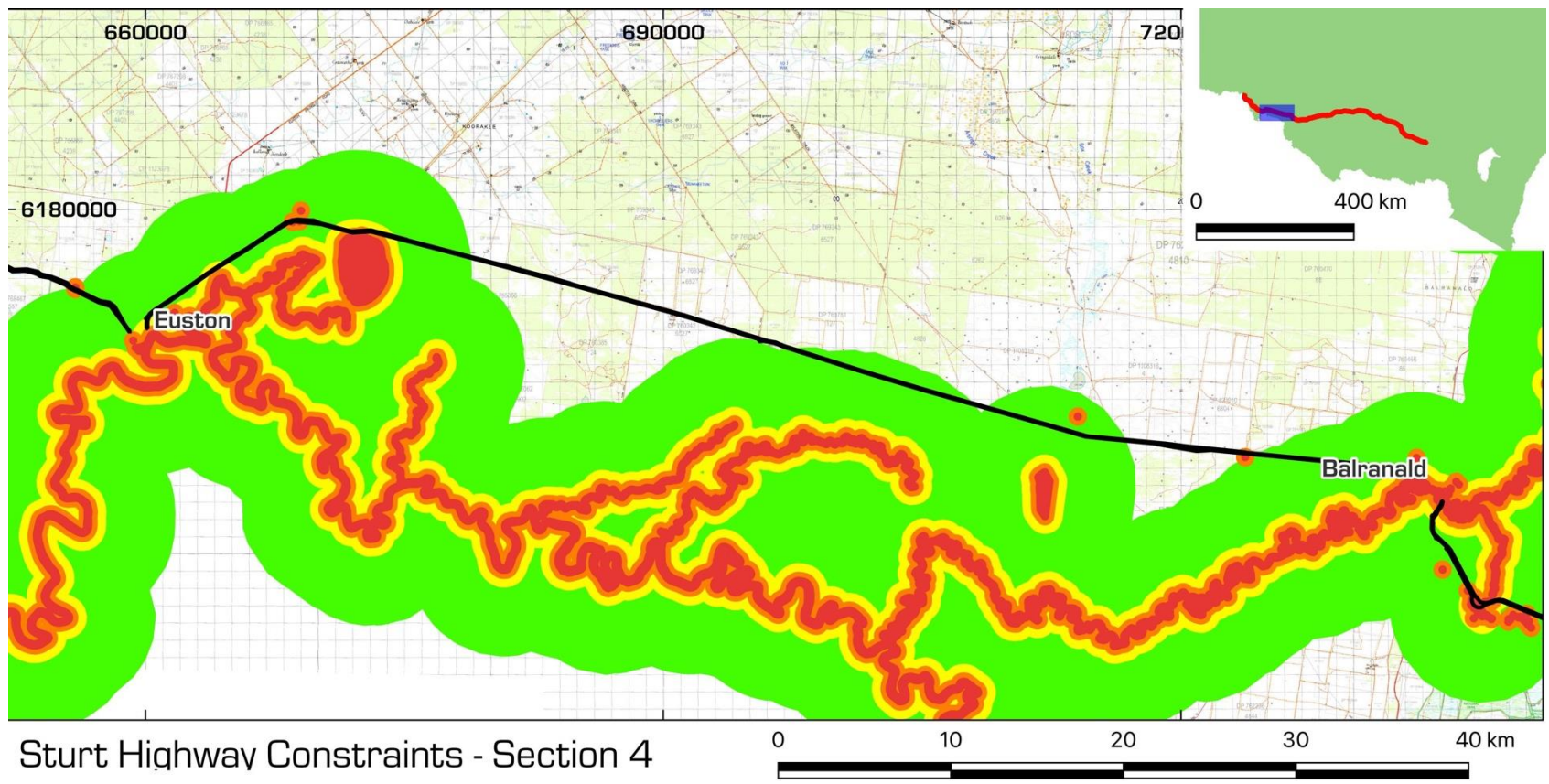


Legend

- Very High Sensitivity (200m buffer around known sites and rivers)
- High Sensitivity (500m buffer around known sites and rivers)
- Moderate-High Sensitivity (1km buffer around rivers)
- Low-Moderate Sensitivity (5km buffer around rivers)
- Study Area



Figure 50: Illustration of levels of archaeological and cultural sensitivities within section 3 of Sturt Highway study area

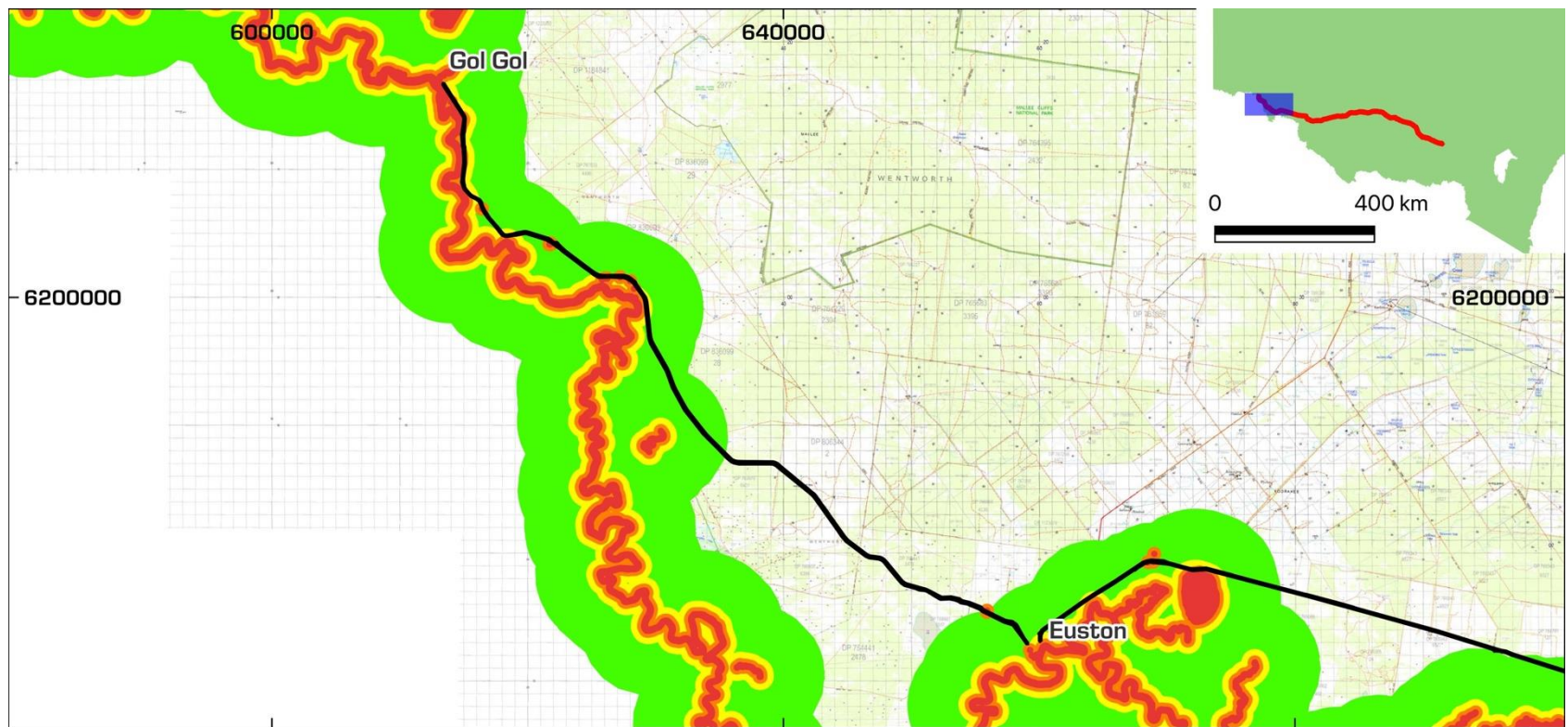


Legend

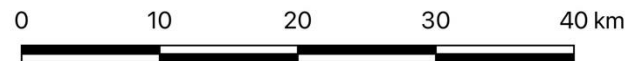
- Very High Sensitivity (200m buffer around known sites and rivers)
- High Sensitivity (500m buffer around known sites and rivers)
- Moderate-High Sensitivity (1km buffer around rivers)
- Low-Moderate Sensitivity (5km buffer around rivers)
- Study Area



Figure 51: Illustration of levels of archaeological and cultural sensitivities within section 4 of Sturt Highway study area



Sturt Highway Constraints - Section 5

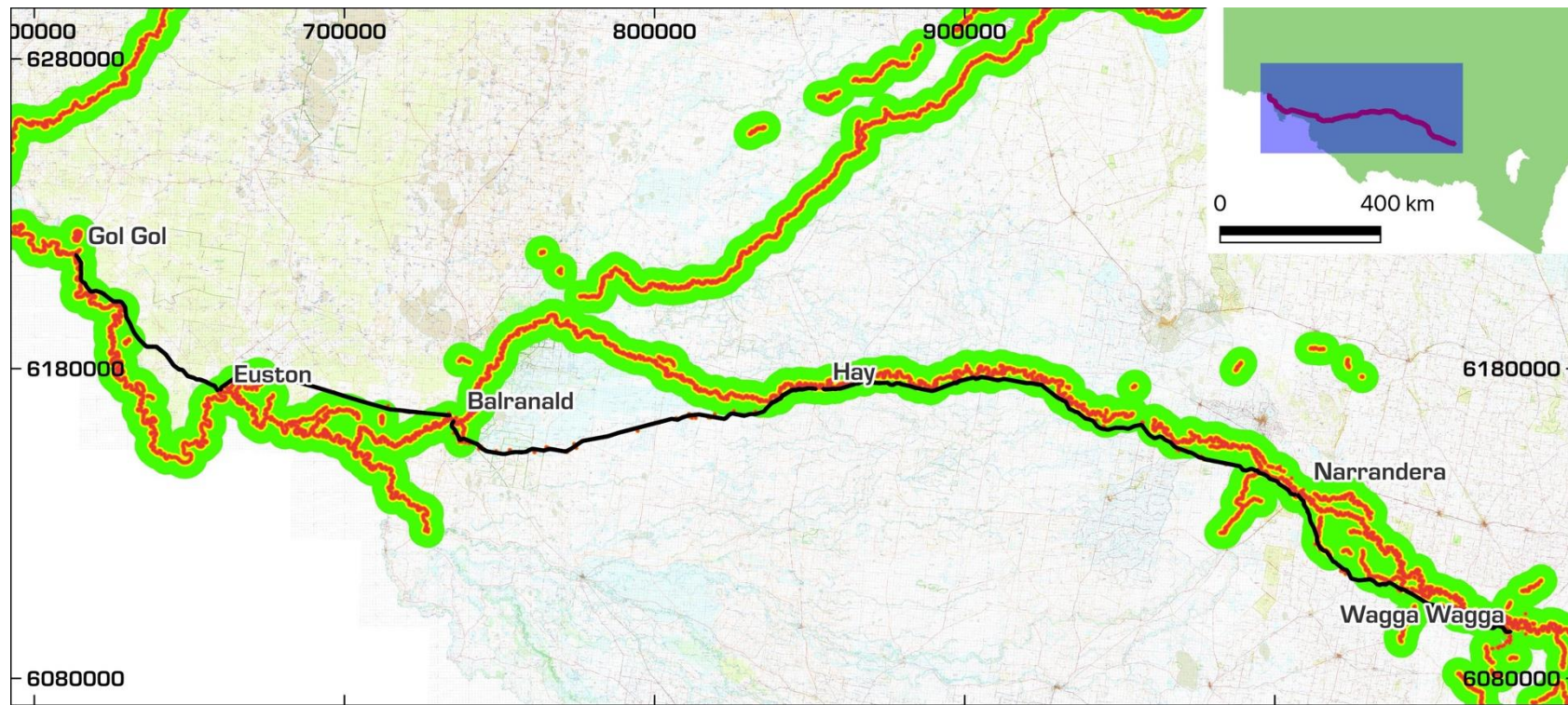


Legend

- Very High Sensitivity (200m buffer around known sites and rivers)
- High Sensitivity (500m buffer around known sites and rivers)
- Moderate-High Sensitivity (1km buffer around rivers)
- Low-Moderate Sensitivity (5km buffer around rivers)
- Study Area



Figure 52: Illustration of levels of archaeological and cultural sensitivities within section 5 of Sturt Highway study area



Sturt Highway Constraints- Overview



Legend

- Very High Sensitivity (200m buffer around known sites and rivers)
- High Sensitivity (500m buffer around known sites and rivers)
- Moderate-High Sensitivity (1 km buffer around rivers)
- Low-Moderate Sensitivity (5km buffer around rivers)
- Study Area



Figure 53: Illustration of levels of archaeological and cultural sensitivities along entire Sturt Highway study area

Appendix 6

Consideration of clause 171 factors and matters of national environmental significance

Clause 171 Checklist

In addition to the requirements of the *Is an EIS required?* guideline (DUAP 1995/1996) and the *Roads and Related Facilities EIS Guideline* (DUAP 1996) as detailed in the REF, the following factors, listed in clause 171 the Environmental Planning and Assessment Regulation 2021, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

Factor	Impact
<p>a) Any environmental impact on a community? Positive socio-economic impact on freight and commuters using the Sturt Highway (see Section 6.10). Safeguards include clear delineation of vegetation removal where vegetation to be retained would be fenced. See Section 6.1.</p>	Minor positive/ minor negative
<p>b) Any transformation of a locality? Removal of vegetation, excavation and fill deposition and road construction would result in a temporary reduction in visual amenity. All measures would be carried out to minimise this impact. See Section 6.9.</p>	Minor negative – short term
<p>c) Any environmental impact on the ecosystems of the locality? Native and non-native vegetation would be removed as part of the proposal. Safeguards include the clear delineation of the vegetation removal area. An assessment of significance has been carried out for potential threatened biota in the BA, Appendix 3. Also see Section 6.1.</p>	Moderate negative
<p>d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? Removal of vegetation, excavation and fill deposition and construction would result in a temporary reduction in visual amenity. All measures would be carried out to minimise this impact. See Section 6.9.</p>	Minor negative – short term
<p>e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? Removal of vegetation, excavation and fill deposition and construction would result in a temporary reduction in visual amenity. All measures would be carried out to minimise this impact. It is unlikely that this proposal would have a significant impact on visual amenity. See Section 6.9.</p>	Minor negative -short term
<p>f) Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act 1974</i>)? There is the potential for removal a small amount of habitat and of a minor amount of potential foraging habitat for some threatened and migratory species. An assessment of the significance has been carried out in the BA, Section 6.1 and Appendix 3.</p>	Minor negative
<p>g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? A test of significance has been carried out, for threatened species which occur or have the potential to occur in the area in the BA, Section 6.1 and Appendix 3. The test of significance concluded that a significant impact is unlikely.</p>	Nil
<p>h) Any long-term effects on the environment? The proposed work would have positive long-term effects on the environment due to improvement in safety and efficiency for road users as well as the removal of dust pollution from roadside vegetation</p>	Long term positive

Factor	Impact
<p>i) Any degradation of the quality of the environment? The proposal would have a minimal impact on the quality of the environment. Safeguards and management measures area described in Section 6 to mitigate potential impact.</p>	Minor negative
<p>j) Any risk to the safety of the environment? The work would increase the safety of the environment by creating a safe road environment for road users.</p>	Long term positive
<p>k) Any reduction in the range of beneficial uses of the environment? Vegetation removal would result in the reduction of fauna habitat however this is considered a very minor reduction of beneficial uses of the natural environment considering the marginal nature of the habitat present. See Section 6.1.</p>	Minor negative
<p>l) Any pollution of the environment? There is the potential for pollution of the environment however mitigation measures described in Section 6 would mitigate this potential impact.</p>	Minor negative -short term
<p>m) Any environmental problems associated with the disposal of waste? The proposal would not create any environmental problems associated with the disposal of waste.</p>	Nil
<p>n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposal would not increase demands on resources in short supply.</p>	Nil
<p>o) Any cumulative environmental effect with other existing or likely future activities? Cumulative environmental effects include the improvement to the safety of this section of the Sturt Highway.</p>	Minor negative -short term, Positive long term
<p>p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? There would be no impact to coastal processes or hazards.</p>	Nil
<p>q) Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1 The proposal is consistent with the NSW Road Safety Plan 2021</p>	Minor long-term positive
<p>r) Other relevant environmental factors The potential impacts of this proposal all relevant environmental factors have been considered within this REF.</p>	Nil

Matters of National Environmental Significance

Under the environmental assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999*, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government Department of the Environment and Energy.

A referral is not required for proposed actions that may affect nationally listed threatened species, endangered ecological communities and migratory species. Impacts on these matters are still assessed as part of the REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor	Impact
a) Any impact on a World Heritage property?	Nil
b) Any impact on a National Heritage place?	Nil
c) Any impact on a wetland of international importance?	Nil
d) Any impact on a listed threatened species or communities? An assessment of the significance has been carried out in the BA, Section 6.1 and Appendix 3. The impact is considered to be minor and unlikely to significantly impact these species.	Minor
e) Any impacts on listed migratory species? An assessment of the significance has been carried out in the BA, Section 6.1 and Appendix 3. The impact is considered to be minor and unlikely to significantly impact these species.	Minor
f) Any impact on a Commonwealth marine area?	Nil
g) Does the proposal involve a nuclear action (including uranium mining)?	Nil
h) Additionally, any impact (direct or indirect) on Commonwealth land?	Nil

Appendix 7

Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) Stage 1 assessment PACHCI Assessment letter



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